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Comprehensive Long-term Environmental Action Navy

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for

Mine Fill B (SWMU 13)

Volume I of II
Sections 1 through 6

Naval Surface Warfare Center
Crane
Crane, Indiana

Contract Task Order 0343

April 2007

NAVFAC Naval Facilities Engineering Command
Midwest
201 Decatur Avenue
Building 1A, Code EV
Great Lakes, Illinois 60088

TETRA TECH NUS, Inc.

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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT FOR MINE FILL B (SWMU 13)

NAVAL SURFACE WARFARE CENTER CRANE CRANE, INDIANA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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ACRONYMS

°F	degrees Fahrenheit
°C	degrees Celsius
2ADNT	2-amino-4,6-dinitrotoluene
4ADNT	4-amino-2,6-dinitrotoluene
ACH	Air changes per hour
AET	Apparent Effects Threshold
Ah	aryl hydrocarbon
ALM	Adult Lead Model
amsl	above mean sea level
APE	Ammunition Peculiar Equipment
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
AVS	acid volatile sulfide
AWQC	Ambient Water Quality Criteria
B&R Environmental	Brown and Root Environmental
BAF	Bioaccumulation Factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
btor	below top of riser
CAAA	Crane Army Ammunition Activity
CA EPA	California Environmental Protection Agency
CCME	Canadian Council of Ministers of the Environment
CDD	chlorinated dibenzo-p-dioxin
CDI	Chronic Daily Intake
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
Cm2	square centimeters
Cm/s	centimeters per second
CMS	Corrective Measures Study
COC	Chemicals of Concern
COPC	Chemicals of Potential Concern

CSFs	Cancer Slope Factors
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
CTO	Contract Task Order
DDT	dichlorodiphenyltrichloroethane
DI	deionized
DNB	dinitrobenzene
DO	dissolved oxygen
DPT	Direct push technology
EcoSSL	Ecological Soil Screening Level
EEQ	Ecological Effect Quotient
EMR	Environmental Monitoring Reports
EP	Extraction Procedure
EPC	Exposure Point Concentration
EPD	Environmental Protection Department
ERA	Ecological Risk Assessment
ER-L	Effects Range Low
ER-M	Effects Range Median
ESL	Ecological Screening Value
EU	Exposure Unit
FAQs	Frequently Asked Questions
FOL	Field Operations Leader
FSOP	Field Sampling Operations Plan
FTMR	Field Task Modification Report
gpm	gallons per minute
ha	hectares
HASP	Health and Safety Plan
HBX	high blast explosive
HEAST	Health Effects Assessment Summary Tables
Hg	mercury
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HQ	Hazard Quotient
HSA	Hollow Stem Auger
IA	Installation Assessment

IAC	Indiana Administrative Code
IAS	Initial Assessment Study
ICS	Initial Characterization Study
ID	Inside diameter
IDEM	Indiana Department of Environmental Management
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental lifetime cancer risk
IM	interim measure
IMR	interim measure report
IRIS	Integrated Risk Information System
K	hydraulic conductivity
kg	kilogram
kg/mg	kilogram per milligram
L/day	liters per day
L/hour	liters per hour
LEL	lower exposure limit
LOAEL	Lowest Observed Adverse Effects Level
LOEC	Lowest Observed Effects Concentration
MATC	Maximum Acceptable Toxicant Concentration
MCL	Maximum Contaminant Level
MCLC	Mine Clearing Line Charges
MDL	Method Detection Limt
MEQ	milliequivalent
MET	minimum effect threshold
MFA	Mine Fill A
MFB	Mine Fill B
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
mg/L	milligrams per liter
MK	Morrison Knudsen
mL	milliliter
MRL	minimum risk level
MS	matrix spike
MSCM	millisiemens per centimeter
MSD	matrix spike duplicate

MV	millivolts
NAD27	1927 North American Datum
NAVD88	1988 North American Vertical Datum
NAVFAC EFD SOUTH	Naval Facilities Engineering Field Division South
NCEA	National Center for Environmental Assessment
NECC	nutrient and energy cycling check value
NEESA	Naval Energy and Environmental Support Agency
ng/kg	nanogram per kilogram
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observable Adverse Effects Level
NOEC	No Observed Effects Concentration
NSWC	Naval Surface Warfare Center
NSWC	Naval Surface Warfare Center
NTU	nephelometric turbidity unit
NWSC	Naval Weapons Support Center
OD	outside diameter
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
ORD	Office of Research and Development
ORNL	Oak Ridge National Laboratory
ORP	oxidation-reduction potential
OSWER	Office of Solid Waste and Emergency Response
PAH	polynuclear aromatic hydrocarbon
PCA	tetrachloroethane
PCB	polychlorinated biphenyl
PEC	Probable Effects Concentration
PEL	probable effect level
PES	post excavation sample
PETN	pentaerythritoltetranitrate
PID	photoionization detector
Plz	Lower Pennsylvanian water-bearing zone
Pmz	Pennsylvanian middle water-bearing zone
PPA	permanent placement area
PPE	personal protective equipment
ppm	parts per million
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	Preliminary Remediation Goal

Psz	Shallow Pennsylvanian water-bearing zone
Puz	Upper Pennsylvanian water-bearing zone
PVC	polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration
RBSL	Risk-Based Screening Level
RBTL	Risk-Based Target Level
RCRA	Resource Conservation and Recovery Act
RDA	Recommended Daily Allowance
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RfD	Reference Dose
RFI	RCRA Facility Investigation
RISC	Risk Integrated System of Closure
RKI	Rockeye
RME	Reasonable Maximum Exposure
RPD	relative percent difference
RQD	Rock Quality Designation
SCS	Soil Conservation Service
SCV	secondary chronic value
SDWA	Safe Drinking Water Act
SEL	Severe Effects Level
SEM	simultaneously extracted metal
SERA	Screening Ecological Risk Assessment
SOP	standard operating procedure
SQAL	sediment quality advisory level
SQG	Soil Quality Guideline
SRA	screening risk assessment
SSLs	Soil Screening Level
S.U.	standard Units
SV	screening value
SVOCs	Semi Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TBC	To be considered
TCA	trichloroethane

TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethylene
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedures
TCMS	Turkey Creek mainstream
TEC	Threshold Effects Concentration
TEF	toxicity equivalency factor
TEL	Threshold Effects Level
TEQs	Toxic Equivalency Concentrations
TET	toxic effect threshold
TNB	trinitrobenzene
TNT	2,4,6-trinitrotoluene
TOC	Total organic carbon
TOM	Task Order Manager
TRV	Toxicity Reference Value
TRW	Technical Review Workgroup
TT	Tol Test
TtNUS	Tetra Tech NUS, Inc.
µm	micrometer
UCL	Upper 95 Percent Confidence Limit
µg/dL	microgram per deciliter
µg/kg	microgram per kilogram
µg/L	microgram per liter
µmo/g	micromoles per gram
USACE	United States Army Corp of Engineers
USCS	Unified Soil Classification System
U.S. EPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
UTL	upper tolerance limit
VDEQ	Virginia Department of Environmental Quality
VF	volatilization factor
VOC	volatile organic compound
VOCs	Volatile Organic Compounds
WES	Waterways Experiment Station
WQC	Water Quality Criteria
WQS	Water Quality Standards

EXECUTIVE SUMMARY

This report documents the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 13, Mine Fill B (MFB), located at the Naval Surface Warfare Center (NSWC), Crane, Indiana. Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy (Navy) Naval Facilities Engineering Field Division South (NAVFACEFD South) under Contract Task Order (CTO) 0343, Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888.

PURPOSE OF RFI REPORT

This report summarizes RFI fieldwork conducted from March 2003 through September 2006, describes the nature and extent of contamination, describes the baseline human health and ecological risk assessments, and provides recommendations for future action.

SWMU 13 DESCRIPTION

MFB, which is approximately 50 acres in size, is located in the central portion of NSWC Crane within the Boggs and Turkey Creek Drainage Basin, one of the five drainage basins that carry surface water off the installation and eventually drain into the East Fork of the White River and then to the Wabash River to the southwest.

MFB is divided into two halves each having similar operations. Operations at MFB began in December 1941 when NSWC Crane was commissioned. Production of explosive ordnance occurred at MFB from 1941 until 1973. MFB originally had the capability to handle only 2,4,6-trinitrotoluene (TNT). Later, MFB was modified to handle Torpex, Minol, HBX, and Amatol. During the Vietnam War, TNT, Composition B, H-6, Tritonal, and Minol were used in mine-filling operations at this site. Constituents of these explosives are hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), TNT, aluminum powder, ammonium nitrate, and wax. Fertilizers (ammonium nitrate) were also melted into bombs. Since 1973, the facilities at MFB have been used for renovation of ordnance and equipment.

Building 165 (B165) was used for renovation of mortars and bullets. The operations in B165 included rotary grit blasting, spray painting, propellant removal, and fuse and configuration changes. In 1998, Crane Army Ammunition Activity (CAAA) removed the two paint booths from B165. The B165 area is now used for extrusion of C-4 blocks for various military items. A new building was constructed next to B165, and an extruder was installed in this new building [Building 2172 (B2172)].

Renovation facilities in Building 169 (B169) include one paint booth where application of an enamel coating that contains 22 percent naphtha by weight and a bituminous solvent-type coating that contains 30 percent naphtha by weight occurred. Additionally, B169 was formerly used to load bullets with titanium tetrachloride and vanadium oxytrichloride or to dummy load bullets with sands and salts (Halliburton NUS, 1992).

Building 173 (B173), formerly used to degrease mines, is no longer used. Building 174 (B174) is currently used primarily for demilitarization jobs. B174 contained a vapor degreaser; however, this equipment was removed in 1993. A paint booth remains in the building, but it has not been used recently.

Building 3299 (B3299), a recently constructed building with a 6-inch curb and sealed floors, is utilized by the Navy Ordnance Department to test small water jet cutting systems.

Large quantities of TNT, Composition B, HBX-1, HBX-3, and H-6 were reportedly collected in the MFB sumps (Halliburton NUS, 1992). These sumps released explosives-contaminated water directly to surface drainage channels that flow into the Boggs Creek Watershed. Widespread soils explosives contamination was reported at MFB (Halliburton NUS, 1992).

Some residual PCB contamination remained near B166 and B171 where therminol boilers were operated (Halliburton NUS, 1992). It is believed that polychlorinated biphenyl (PCB) oils were heated in the therminol boilers and then transported to the melt building where the oil was used as a heat-transfer medium in the melting of explosive mixtures. In 1992, PCB contamination was detected near B166 and B171 (Halliburton NUS, 1992). Soils containing PCBs were removed during remediation of explosives-contaminated soil at MFB. Confirmation sampling indicated that the remaining soils contained PCBs in excess of 10 milligrams per kilogram. Some residual PCB contamination still remained near Buildings 166 and 171 as of 1992 (Halliburton NUS, 1992).

Various sampling activities took place in 1972, 1978, 1979, and 1985. Selected groundwater (from hand-dug wells), surface water, sediment, and soil samples were collected and indicated the presence of TNT, RDX, and cyclotetramethylenetetranitramine (HMX) (Halliburton NUS, 1992).

In 1999, 2000, and 2001, remediation activities took place at MFB as part of the bioremediation program that included sampling, excavation, on-site treatment through bioremediation (composting) of explosives-contaminated soil, and on-site backfilling of compost (TolTest, 2002).

FIELD AND ANALYTICAL PROGRAM FOR SWMU 13

The first round of SWMU 13 fieldwork was conducted from March through May 2003 (Round 1) in accordance with the procedures and methodologies described in the United States Environmental Protection Agency (U.S. EPA) approved Quality Assurance Project Plan (QAPP) (TtNUS, 2003a). The results of the Round 1 sampling indicated that further sampling would be required to delineate contamination; therefore, an addendum to the U.S. EPA approved QAPP (QAPP Addendum No. 1) was developed to conduct a second round of sampling at SWMU 13 (TtNUS, 2003b).

The second round of SWMU 13 RFI fieldwork was conducted from October 2003 through January 2004 (Round 2). The results of the Round 2 sampling indicated that still further sampling would be required to delineate contamination, a second addendum to the U.S. EPA-Approved QAPP (QAPP Addendum No. 2) was developed to conduct a third round of sampling (TtNUS, 2004). From July through November 2004, the third round of SWMU 13 RFI fieldwork was conducted (Round 3).

In May 2005, additional sediment samples were collected in response to U.S. EPA Region 5 comments on potential ecological risk at locations nearest to permanent aquatic habitat. In February 2006, an External Sump/Drainage Investigation was conducted in which additional samples were collected for overburden groundwater (temporary wells), surface water (sumps), sediment (sludge), and were analyzed only for explosives. In June and August/September 2006 timeframe, additional sediment and soil samples were collected in order to delineate PCB contamination at SMWU 13.

All work performed for Round 1 was conducted in accordance with the procedures and methodologies described in the U.S. EPA-approved QAPP [Tetra Tech NUS, Inc. (TtNUS), 2003a]. Work performed for Round 2 was done in accordance with the procedures and methodologies described in Addendum No. 1 to the approved QAPP (TtNUS, 2003b). Work performed for Round 3 was conducted in accordance with the procedures and methodologies described in Addendum No. 2 to the approved QAPP (TtNUS, 2004). Work performed for the external sump/drainage investigation was done in accordance with the QAPP Addendum No. 4 (TtNUS, 2006). Work performed for the PCB delineation investigations was done in accordance with correspondence sent to the U.S. EPA regarding additional sampling at SWMU 13 to adequately delineate PCB contamination for an accurate estimation of the quantity of soils for possible removal.

Soils

The Round 1 soils analytical program included dioxins, herbicides, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polynuclear-aromatic hydrocarbons (PAHs), and PCBs. Soils analyzed in Rounds 2 and 3 were limited to PCBs because few detections were observed for chemicals in other fractions. No soil samples were collected for explosives because the soils explosives content was well characterized by confirmation sampling during remedial activities. The subsequent rounds of soil sampling were designed to delineate the vertical and horizontal extent of PCB contamination and, in doing so, typically generated lower concentrations than the previously collected samples.

Surface Water/Seeps

Surface water samples collected in Rounds 1 and 2 and seep samples only collected in Round 2 were analyzed for explosives, mercury, total and dissolved metals, ammonia, and nitrite/nitrate. Round 3 surface water sampling was limited to explosives, mercury, metals, and nitrite/nitrate. Seep sampling was limited to a single round of sampling (e.g., Round 2). The natural drainage channel surface water and seep samples were analyzed for various combinations of energetic compounds, SVOCs, herbicides, total and dissolved metals, and water quality parameters (e.g., temperature and pH), and miscellaneous inorganic parameters.

Sediment

Sediment samples were collected from sumps during the ES/DI and from natural drainage channels during Rounds 1 through 3 and PCB Delineation. Similar to the surface water samples, sediment sample data for natural drainage channels were divided into two data sets: Gullies and mainstream. No sediment samples were collected at seep locations. Sediments collected for PCB Delineation are divided into surface sediments and subsurface sediments. Depending on the sampling round, sediment samples were analyzed for various combinations of acid volatile sulfide/simultaneously extracted metal (AVS/SEM), energetic compounds, herbicides, metals, miscellaneous inorganic parameters, PCBs, and SVOCs.

Groundwater

During RFI Rounds 1 through 3, samples were collected from various wells, primarily to determine the extent of explosives and metals contamination. Depending on the sampling round, groundwater samples were analyzed for various combinations of energetic compounds, total and dissolved metals, miscellaneous inorganic parameters, SVOCs, VOCs, and water quality parameters. The analyte list was shortened over time to reflect what was believed to be the true site-related contaminants.

Twenty-six new monitoring wells were installed and sampled as part of the Round 1 fieldwork. Results from Round 1 groundwater sampling indicated that additional monitoring wells were required to fully delineate groundwater contamination; therefore, Round 2 included the addition of 21 new monitoring wells. Upon completion of the Round 2 sampling, it was concluded that further delineation of groundwater contamination was required; therefore, four new monitoring wells were installed and sampled as part of the Round 3 fieldwork.

During the External Sump/Drainage Investigation, samples were collected from overburden temporary wells, designated at perched groundwater or overburden groundwater, and were analyzed only for explosives.

Vegetation

The vegetation analytical program was limited to explosives. Vegetation sampling was limited to a single round of sampling (i.e., Round 3).

CONCEPTUAL SITE MODEL

Past operations at SWMU 13 have resulted in the release of explosives residue (e.g., TNT, RDX, HMX, ammonium nitrate) to soils surrounding certain buildings (e.g., 166 and 177) located within the SWMU fenced area. PCB oil was heated in two therminol boilers located on the southeastern side of MFB and used as a heat transfer medium in the process of melting and loading of munitions. Oils reportedly leaked from the boilers and the conveyance system thereby contaminating soils with PCBs. Releases are no longer actively occurring at SWMU 13 because operations have changed and/or control measures have been instituted to eliminate releases.

Explosives, primarily RDX, and to lesser extent HMX, TNT degradation products, and ammonium nitrate were released to soils. Interim remedial actions have resulted in more than 99 percent of the soils meeting residential or industrial standards. Residual explosives in soils are continuing to degrade.

The upper zone of groundwater has been contaminated with explosives, primarily RDX, and to a lesser extent HMX, TNT degradation products, and ammonium nitrate. Nearly all of the groundwater in the uppermost bedrock is flowing laterally toward the upper slopes of the ridge. Some of this groundwater seeps into the gullies on the sides of the ridge, and some of the contaminated groundwater is taken up by trees and other vegetation and transpired. Thus, natural phytoremediation is playing a part in reducing

the rate of contaminants reaching the base of the ridge and entering the tributary stream. Explosives (RDX and TNT) in groundwater are degrading as evidenced by the presence of degradation products. Some of the explosives contaminants (mainly RDX and HMX) are reaching the unnamed intermittent stream on the northwestern side of the site, which is a tributary of Boggs Creek. Only a trace of contaminants (less than 0.5 µg/L of 2-nitrotoluene and 3-nitrotoluene) have reached the deeper groundwater monitoring wells (i.e., 60-100 feet below ground surface). The siltstone and shale layers between the upper and lower water-bearing zones are an effective aquitard, which prevents most of the shallow groundwater and contaminants from reaching the deeper portion of the ridge. Some groundwater in the valley deposits northeast of the ridge is contaminated with RDX and nitrate. This contamination is believed to be derived from contaminated surface water running down the gullies and infiltrating the valley bottom. Contaminated groundwater in the valley bottom is either flowing into the tributary streams or is flowing down the valley as groundwater underflow. No groundwater from SWMU 13 is flowing under the stream beneath the adjacent ridge.

Contaminants continue to leach from the surface and near-surface soils and migrate downhill in steep gullies on the northwestern and southeastern sides of the ridge. The largest concentrations of explosives were detected in the gullies leading down the northwestern side of the ridge. Concentrations of several metals (e.g., iron, manganese, cobalt, lead, and zinc), are elevated in the uppermost groundwater monitoring zone. The source(s) of metals in the shallow groundwater is unclear because the only metal directly attributable to site operations was aluminum. Metals maybe to be leaching, in large part, directly from the bedrock (i.e., a natural source).

PCBs released from the therminol boilers have contaminated surface and near subsurface soils. No subsurface soils below 6 feet deep have been contaminated. PCBs have not migrated into the surface drainages or the shallow groundwater. PAHs are present in site soils, gully sediments, and gully waters in low concentrations and are well bounded. It is believed that PAHs are not reaching nor will they reach the unnamed tributary stream or shallow groundwater.

HUMAN HEALTH RISK ASSESSMENT

The human receptors evaluated for SWMU 13 were the construction worker, maintenance worker, occupational worker, adolescent trespasser, adult recreational user, and future adult and child residents. Human exposure pathways evaluated for SWMU 13 were surface soil, subsurface soil, groundwater, surface water, and sediment.

ECOLOGICAL RISK

A SERA was conducted in accordance with the protocol discussed in the U.S. EPA approved QAPP (TtNUS, 2003a) with modifications made to reflect discussion with U.S. EPA (September 2004) regarding comments on other ecological risk assessment for NSWC Crane SWMUs. The ecological receptors evaluated in the screening assessment included:

- Those directly exposed to chemicals in the surface water, sediment, and surface soil (i.e., plants, invertebrates in soil and sediment, and aquatic organisms).

- Those indirectly exposed to chemicals via the food chain (i.e., through the ingestion of plants and invertebrates).

In summary, the list of chemicals initially selected as chemicals of potential concern (COPCs) was further evaluated in Step 3a, the first step of the baseline environmental risk assessment (BERA). Step 3a consists of refining the conservative exposure assumptions/concentrations when evaluating potential risks to ecological receptors (i.e., plants, invertebrates, and wildlife receptors) and re-evaluating the analytical data using benchmarks that may be more appropriate for the assessment endpoints.

CONCLUSIONS

The soils, groundwater, surface water, and sediment data collected during the RFI were adequate to support the development of baseline human health and ecological risk assessments for SWMU 13. Additional Mainstream sediment sampling was also conducted to determine the potential risk to aquatic organisms from downstream migration of arsenic, cadmium, chromium, iron, manganese, and zinc.

Upon evaluation of the data obtained during this investigation and the operational history of SWMU 13, baseline human health risk and ecological risk assessments were conducted. Results of these risk assessments are summarized below.

HUMAN HEALTH RISK ASSESSMENT

Surface Soil

Near Building 166

- For future on-site residents (child, adult, and lifelong), the ILCRs were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA from incidental ingestion and dermal contact of surface soil with Aroclor-1248.

Near Building 171

- For current/future occupational workers, the ILCRs were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA from incidental ingestion and dermal contact of surface soil with Aroclor-1248.

Surface/Subsurface Soil

Near Building 166

- For future on-site residents (child, adult, and lifelong), the ILCRs were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA from incidental ingestion and dermal contact of surface/subsurface soil with Aroclor-1248.

Near Building 171

- For the future on-site residents (child, adult, and lifelong), the ILCRs were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA from incidental ingestion and dermal contact of surface/subsurface soil with Aroclor-1248.

Groundwater

- For the current/future occupational worker and the future recreational user (child, adult, and lifelong), the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA for ingestion of RDX

- For the future on-site resident (child and lifelong), the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA for ingestion of RDX, 2,4,6-trinitrotoluene (TNT), 4-amino-2,6-dinitrotoluene, iron, lithium, manganese, and nitrate/nitrite.

- For the future on-site adult residents, the ILCRs from ingestion of groundwater were estimated to exceed the range of 10^{-6} to 10^{-4} established by U.S. EPA for ingestion of RDX, iron, lithium, manganese, and nitrate/nitrite.

Mainstream Surface Water

- The SWMU 13 ILCRs for all human receptor exposure pathways were estimated to be within or less than the range of 10^{-6} to 10^{-4} established by U.S. EPA as acceptable; therefore, the human health risk for the mainstream surface water is acceptable for all human receptor exposure pathways.

Gully Surface Water

- For the future child recreational user and the future on-site lifelong resident, the overall Hazard Index exceeded 1.0 from the ingestion of surface water.

Sediment

- For the mainstream and gully sediment at SWMU 13, the ILCRs for all human receptor exposure pathways were estimated to be within, or less than, the range of 10^{-6} to 10^{-4} established by U.S. EPA as acceptable; therefore, the human health risk for sediment is acceptable for all human receptor exposure pathways.

Based on these conclusions, the following will be retained for further evaluation during a Corrective Measures Study (CMS):

- Aroclor-1248 in surface and subsurface soil.
- 4-amino-2,6-dinitrotoluene, iron, lithium, manganese, nitrate/nitrite, RDX, and TNT in groundwater and RDX in the gully surface water.

ECOLOGICAL RISK

Surface Soil

Near Building 166

- For insectivorous birds, ecological risk was determined to be unacceptable for incidental soil ingestion and ingestion of food from exposure to Aroclor-1248.

Near Building 171

- For insectivorous birds and small mammals, ecological risk was determined to be unacceptable for incidental soil ingestion and ingestion of food from exposure to Aroclor-1248.

- For herbivorous and insectivorous small mammals, ecological risk was determined to be unacceptable for incidental soil ingestion and ingestion of food from exposure to HMX.

Mainstream Sediment

For aquatic organisms, ecological risk are unacceptable because concentrations of arsenic, cadmium, chromium, iron, manganese, and zinc exceed upper effects levels in downstream samples.

Therefore, Aroclor-1248 and HMX in surface soil are retained for further evaluation during a CMS. Based on the results of the additional sediment sampling, metals may also be included in the CMS.

Table ES-1 contains a summary of receptor-specific human risks and hazards, ecological risks, critical pathways and chemicals of concern (COCs) for SWMU 13 and, where necessary, recommendations for further actions.

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 166 - SURFACE SOIL						
Current/Future Maintenance Worker (Adult)	6E-06	N/A	N/A	N/A	N/A	NFA
Current/Future Occupational Worker (Adult)	6E-05	N/A	N/A	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	5E-06	N/A	N/A	N/A	N/A	NFA
Future Construction Worker (Adult)	N/A	N/A	N/A	N/A	N/A	NFA
Future Recreational User (Child)	1E-05	N/A	N/A	N/A	N/A	NFA
Future Recreational User (Adult)	9E-06	N/A	N/A	N/A	N/A	NFA
Future Recreational User (Lifelong)	2E-05	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	1E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Adult)	7E-05	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 166 - SURFACE SOIL (continued)						
Future On-Site Resident (Lifelong)	2E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Terrestrial Plants and Invertebrates[(1)]	N/A	N/A	N/A	Acceptable	N/A	NFA
Mammals and Birds[(1)]	N/A	N/A	N/A	Unacceptable	Incidental soil ingestion and ingestion of food by insectivorous birds from exposure to Aroclor-1248	Proceed to CMS
AREA NEAR BUILDING 166 - SURFACE/SUBSURFACE SOIL						
Current/Future Maintenance Worker (Adult)	4E-06	0.006	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Occupational Worker (Adult)	4E-05	0.06	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	3E-06	0.01	No unacceptable exposure to lead	N/A	N/A	NFA
Future Construction Worker (Adult)	2E-06	0.1	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Child)	9E-06	0.06	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Adult)	5E-06	0.007	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	1E-05	N/A	N/A	N/A	N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 166 - SURFACE/SUBSURFACE SOIL (continued)						
Future On-Site Resident (Child)	9.E-05	0.7	No unacceptable exposure to lead	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Adult)	4.E-05	0.08	No unacceptable exposure to lead	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Lifelong)	1.E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
AREA NEAR BUILDING 171 - SURFACE SOIL						
Current/Future Maintenance Worker (Adult)	2E-05	N/A	N/A	N/A	N/A	NFA
Current/Future Occupational Worker (Adult)	2E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Current/Future Trespasser (Adolescent)	2E-05	N/A	N/A	N/A	N/A	NFA
Future Construction Worker (Adult)	N/A	N/A	N/A	N/A	N/A	NFA
Future Recreational User (Child)	5E-05	N/A	N/A	N/A	N/A	NFA
Future Recreational User (Adult)	3E-05	N/A	N/A	N/A	N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 171 - SURFACE SOIL (continued)						
Future Recreational User (Lifelong)	8E-05	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	5.E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Adult)	2.E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Lifelong)	8.E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Terrestrial Plants and Invertebrates(1)	N/A	N/A	N/A	Acceptable	N/A	NFA
Mammals and Birds(1)	N/A	N/A	N/A	Unacceptable	Incidental soil ingestion and ingestion of food by insectivorous birds and small mammals from exposure to Aroclor-1248 and incidental soil ingestion and ingestion of food by herbivorous and insectivorous small mammals from exposure to HMX	Proceed to CMS

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 171 - SURFACE/SUBSURFACE SOIL						
Current/Future Maintenance Worker (Adult)	1E-05	0.01	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Occupational Worker (Adult)	1E-04	0.1	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	9E-06	0.02	No unacceptable exposure to lead	N/A	N/A	NFA
Future Construction Worker (Adult)	7.E-06	0.2	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Child)	3E-05	0.1	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Adult)	2E-05	0.01	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	4E-05	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	3.E-04	1	No unacceptable exposure to lead	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
Future On-Site Resident (Adult)	1.E-04	0.1	No unacceptable exposure to lead	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
AREA NEAR BUILDING 171 - SURFACE/SUBSURFACE SOIL (continued)						
Future On-Site Resident (Lifelong)	4.E-04	N/A	N/A	N/A	Incidental ingestion and dermal contact with Aroclor-1248	Proceed to CMS
GROUNDWATER						
Future Construction Worker (Adult)	4E-08	0.1	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Occupational Worker (Adult)	3.E-04	5	No unacceptable exposure to lead	N/A	Ingestion of groundwater (RDX)	Proceed to CMS
Future Recreational User (Child)	6E-05	5	No unacceptable exposure to lead	N/A	Ingestion of groundwater (RDX)	Proceed to CMS
Future Recreational User (Adult)	5E-05	1	No unacceptable exposure to lead	N/A	Ingestion of groundwater (RDX)	Proceed to CMS
Future Recreational User (Lifelong)	1.E-04	N/A	N/A	N/A	Ingestion of groundwater (RDX)	Proceed to CMS
Future On-Site Resident (Child)	6.E-04	53	No unacceptable exposure to lead	N/A	Ingestion of groundwater (RDX, TNT, 4-amino-2,6-dinitrotoluene, Iron, Lithium, Manganese, Nitrate/Nitrite-N)	Proceed to CMS
Future On-Site Resident (Adult)	7.E-04	15	No unacceptable exposure to lead	N/A	Ingestion of groundwater (RDX, Iron, Lithium, Manganese, Nitrate/Nitrite-N)	Proceed to CMS
Future On-Site Resident (Lifelong)	1.E-03	N/A	N/A	N/A	Ingestion of groundwater (RDX, TNT)	Proceed to CMS

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
MAINSTREAM SURFACE WATER						
Current/Future Maintenance Worker (Adult)	2E-09	0.0004	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	6E-08	0.004	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Child)	2E-07	0.02	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Adult)	5E-08	0.005	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	2E-07	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	2.E-07	0.02	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Adult)	5.E-08	0.005	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Lifelong)	2E-07	N/A	N/A	N/A	N/A	NFA
Aquatic Organisms	N/A	N/A	N/A	Acceptable	N/A	NFA
MAINSTREAM SEDIMENT						
Current/Future Maintenance Worker (Adult)	3E-06	0.1	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	3E-06	0.2	No unacceptable exposure to lead	N/A	N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
MAINSTREAM SEDIMENT (continued)						
Future Recreational User (Child)	8E-06	1	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Adult)	4E-06	0.15	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	1E-05	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	8.E-06	1	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Adult)	4.E-06	0.15	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Lifelong)	1E-05	N/A	N/A	N/A	N/A	NFA
Aquatic Organisms	N/A	N/A	N/A	Unacceptable	Direct Contact, Ingestion of Sediment and Food, and Potential Downstream Migration (metals)	Proceed to CMS
GULLY SURFACE WATER						
Current/Future Maintenance Worker (Adult)	1E-05	0.01	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	3E-05	0.3	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Child)	8E-05	2	No unacceptable exposure to lead	N/A	Ingestion of surface water (RDX)	Proceed to CMS

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
GULLY SURFACE WATER (continued)						
Future Recreational User (Adult)	1E-04	0.2	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	2E-04	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	8.E-05	2	No unacceptable exposure to lead	N/A	Ingestion of surface water (RDX)	Proceed to CMS
Future On-Site Resident (Adult)	1.E-04	0.2	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Lifelong)	2E-04	N/A	N/A	N/A	N/A	NFA
Aquatic Organisms	N/A	N/A	N/A	Acceptable	N/A	NFA
GULLY SEDIMENT						
Current/Future Maintenance Worker (Adult)	2E-06	0.05	No unacceptable exposure to lead	N/A	N/A	NFA
Current/Future Trespasser (Adolescent)	1E-06	0.08	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Child)	4E-06	0.5	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Adult)	2E-06	0.05	No unacceptable exposure to lead	N/A	N/A	NFA
Future Recreational User (Lifelong)	6E-06	N/A	N/A	N/A	N/A	NFA
Future On-Site Resident (Child)	4.E-06	0.5	No unacceptable exposure to lead	N/A	N/A	NFA

TABLE ES-1

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS, ECOLOGICAL RISKS, AND RECOMMENDATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptor Population	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Lead Exposure	Overall Risk (Ecological)	Critical Pathways and Chemicals of Concern	Recommendations
GULLY SEDIMENT (continued)						
Future On-Site Resident (Adult)	2.E-06	0.05	No unacceptable exposure to lead	N/A	N/A	NFA
Future On-Site Resident (Lifelong)	6E-06	N/A	N/A	N/A	N/A	NFA
Aquatic Organisms	N/A	N/A	N/A	Acceptable	N/A	NFA

1 Risks to terrestrial plants/invertebrates and mammals/birds were evaluated at all buildings at SWMU 13. Risks to these receptors were acceptable at all those listed here.

N/A - Not Applicable. Risk were not calculated for the specified receptor/exposure pathway or the calculated risks were acceptable.

NFA - No Further Action.

No noncarcinogenic Hazard Indices were calculated for surface soils near Buildings 166 and 171 because no noncarcinogens were identified as COPCs for surface soil.

Hazard Indices (i.e., child + adult) are not summed for 'Lifelong' receptors because according to U.S. EPA risk assessment guidance, it is not correct to sum noncancer risks for child and adult receptors.

1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Field Report for Mine Fill B (MFB) was prepared for the Naval Surface Warfare Center (NSWC) Crane facility, located in Crane, Indiana, through the Naval Facilities Engineering Field Division South (NAVFAC EFD SOUTH) under Contract Task Order (CTO) 0343 for the Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888. MFB is also known as Solid Waste Management Unit (SWMU) 13.

MFB was used for the preparation of nitrate and the production of large mines, depth charges, rocket heads, aerial bombs, and projectiles. In the past, explosives powders discharged from roof vents which accumulated on the roofs were washed down to the ground, resulting in the contamination of soils. Wastewaters containing explosives were previously discharged into ditches. In addition, an interim removal action was conducted in which the therminol boilers were removed and disposed offsite. The surrounding explosive contaminated soil was removed and treated at the NSWC Crane Biofacility by composting to degrade the explosive compounds in the soil. Organic amendments (chicken manure and straw) were mixed with the contaminated soil to form compost windrows. The amendments in the compost matrix served as a carbon source for the microorganism in the material that was capable of degrading the explosives. Treated soils were then placed into the areas from which contaminated soils had been removed. MFB is currently used for the renovation of ordnance and equipment.

1.1 PURPOSE

The purpose of this RFI Report is to describe the site investigation activities conducted at SWMU 13 and to present the results and interpretation thereof for MFB. This report provides information regarding concentrations of organic and inorganic chemicals measured in surface soils, subsurface soils, sediment, surface water, and groundwater at MFB. In addition, human health and ecological risks associated with MFB were evaluated by way of a baseline human health risk assessment (HHRA) and a screening-level ecological risk assessment (SERA). The risk assessments were performed using the data collected during investigations conducted in 2003, 2004, 2005, and 2006. Field samples collected in 2004 and 2005 were from the operational areas within SWMU 13.

In May 2005, additional sediment samples were collected and analyzed for metals on the basis of potential ecological risk from metals and U.S. EPA comments suggesting sediment samples should be collected at the location of the nearest permanent aquatic habitat. In 2006, it was determined that a

concrete drainage system conveyed explosive-contaminated waters to exterior sumps. No information was available regarding the integrity of the drainage system or the sumps. If the drainage system or sumps have leaked explosive-contaminated waters, the surrounding soils may also be contaminated with explosives. As a result, the additional soil sampling was conducted to determine whether soils at SWMU 13 have been contaminated as the result of releases of explosive-contaminated waste waters from the drainage system and sumps. Information regarding previous investigation results are presented, as appropriate, to provide perspective on current data.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

NSWC Crane is located in a rural, sparsely populated region of south-central Indiana, approximately 75 miles southwest of Indianapolis, 60 miles northwest of Louisville, Kentucky, and immediately east of Burns City and Crane Village, Indiana. A location map of the NSWC Crane facility is provided as Figure 1-1. NSWC Crane encompasses approximately 62,463 acres or approximately 98 square miles of the northern portion of Martin County and smaller portions of Greene, Daviess, and Lawrence Counties.

MFB, approximately 50 acres in size, is located in the central portion of NSWC Crane within the Boggs and Turkey Creek Drainage Basin, which is one of the five drainage basins that carry surface water off the installation and eventually drain into the East Fork of the White River and then to the Wabash River to the southwest. The location of SWMU 13 within NSWC Crane is shown in Figures 1-1 and 1-2.

1.2.2 Site History

Site features and structures at MFB are shown in Figure 1-3. MFB is divided into two halves by a northwest to southeast trending line. Identical activities took place in each half. Operations at MFB began when NSWC Crane was commissioned in December 1941. Production of explosive ordnance occurred at MFB from 1941 until 1973. MFB originally had the capability to handle only 2,4,6-trinitrotoluene (TNT). Later, MFB was modified to handle Torpex, Minol, HBX, and Amatol. During the Vietnam War, TNT, Composition B, H-6, Tritonal, and Minol were used in ordnance-filling operations at this site. Constituents of these explosives are Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), TNT, aluminum powder, ammonium nitrate, and wax. Fertilizers (ammonium nitrate) were also melted into bombs. Since 1973, the facilities at MFB have been used for renovation of ordnance and equipment.

Renovation facilities in Building 169 include one paint booth. The 1983 Operation Permit application contained information on these activities. The paint booth applies an enamel coating that contains

22 percent naphtha by weight and also applies a bituminous solvent-type coating that contains 30 percent naphtha by weight.

Loading of bullets also took place in Building 169 (Halliburton NUS, 1992). Bullets were loaded with titanium tetrachloride and vanadium oxytrichloride or dummy loaded with sands and salts. As many as 15 gallons of titanium tetrachloride are reported to have been spilled at Building 169 and neutralized, and the residue was reportedly disposed in a sanitary landfill. These rounds are no longer loaded at Building 169. Most of the vanadium oxytrichloride and titanium dioxide puff round loading equipment has been removed from this facility. Building 169 is currently used primarily for inert loading and painting of projectiles.

Renovation of mortars and bullets reportedly takes place in Building 165 (B165). Renovation activities include rotary grit blasting, spray painting, propellant removal, and fuse and configuration changes. In 1998, Crane Army Ammunition Activity (CAAA) removed the two paint booths from B165. A new building was constructed next to B165, and an extruder was installed in this new building (Building 2172). The B165 area is now used for extrusion of C-4 blocks for various military items. This process is permitted under the Crane Title V operating permit, although there are relatively little air emissions. Building 173, formerly used to degrease mines, is no longer used. There are no records of historical spills in this area. Building 174 (B174) is currently used primarily for demilitarization jobs. The most recent job involved the repackaging of Mine Clearing Line Charges (MCLC). B174 contained a vapor degreaser, but this equipment was removed in 1993. A paint booth remains in the building, but it has not been used recently.

Building 3299, which was recently constructed, is utilized by the Navy Ordnance Department to test small water jet cutting systems. The building has a 6-inch curb and sealed floors, so no wastewater can exit the building.

Large quantities of TNT, Composition B, HBX-1, HBX-3, and H6 were reportedly collected in the sumps of MFB (Halliburton NUS, 1992). These sumps released explosives-contaminated water directly to surface drainage channels that flow into the Boggs Creek Watershed. Widespread soils explosives contamination was reported at MFB (Halliburton NUS, 1992).

It is assumed that polychlorinated biphenyl (PCB) oils were heated in the therminol boilers and then transported to the melt building (Building 2500) where the oil was used as a heat-transfer medium in the melting of explosive mixtures. PCB oils are reported to have leaked or spilled from the boilers and conveyance system, thus contaminating soil (Halliburton NUS, 1992). During the remediation of explosives-contaminated soil at the MFB, soil containing PCBs was removed. No specific remediation

goal for PCBs was established. Confirmation sampling indicated that the remaining soils contained PCBs in excess of 10 milligrams per kilogram (mg/kg). Some residual PCB contamination still remained near Buildings 166 and 171 as of 1992 (Halliburton NUS, 1992).

Contaminants likely to be present at this SWMU include explosives, semivolatile organic compounds (SVOCs), dioxins, PCBs, and metals.

1.3 PREVIOUS INVESTIGATIONS

The major sources of contamination at MFB were washdown of explosive formulations from building roofs onto the ground and exhausts vented from ventilation systems. Also, therminol boilers located near Buildings 166 and 171 leaked PCB oils. The boilers and surrounding soil were removed in 1989, but subsequent soil samples collected near the former locations of the boilers indicated that PCB concentrations were greater than 10 mg/kg.

Selected surface water samples were collected in drains and ditches in 1972, 1978, and 1979 by the Department of the Army (Halliburton NUS, 1992). Samples were collected adjacent to and at greater distances from the buildings. TNT, RDX, and cyclotetramethylenetetranitramine (HMX) were detected in most samples, and concentrations in the samples collected nearer the buildings were greater than the concentrations in the more distant samples.

In 1972, surface water samples collected in drains near Buildings 166, 167, 168, 171, 174, 2501, 2502, and 2503 were found to contain TNT (10.1 to 15.4 [milligrams per liter] mg/L), RDX (0.4 to 20.4 mg/L), and HMX (0.26 to 2.4 mg/L). The greatest concentrations were detected in the southern drain near Buildings 171, 174, 2501, and 2503.

In 1972, samples were collected from three hand-dug wells located in the vicinity of MFB (Kent et al., 1972). Water samples were collected from these wells and only one well (W036) contained detectable levels of explosives (at concentrations exceeding risk-based Drinking Water Health Advisories). Concentrations of TNT ranged from 0.1 to 5.8 mg/L, and concentrations of RDX ranged from 0.1 to 10 mg/L. Kent et al. (1973) also reported soil sample concentrations of TNT and RDX in ditches near Buildings 172 and 2501 at percent levels (concentrations of TNT ranged from 0.12 percent to 25 percent and RDX ranged from 0.05 percent to 58 percent). The greatest concentrations were found in soil collected from the ditch northeast of Building 2501.

In 1978, drainage and runoff samples from the northern and southern locations contained TNT (0.24 to 7.7 mg/L), RDX (0.865 to 16 mg/L), and HMX (0.46 mg/L); the greatest concentrations were in the southern runoff locations.

Surface water samples were collected in ditches farther from the facilities in 1979. TNT was detected in one sample at a concentration of 0.253 mg/L (central ditch). RDX was detected in the south-central and central ditches at concentrations of 0.6 and 2.7 mg/L, respectively. HMX was detected in the south-central and central ditches at concentrations of 0.3 and 0.3 mg/L, respectively. Also in 1979, sediment samples were collected from ditches located farther from the buildings. TNT (0.1 to 2.0 mg/kg), RDX (20 to 28 mg/kg), and HMX (3.4 to 36 mg/kg) were detected in the sediment samples. Data from these sampling events exhibited the same pattern. Samples from the northern ditch had no detectable explosives; samples from the central and south-central ditches had measurable concentrations of TNT, RDX, and HMX in both the aqueous and sediment fractions; and samples from the southern ditch had no detectable explosives in water but contained high levels of RDX and HMX in sediment. The quality of the surface water and sediment data is not known, and the data do not appear to have been validated.

As part of the Initial Assessment Survey (IAS) for MFB, eight soil samples were collected around Buildings 167 and 172 at a depth of 20-inches in 1985 and analyzed for explosives (Halliburton NUS, 1992). Concentrations of TNT ranged from 4.8 to 2,410 mg/kg, concentrations of HMX ranged from 10.8 to 2,020 mg/kg, and concentrations of RDX ranged from 20.6 to 24,100 mg/kg. The data indicated that the area around Building 172 was much more contaminated than the area around Building 167.

In 1985, a soil sample was collected from the area around Building 169. The sample was tested by the Extraction Procedure (EP) Toxicity Test for susceptibility of contaminants to leach. Concentrations of metals, methylene chloride, and PCBs were less than 1990 Toxicity Characteristic Leaching Procedures (TCLP) action levels.

MFB was remediated in 1999, 2000, and 2001 as part of the bioremediation program that included sampling, excavation, on-site treatment through bioremediation (composting) of explosives-contaminated soil, and on-site backfilling of compost at MFB. The types of analytes measured before and after the remediation included volatile organic compounds (VOCs), explosives, and metals, with the addition of PCBs (Aroclor 1242, 1254, and 1260). Details of the remediation program are discussed in Section 1.3.1

1.3.1 Remediation Program

This section describes remedial activities that have occurred at MFB and provides a summary of post-remediation conditions at the site. The information provided below was adapted from the Interim Measures Report (IMR) [TolTest (TT), 2002]. The IMR details the identification, removal, and treatment through bioremediation of explosives-contaminated soil from MFB and the subsequent on-site backfill of the treated material. The work described in the IMR was performed by TT from June 1999 to January 2002.

The work performed by TT included the following:

- Collection and analysis of Initial Characterization Samples (ICS) of potentially impacted soil from 256 grids.

- Excavation and screening of explosives-contaminated soil and rocks.

- Collection and analysis of post-excavation confirmation samples (PES) that included sampling of excavations to verify that all soil exceeding the cleanup goals was removed (to the extent possible).

- Treatment of contaminated soil at the Bioremediation Facility (Biofacility) through composting to reduce the levels of the contaminants of concern to less than the target cleanup goals.

- Transportation of treated soil compost back to MFB for use as backfill. All treated material met industrial or residential cleanup levels for the constituents of concern.

The IMR indicated that contamination greater than cleanup goals remains at 10 grids at MFB, due primarily to the presence of utilities. The IMR recommended no further interim action for MFB outside of these contaminated grids.

During the IMR, 31 SWMUs at NSWC Crane were evaluated to reduce or eliminate the potential for contaminant migration and to determine which ones would be amenable to accelerated cleanup actions, otherwise known as Interim Measures (IM). Of the 31 SWMUs evaluated, MFB and three other SWMUs were identified for IM cleanup due to explosive contaminants in soil. Based on past success at other Department of Defense facilities, as well as other factors (e.g., cost), excavation and on-site, ex-situ bioremediation of contaminated soils was selected as the preferred treatment alternative for the IM at

MFB and the other SWMUs. The bioremediation process selected was known to be successful at other sites having explosive-contaminated materials.

SWMU 33/00, known as the Biofacility, was the treatment location for the effected soil. The Biofacility was constructed by Morrison Knudsen (MK - now Washington Group, Inc.) from March 1996 to June 1997. The Biofacility area is a 5½-acre complex located in the southwestern quadrant of NSWC Crane near the Crane Landfill. It is comprised of three compost buildings each measuring 300 feet long by 70 feet wide by 18 feet tall, a vehicle decontamination facility, two lined storm water collection ponds, a diesel storage tank, amendment storage area, and a field laboratory and administration facility. A description of the facility is provided in the Full-Scale Operational Plan for Soils Bioremediation Facility (MK, 1998).

1.3.1.1 Constituents of Concern – MFB Historical Soil Samples

Production at MFB was similar to Mine Fill A (MFA) and included the cast loading of depth charge bombs and numerous other items including rocket heads, depth charges, projector charges and ammunition. The areas where soil was suspected to be impacted were around the bulk loading buildings (172, 173, 2501 and 167, 168, 2500) and the production buildings (165, 166, and 171), as shown on Figure 1-4.

The constituents of concern for MFB included compounds identified in the RFI Phase I Environmental Monitoring Report for Mine Fill B (Halliburton, 1992) and are included in Table 1-1 (Table 1-1 of the IMR).

1.3.1.2 Initial Characterization Soil Sampling

TT and MK obtained ICS for the purpose of delineating the extent of contaminated soil requiring excavation. The locations of potentially contaminated areas were based on visual observations and direction provided by personnel from the NSWC Crane Environmental Protection Department (EPD). Grid sampling was performed around or near Buildings 165 to 168, 171 to 174, 2500, and 2501. The grid layout and boundaries were effected by the presence of buildings, railways, roadways, utilities, etc. A total of 281 grids were marked as shown on Figures C-1 through C-6 of the IMR. Samples were also obtained on blast-wall berms, flat areas accepting runoff from the berms, under vents, and in drainage ditches.

Of the initial 281 grids laid out, only 256 grids were actually sampled. The grids not sampled were on blast-wall berms covered by a thick layer of gravel. Because of the difficult nature of sampling through

this gravel, several grids were consolidated into larger grids for the purpose of obtaining ICS, as identified in Table 1-2 (Table 3-1 of the IMR).

Initial sampling at each grid consisted of two composite samples and one grab sample, as described in the Quality Assurance Project Plan (QAPP) for Full-Scale Operations, Soils Bioremediation Facility (MK, 1998). The composite samples were analyzed for explosives and metals, and the grab samples were analyzed for VOCs. The composite samples were collected at depths of 0 to 12 inches and 24 to 36 inches, and the grab samples were collected from a depth of 12 inches. The samples were analyzed by United States Environmental Protection Agency (U.S. EPA) SW-846 Methods 8330 (explosives), 8260 (VOCs), and 6010/7470 (metals) for the identified constituents of concern. The analyses were performed to ensure that solvent-contaminated soil or other RCRA characteristic wastes were not transported to the Biofacility for composting.

Grids 137 and 258 to 261 at B-171 were also analyzed for PCBs because this was an area of known PCB contamination. PCBs were detected in grid 137 at 13 ppm, but were non-detect in grids 258 to 261. Since the level in grid 137 was less than 50 ppm, the soil was excavated, screened, and transported to the Biofacility for composting.

Of the 256 grids sampled in the initial characterization, analysis revealed 110 grids exceeded industrial cleanup objectives and required excavation. Table D in Appendix D of the IMR summarizes the results of explosives analysis on samples collected from each grid and identifies which grids exceeded the cleanup goals for explosives and required excavation. Analytical results for the ICSs are summarized in Appendix E of the IMR. No metals or VOCs were detected at concentrations greater than cleanup action levels for the contaminants of concern at MFB in any grid that required excavation. Arsenic was present in samples at various levels that exceeded industrial cleanup goals. However, no action was taken because none of the total arsenic results, when divided by an estimation factor of 20, did not exceed the TCLP regulatory limit (i.e., the material did not possess the hazardous waste characteristic of toxicity). The IMR indicated that arsenic concentrations were within background levels for the Crane area.

1.3.1.3 Soil Excavation, Screening, and Transportation

Soil excavation was performed around or near buildings 165, 166, 167, 168, 171, 173, 174, and 2501 (no contamination was detected around B-2500). Soil excavation and screening began in August 1999 and continued through September 2001. Contaminated soil was initially excavated to a depth of 3 feet using a tracked excavator. In-process field screening was then performed to determine if additional soil excavation was necessary. All excavated soil was transported to the screener site at MFB and screened

to remove oversized material (1½ inch or larger) prior to transport to the Biofacility. This was to ensure homogeneity of the soil to be treated so that the composting operation would be effective. Oversized material was separated into soil clods mixed with gravel and large rocks. The reject soil mixed with gravel was re-screened several times to remove as much soil as possible. The rocks were transported to the Biofacility to be washed and placed back into the open excavation at a later date.

1.3.1.4 In-Process Excavation Soil Sampling

Soil samples were collected during excavation activities to assist in determining the extent of excavation required at each grid. Field screening test kits were used to test RDX levels in the in-process soil samples to provide quick screening results. One composite sample was collected from the base of the excavation and one from each side wall (if a side wall was present). If the field screening indicated that concentrations of RDX were greater than industrial cleanup levels, subsequent layers of contaminated soil were removed until field screening indicated acceptable concentrations of explosives (less than industrial cleanup objectives) or until physical impediments (buildings, railways, roadways, utilities, etc.) were encountered. Table 1-3 (Table 3-3 of the IMR) identifies those grids that were not excavated to cleanup goals and why there was no additional excavation in these grids.

1.3.1.5 Post-Excavation Confirmation Soil Sampling

PES were collected following excavation and field screening, to determine the levels of SWMU-specific contaminants remaining in the soil. PESs included one composite and one grab sample from the base of each grid and one grab sample for each 20 feet of side wall. Samples were analyzed for all contaminants of concern.

Figures 1-5 through 1-8 of this report illustrate conditions at B-166, B-171, B-167/168/2500, and B-172/173/2501 after excavation and before backfilling with bioremediated soil. The figures depict levels of RDX in grids that were excavated because concentrations exceeded the industrial cleanup goal (17 mg/kg) and in grids that were not excavated because concentrations of RDX were less than the industrial cleanup goal. The figures also indicate which grids met the residential cleanup goal (4 mg/kg) prior to backfilling.

Table D in Appendix D of the IMR provides a summary of the ICSs and PESs collected from each grid. Post-excavation sampling grid location maps and analytical results are provided in Appendix G and Appendix H, respectively, of the IMR.

Although contaminated soil was excavated by MK at grids 1 and 22 at B-165, there is no record that PESs were obtained from these grids, nor were the excavation areas surveyed. The IMR indicates that equipment and structures were installed in B-165 after the initial characterization, including a partially buried tunnel leading into the building. The tunnel covers grids 1 and 22 (in which concentrations of RDX exceeded industrial cleanup goals). It is thought that in the haste to complete the tunnel system, PESs were not obtained from these grids.

1.3.1.6 Rock Washing

Oversized material (rocks) rejected from the soil screening process was washed and rinsed as described in Section 3.6 of the IMR. The rocks were then returned to the bottom of an open excavation within the same SWMU and covered with no less than 2 feet of finished compost.

1.3.1.7 Biofacility Composting Operations

Explosives-contaminated soil excavated from MFB was treated in the Biofacility by composting to degrade the explosive compounds in the soil. Organic amendments (chicken manure and straw) were mixed with the contaminated soil to form the compost windrows. The amendments in the compost served as a carbon source for the microorganisms present that were capable of degrading the explosives. The availability of organic material and inorganic nutrients (such as nitrogen and phosphorus), temperature, moisture content, pH, and oxygen availability in the compost were optimized to enhance the process. Microbial activity in the soil was stimulated by heat that was generated and contained in the compost matrix. A full description of the composting operation process is provided in Section 5.0 of the approved Field Sampling Operations Plan (FSOP).

A total of 104 windrows were formed to treat the contaminated soil excavated from MFB. Explosives were the only contaminants that exceeded industrial cleanup goals in ICSs. Therefore, explosive compounds were the only parameters that required laboratory analysis during windrow treatment. Day Last samples were collected to confirm that the cleanup goals had been achieved. Analytical results of all explosives analyzed on Day Zero and Day Last are included, by windrow, in Appendix I of the IMR. Average results for HMX, RDX and TNT are summarized in Table 1-4 (Table 4-2 of the IMR) by windrow. Some windrows that initially met industrial cleanup goals were hauled to the staging area at MFB and resampled at a later date to determine if the explosive compounds had been degraded to residential goals. The results of these windrows are listed in Table 1-5 (Table 4-4 of the IMR).

Table 1-6 presents a summary of environmental investigations and IM action that have been conducted at SWMU 13 buildings, including historical investigations and investigations directly related to this RFI document. As indicated in Table 1-6, investigations (historical or RFI related) have not been conducted at several SWMU 13 buildings. In each of these cases, an attempt was made to located additional information regarding operations and materials handled at these buildings, where available, to help identify areas of potential contamination and facilitate the preparation of this RFI report.

1.3.1.8 Disposition of Bioremediated Soil

After laboratory analytical data verified that treatment goals were met for a windrow, the compost was loaded into semi-tractor, live-bottom trailers or dump trucks, covered with a tarp, and hauled to MFB for unloading. The compost was either put directly into open excavations, placed in the permanent placement area (PPA) (if results met residential cleanup goals), or stored in the temporary staging area. Table 4-1 of the IMR identifies the location(s) where each windrow was placed. The grid locations where windrows were backfilled are presented in Figures 1-9 through 1-12. These figures also indicate whether the concentrations of explosives (mainly RDX) in the compost met residential or industrial cleanup goals. Because compost from more than one windrow was placed in some of the grids, the concentrations represent the average concentrations of the windrows backfilled into each grid.

After backfilling, very little erosion occurred because a crust formed on the surface of the compost. Seeding and mulching of the compost in the excavation area and the PPA were completed in the spring of 2002.

1.4 REPORT ORGANIZATION

Section 1.0 of this report is the introduction, including the purpose, site background, site description, site history, previous investigations, and report organization. Section 2.0 describes the study area field sampling activities and procedures associated with the data collection. Section 3.0 discusses data presentation and data quality review. Section 4.0 describes the physical characteristics of SWMU 13. Section 5.0 presents an evaluation of the nature and extent of contamination detected at SWMU 13 in this field investigation. Section 6.0 presents a discussion on the fate and transport of the contaminants and the conceptual site model. Section 7.0 identifies the chemicals of concern (COCs) and presents the results of the HHRA. Section 8.0 presents the results of the SERA. Supporting documentation for this report is attached as Appendices A through J. The information included in each appendix is as follows:

- Appendix A - Field Investigation Photos
- Appendix B - Boring Logs, Well Construction Logs, etc
- Appendix C - Sample Log Sheets
- Appendix D – Miscellaneous Field Documentation (log books and land survey data)
- Appendix E - Slug Test Data
- Appendix F - Health and Safety Forms
- Appendix G - Laboratory Data
- Appendix H - Data Quality Review
- Appendix I - Human Health Risk Assessment Calculations
- Appendix J - Supporting Materials for the Ecological Risk Assessment

TABLE 1-1

CONSTITUENTS OF CONCERN
INTERIM REMEDIAL ACTION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Explosive Compounds	
• Pentaerylthritol tetranitrate (PETN)	• 4-Amino-2,6-dintrotoluene (4A26DT)
• 2,4,6-Trinitrotoluene (TNT);	• 2-Amino-4,6-dintrotoluene (2A46DT)
• cyclotrimethylene trinitramine (RDX)	• 2,4-Dinitrotoluene (24DNT)
• Cycloteremethylenetetranitramine (HMX)	• 2,6-Dintrotoluene (26DNT)
• Tetryl (methyl 2,4,6 trinitro phenylnitroamine)	• 2-Nitrotoluene (2NT)
• Trinitrobenzene (TNB)	• 3-Nitrotoluene (3NT)
• 1,3-Dinitrobenzene (DNB)	• 4-Nitrotoluene (4NT)
• Nitrobenzene (NB)	
Metals	
• Aluminum	• Chromium
• Barium	• Lead
• Cadmium	• Mercury
Volatile Organic Compounds	
• Dichloromethane (methylene chloride)	• Methyl isobutyl ketone (4-methyl-2-pentanone)
• Acetone	• Toluene
• Methyl ethyl ketone (2-butanone)	• Xylenes

TABLE 1-2

INITIAL CHARACTERIZATION SAMPLES GRID CONSOLIDATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Initial Grid No.	Consolidated With Grid No.
28	27
32	31
34	33
35	26
36	27
37	27
71	70
73	72/74
78	77
80	79
83	79
84	77
85	74
86	72/74
87	72
104	103
106	105
108	107
109	107
110	102
111	112
114	103
116	105
117	105
119	107

Interim Measures Report, Removal and Bioremedation of Contaminated Soil from Mine Fill B, SWMU 13/14, TolTest, Inc., NSWC Crane, July 2002.

TABLE 1-3

GRID NOT EXCAVATED TO CLEANUP GOALS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Grid No.	Building	Reason Soil Was Not Excavated to Cleanup Goals
38	167/168	Bottom of grid on rock and over a water main
66	2501	Bottom of grid on rock
71	172/173	Soil left in place supports structure for overhead electrical line
74	172/173	Soil left in place is under asphalt driveway
136	171	Bottom of grid on rock
141	2501	Water main encountered
164	173	Over steam line
178	171	Bottom of grid on rock
186	172/173	Bottom of grid on rock
217	171	Bottom of grid on rock

Interim Measures Report, Removal and Bioremediation of Contaminated Soil from Mine Fill B, SWMU 13, Revision 1 TolTest, NSWC Crane, April 2003.

TABLE 1-4

AVERAGE DAY ZERO AND DAY LAST EXPLOSIVE RESULTS
IN MILLIGRAMS PER KILOGRAM
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Windrow #	**N-102**		**S-103**		**M-104**		**N-105**		**M-106**		**S-107**		**S-108**	
Day #	0	14	0	15	0	19	0	6	0	9	0	7	0	7
HMX	24	2.8	72	3.1	113	2.2	24	3.7	49	1.6	9	1.6	13	1.9
RDX	190	16	591	3.9	827	4.9	101	4.9	131	5.7	41	6.4	73	0.9
TNT	18	0.9	30	1	56	1	2	1.9	1	1	1	0.9	0	0.2
Windrow #	**M-109**		**S-110**		**M-111**		**S-112**		**M-113**		**S-114**		**S-115**	
Day #	0	11	0	10	0	9	0	15	0	9	0	10	0	8
HMX	41	2.2	6	2.2	8	2.1	32	2.6	38	2.7	43	2.9	14	3.2
RDX	256	0.9	37	1.1	42	1	201	2.7	166	2.6	606	3.1	138	5.1
TNT	0	0.3	1	0.2	1	0.2	1	0.3	122	1.6	56	0.6	197	1.2
Windrow #	**M-116**		**S-117**		**S-118**		**M-119**		**M-120**		**S-121**		**S-122**	
Day #	0	6	0	7	0	10	0	9	0	7	0	14	0	7
HMX	**	2.5	**	1.8	**	2.3	**	2.2	**	2	**	3.2	**	2.6
RDX	**	1.6	**	4.1	**	2.1	**	1.6	**	1.9	**	2.2	**	4.6
TNT	**	0.2	**	0.8	**	0.3	**	0.3	**	0.4	**	0.9	**	5.2
Windrow #	**M-123**		**M-124**		**S-125**		**M-126**		**S-127**		**M-128**		**S-129**	
Day #	0	9	0	11	0	9	0	7	0	7	0	9	0	11
HMX	**	3.3	**	2	**	2.6	**	2.5	**	2.9	**	2	**	2.1
RDX	**	11	**	2.2	**	6.1	**	6.7	**	8.6	**	3.7	**	3.9
TNT	**	2.9	**	0.3	**	0.9	**	8.7	**	1.9	**	2.7	**	4.5
Windrow #	**M-130**		**S-131**		**M-132**		**S-133**		**M-134**		**S-135**		**S-136**	
Day #	0	10	0	9	0	10	0	8	0	12	0	9	0	19
HMX	**	2.7	**	2.6	**	2.5	**	2.6	**	2.8	**	4.4	**	1.9
RDX	**	5.9	**	6.9	**	4.7	**	6.7	**	5.7	**	9.1	**	4.3
TNT	**	2.1	**	3.6	**	1.2	**	4.4	**	0.5	**	1.5	**	6.9
Windrow #	**M-137**		**M-138**		**S-139**		**M-140**		**M-141**		**S-142**		**S-143**	
Day #	0	11	0	11	0	11	0	17	0	11	0	14	0	13
HMX	**	2	**	2	**	2.4	**	0.5	**	1.5	**	0.7	**	2.3
RDX	**	3.1	**	3.4	**	5.5	**	1.2	**	2.9	**	0.9	**	3.8
TNT	**	0.8	**	0.4	**	10	**	0.4	**	1.2	**	0.6	**	0.6
Windrow #	**M-144**		**M-145**		**S-146**		**S-147**		**M-148**		**M-149**		**S-150**	
Day #	0	10	0	11	0	18	0	10	0	14	0	14	0	10
HMX	**	1.6	**	0.5	**	2.1	**	1.8	**	0.6	**	0.9	**	1
RDX	**	6.8	**	2.7	**	8.2	**	5.5	**	1.4	**	2.3	**	1.2
TNT	**	5.5	**	0.6	**	0.7	**	0.5	**	0.8	**	3.8	**	0.9

TABLE 1-4

AVERAGE DAY ZERO AND DAY LAST EXPLOSIVE RESULTS
IN MILLIGRAMS PER KILOGRAM
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 3

Windrow #	**S-151**		**M-152**		**M-153**		**S-154**		**S-155**		**M-156**		**M-157**	
Day #	0	12	0	12	0	15	0	15	0	12	0	9	0	9
HMX	**	0.9	**	0.9	**	1.2	**	0.7	**	0.5	**	1.5	**	1.3
RDX	**	1.1	**	1.2	**	1.4	**	0.6	**	0.8	**	1.2	**	1.7
TNT	**	2.8	**	0.4	**	0.5	**	0.4	**	1.3	**	0.6	**	0.5
Windrow #	**S-158**		**S-159**		**M-160**		**M-161**		**S-162**		**S-163**		**M-164**	
Day #	0	11	0	9	0	11	0	10	0	10	0	8	0	10
HMX	**	2.4	**	0.7	**	0.4	**	0.6	**	0.9	**	1	**	1.5
RDX	**	2.3	**	2.9	**	0.8	**	0.8	**	2.1	**	3.8	**	3.3
TNT	**	0.4	**	0.6	**	0.5	**	0.5	**	0.7	**	0.4	**	0.5
Windrow #	**M-165**		**S-166**		**S-167**		**M-168**		**M-169**		**S-170**		**S-171**	
Day #	0	9	0	8	0	10	0	8	0	7	0	12	0	10
HMX	**	0.5	**	0.9	**	0.4	**	0.6	**	0.7	**	0.5	**	0.5
RDX	**	1.5	**	1.2	**	0.6	**	2.6	**	6.6	**	1.9	**	1.5
TNT	**	0.5	**	0.4	**	1.1	**	0.5	**	1.1	**	0.4	**	0.8
Windrow #	**M-172**		**M-173**		**S-174**		**S-175**		**M-176**		**M-177**		**S-178**	
Day #	0	12	0	10	0	10	0	12	0	12	0	15	0	10
HMX	**	0.4	**	0.4	**	0.6	**	1.1	**	0.8	**	1.6	**	0.9
RDX	**	0.7	**	0.4	**	0.5	**	1.2	**	0.7	**	4.2	**	2.7
TNT	**	0.5	**	0.4	**	0.5	**	0.5	**	0.5	**	0.5	**	0.5
Windrow #	**S-179**		**M-180**		**M-181**		**S-182**		**S-183**		**M-184**		**M-185**	
Day #	0	16	0	17	0	15	0	14	0	12	0	13	0	16
HMX	**	1	**	1.4	**	1.3	**	1.2	**	3.1	**	1.9	**	2.3
RDX	**	3.8	**	1.9	**	5.8	**	2	**	8.7	**	3.3	**	8.6
TNT	**	1.9	**	0.5	**	0.5	**	0.6	**	0.5	**	0.5	**	1.1
Windrow #	**S-186**		**S-187**		**M-188**		**M-189**		**S-190**		**S-191**		**M-193**	
Day #	0	15	0	19	0	21	0	18	0	16	0	17	18	31
HMX	**	0.8	**	1.1	**	1	**	1.4	**	0.7	**	0.7	2	0.7
RDX	**	0.8	**	1.6	**	2.1	**	1.5	**	1.9	**	1.9	4	1.3
TNT	**	0.5	**	0.5	**	0.5	**	0.5	**	1.6	**	0.6	0	0.5
Windrow #	**S-196**		**M-198**		**M-199**		**N-200**		**S-201**		**M-209**		**M-210**	
Day #	0	24	0	21	0	69	0	18	0	20	0	21	0	20
HMX	**	1.2	**	0.5	**	0.7	**	29	**	1.8	**	1.2	**	1.6
RDX	**	3.6	**	1.1	**	1.9	**	133	**	5.2	**	3.5	**	1
TNT	**	0.3	**	0.4	**	0.4	**	1.2	**	0.5	**	0.8	**	0.4

TABLE 1-4

AVERAGE DAY ZERO AND DAY LAST EXPLOSIVE RESULTS
IN MILLIGRAMS PER KILOGRAM
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 3 OF 3

Windrow #	S-211		S-212		M-213		N-214		M-215		N-216			
Day #	0	18	0	37	0	18	0	23	0	23	0	17		
HMX	**	1.5	**	0.5	**	1.3	**	1.3	**	1.3	**	0.3		
RDX	**	2.1	**	0.6	**	1.5	**	1.1	**	1.6	**	0.5		
TNT	**	0.4	**	0.5	**	0.5	**	0.5	**	0.5	**	0.5		

Interim Measures Report, Removal and Bioremediation of Contaminated Soil from Mine Fill B, SWMU 13/14, TolTest, Inc. NSWC Crane, July 2002.

TABLE 1-5

AVERAGE EXPLOSIVE RESULTS IN MILLIGRAMS PER KILOGRAM FOR RESAMPLED WINDROWS SWMU 13 - MINE FILL B NSWC CRANE CRANE, INDIANA

Windrow #	**N-102**		**M-132**		**S-133**		**M-134**	
Day #	14	432	10	455	8	455	12	455
HMX	2.8	0.7	2.5	0.4	2.6	0.5	2.8	0.3
RDX	15.5	1.9	4.7	0.4	6.7	1.6	5.7	0.6
TNT	0.9	0.4	1.2	0.8	4.4	0.6	0.5	0.6
Windrow #	**S-135**		**M-181**		**M-185**			
Day #	9	456	15	318	16	336		
HMX	4.4	0.4	1.3	0.5	2.3	0.9		
RDX	9.1	0.7	5.8	0.8	8.6	2.5		
TNT	1.5	0.5	0.5	0.6	1.1	0.6		

Interim Measures Report, Removal and Bioremediation of Contaminated Soil from Mine Fill B, SWMU 13/14, TolTest, NSWC Crane, July 2002.

TABLE 1-6

INVESTIGATION AND INTERIM MEASURE SUMMARY FOR SWMU 13 BUILDINGS AND STRUCTURES
NSWC CRANE
CRANE, INDIANA

Building Number/Structure ID	Historical Investigations	RFI Investigation	Comments
106	None	None	Used as a casing washing and repair house.
162	Interim remedial (IR) activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	None	This building was used to store explosives and is known for having PCB contamination in soil due to leaking Therminol boilers. IR post excavation samples indicate soil around B-171 meet Industrial or residential clean up goals for explosives with the exception of 3 grid cells. The IMR recommended no further interim action of this building. This building is scheduled for demolition.
163	None	None	This building was used to store explosives and as a press loading facility. This building is scheduled for demolition.
164	None	None	This building was used to store explosives. This building is scheduled for demolition.
165	Interim remedial (IR) activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	None	IR report indicates no excavation required around this building because cleanup goals are less than industrial levels.
166	Surface water samples were collected in drains and ditches adjacent to and at greater distances from the Building in 1972, 1978, and 1979. Explosives were detected in most samples. Contaminated soil surrounding the building was removed in 1989. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Soil samples located southwest of B-166 area indicate PCB contamination greater than 1 mg/kg.	After soil removal in 1989, subsequent soil samples near boiler locations indicated PCB concentrations were greater than 10 mg/kg. IR post excavation samples indicate soil around B-166 meets Industrial clean up goals for explosives. The IMR recommended no further interim action for MFB. This building is scheduled for demolition.

TABLE 1-6

INVESTIGATION AND INTERIM MEASURE SUMMARY FOR SWMU 13 BUILDINGS AND STRUCTURES
NSWC CRANE
CRANE, INDIANA

Building Number/Structure ID	Historical Investigations	RFI Investigation	Comments
167	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples. In 1985, the IAS collected soil samples around the building and analyzed for explosives. RDX, TNT, and HMX were detected in the samples. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	None	This building was used to process explosives A small silver of contaminated soil south of B-167 was not excavated due to a nearby water main. Total volume of this sliver is conservatively estimated to be less than 25 cubic yards (assuming a 2 yard depth). The IMR recommended no further interim action for MFB. This building is scheduled for demolition.
168	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Soil samples were collected near this building under the conveyor system.	This building was used to process explosives. IR post excavation samples indicate soil around B-168 meets Industrial or residential clean up goals for explosives. The IMR recommended no further interim action for MFB. This building is scheduled for demolition.
169	In 1985, a soil sample collected around this building was tested by the EP test. Concentrations of metals, methylene chloride and PCBs were less than TCLP action levels.	None	Drawings describe this building as a hot melt building for explosives production; also contained a paint booth. Transformers containing PCBs were located at this building.
170	None	None	Lunch and locker rooms.

TABLE 1-6

INVESTIGATION AND INTERIM MEASURE SUMMARY FOR SWMU 13 BUILDINGS AND STRUCTURES
NSWC CRANE
CRANE, INDIANA

Building Number/Structure ID	Historical Investigations	RFI Investigation	Comments
171	Surface water samples were collected in drains and ditches adjacent to and at greater distances from the Building in 1972, 1978, and 1979. Explosives were detected in most samples. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Soil samples around Building 171 indicate PCB contamination at several locations is greater than human health and ecological screening values1. Sump water sample south of Building 171 contaminated with RDX (69 µg/m3).	This building is known for processing explosives and having PCB contamination in soil due to leaking Therminol boilers. IR post excavation samples indicate soil around B-171 meet Industrial or residential clean up goals for explosives with the exception of 3 grid cells where soil could not be removed due to obstructions. The IMR recommended no further interim action for MFB. This building is scheduled for demolition.
172	In 1985, the IAS collected soil samples around the building and analyzed for explosives. RDX, TNT, and HMX were detected. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Soil sample collected near Building 172 under conveyor system. Analytical results indicate surface and subsurface RDX contamination is less than human health risk screening value. Sump water sample collected northeast of Building 172 contaminated with RDX (630 µg/m3).	Explosives handling facility. IR post excavation samples indicate soil around B-171 meet Industrial or residential clean up goals for explosives with the exception of 3 nearby grid cells where soil could not be removed due to obstructions. The IMR recommended no further interim action for MFB. This building is scheduled for demolition.
173	Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Soil sample collected near Building 173 under conveyor system. Analytical results indicate surface and subsurface RDX contamination is less than human health risk screening value. Sump water sample collected northeast of Building 172 contaminated with RDX (630 µg/m3).	TNT loading and storage building. There are no historical records of spills in this area.

TABLE 1-6

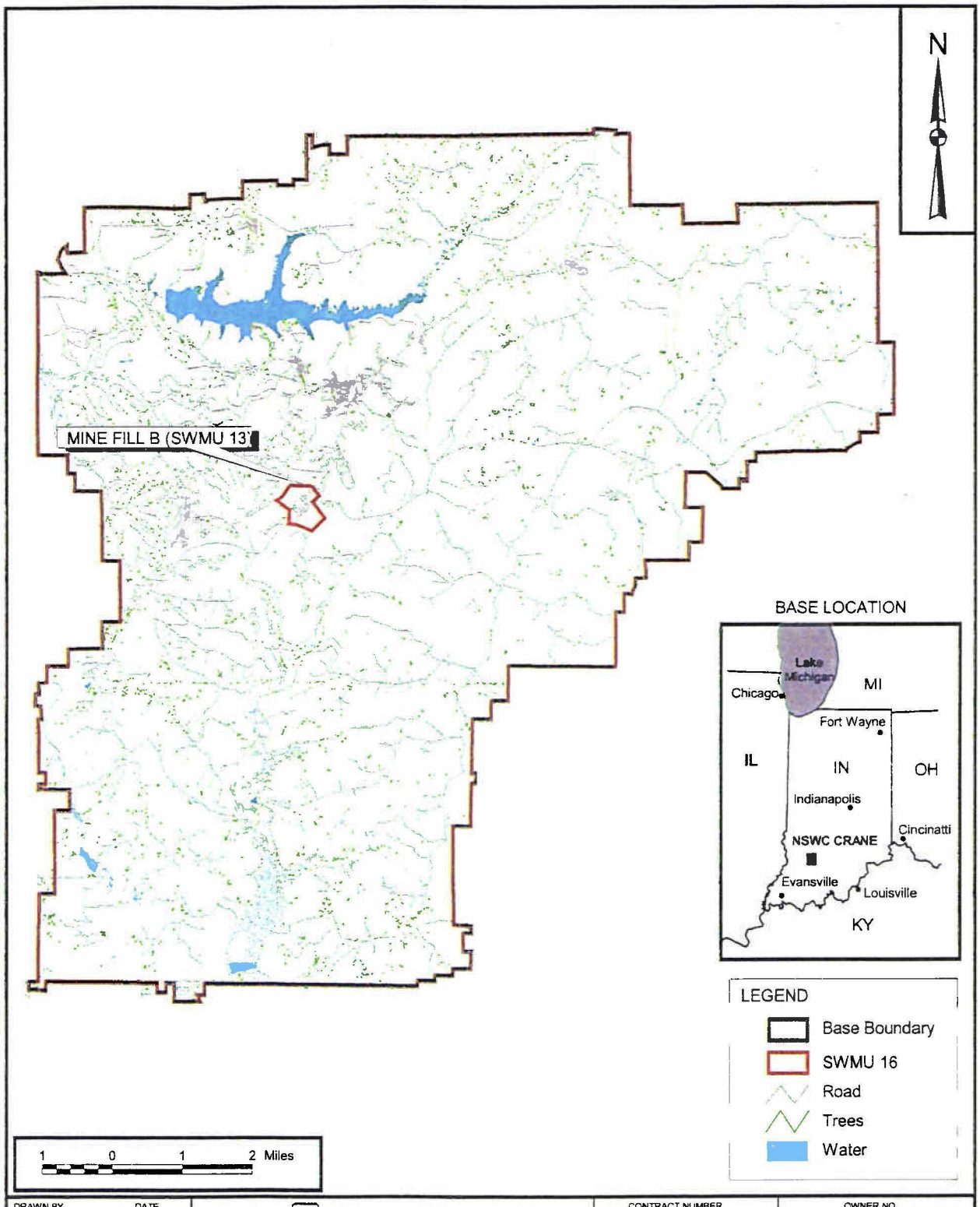
INVESTIGATION AND INTERIM MEASURE SUMMARY FOR SWMU 13 BUILDINGS AND STRUCTURES
NSWC CRANE
CRANE, INDIANA

Building Number/Structure ID	Historical Investigations	RFI Investigation	Comments
174	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Surface and subsurface soil samples collected northeast of Building 174 reported no detection of explosives.	Formerly contained transformers (PCBs) and melting kettles for explosives production. Currently used for demilitarization activities; also has one paint booth. IR post excavation samples indicate soil around B-174 meets Industrial and residential clean up goals for explosives. The IMR recommended no further interim action for MFB.
2171	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples.	None	No information available regarding the activities or materials handled in this building.
2179	None	None	No information available regarding the activities or materials handled in this building.
2500	Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Monitoring well installed just west of Building 2500.	Explosives production. PCBs used to melt explosives. No contamination was detected around Building 2500 during IR activities.
2501	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples. Interim remedial activities were conducted from 1999 through 2001 using bioremediation to remove contaminated soils from around this building.	Sump water sample collected southwest of Building 172 contaminated with RDX (630 µg/m^3).	Used for explosives production and as a magazine hardening facility. IR post excavation samples indicate soil around B-2501 meet Industrial or residential clean up goals for explosives with the exception of 1 grid cell northwest of Building 2501 where soil could not be removed due to an obstruction (water main). The IMR recommended no further interim action for MFB. This building is scheduled for demolition.
2502	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples.	None	Used as a magazine hardening facility.

TABLE 1-6

INVESTIGATION AND INTERIM MEASURE SUMMARY FOR SWMU 13 BUILDINGS AND STRUCTURES
NSWC CRANE
CRANE, INDIANA

Building Number/Structure ID	Historical Investigations	RFI Investigation	Comments
2503	Surface water samples were collected in drains near this building in 1972. Explosives were detected in most samples.	None	Used as a pump house.
2515	None	Soil and groundwater samples collected near Building 2515. Surface and subsurface samples indicate no RDX. However, nearby monitoring well reported 120 µg/L of RDX. Sump water sample southwest of Building 2515 contaminated with RDX (69 µg/m3).	No information available regarding the activities or materials handled in this building.
2532	None	None	Lunch and locker rooms.
2566	None	None	Compressor House
2787	None	None	Pump House
2788	None	None	Pump House
2789	None	None	Pump House
3299	None	None	Recently constructed building for testing of small water jet cutting systems.



DRAWN BY: J. LAMEY — DATE: 8/27/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 7448	OWNER NO.: —
CHECKED BY: — — DATE: —	BASE AND SITE LOCATION MAP SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA	APPROVED BY: — — DATE: —	
COST/SCHEDULE-AREA		APPROVED BY: — — DATE: —	
SCALE: AS NOTED		DRAWING NO.: FIGURE 1-1	REV: 0

P:\GIS\CRANE_NSWC\SURFICIAL APR SITE LOCATIONS LAYOUT 2/3/05 KMP

LEGEND

Installation Boundary

Major Surface Drainage Basins

I Furst Creek Drainage Basin

II Indiana Creek Drainage Basin

III Sulphur Creek Complex Drainage Basin

IV Boggs & Turkey Creeks Drainage Basin

V Seed Tick Creek Drainage Basin

SOURCE: "Initial Assessment of Study of Naval Weapons Support Center Crane, Indiana." Naval Energy and Environmental Support Activity, May 1983.

DRAWN BY: J. LAMEY — DATE: 8/27/01	Tetra Tech NUS, Inc.		CONTRACT NUMBER: 7448	OWNER NO.: CTO 279
CHECKED BY: B. BALKOVEC — DATE: 3/17/04	SWMU LOCATION AND DRAINAGE BASINS SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA		APPROVED BY: — DATE: —	
COST/SCHEDULE-AREA			APPROVED BY: — DATE: —	
SCALE: AS NOTED			DRAWING NO.: FIGURE 1-2	REV: 0

P:\GIS\CRANE_NSWC\SURFICIAL.APR DRAINAGE BASINS LAYOUT 2/3/05 KMP

P:\GIS\CRANE NSWC\MAPDOCS\APR\FINAL RFI SWMU13&16.APR SWMU 13 SITE FEATURES 6/30/05 KMP

N

Road
Railroad
Wall
Fence
Vegetation
Stream
Topographic Contour
Building

400 0 400 Feet

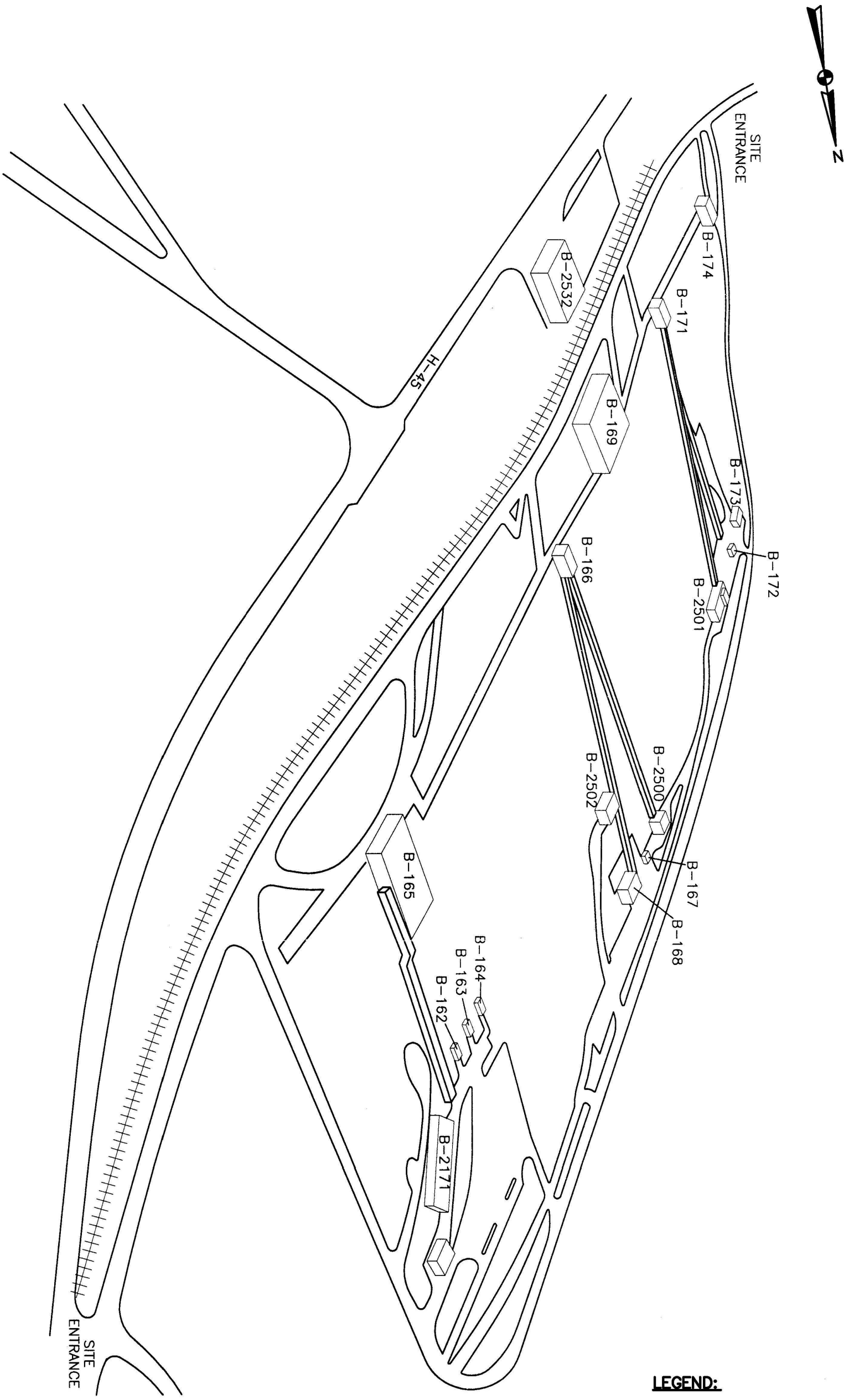
DRAWN BY K. PEILA	DATE 1/24/05
CHECKED BY J. SCHUBERT	DATE 1/24/05
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

SITE FEATURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 1-3	REV 0

ACAD: 7448CP11.dwg 06/08/06 MF PIT

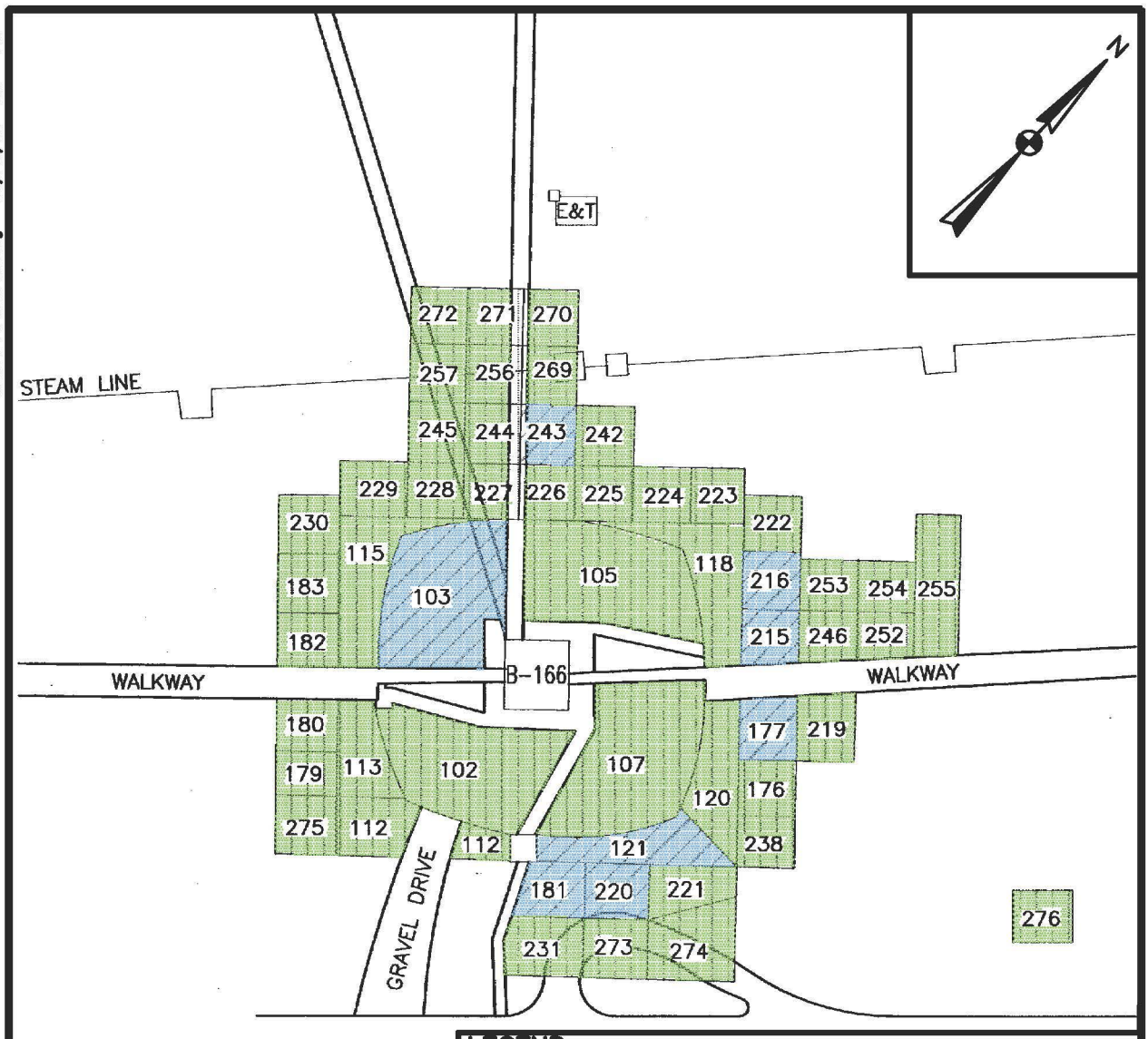


LEGEND:

RAILROAD TRACKS

DRAWN BY MF DATE 3/15/07	NAVFAC	MINE FILL B AREA MAP IMWP FOR SWMU 13 – MINE FILL B INTERIM MEASURES WORK PLAN NSWC CRANE CRANE, INDIANA	CONTRACT NO. 0020
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1–4 / REV. 0

FORM CADD NO. SDIV-BV.DWG - REV 1 - 9/10/98



LEGEND:

MEETS RESIDENTIAL CLEANUP GOALS

BOTTOM OR SIDE WALL OF GRID MEETS INDUSTRIAL CLEANUP GOALS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE G-1 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT

0 60 120

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 1/26/05	POST-EXCAVATION SAMPLING GRID LOCATION MAP BUILDING 166, MINE FILL B NSWC CRANE CRANE, INDIANA
CHECKED BY	DATE	
REVISED BY	DATE	
SCALE AS NOTED		

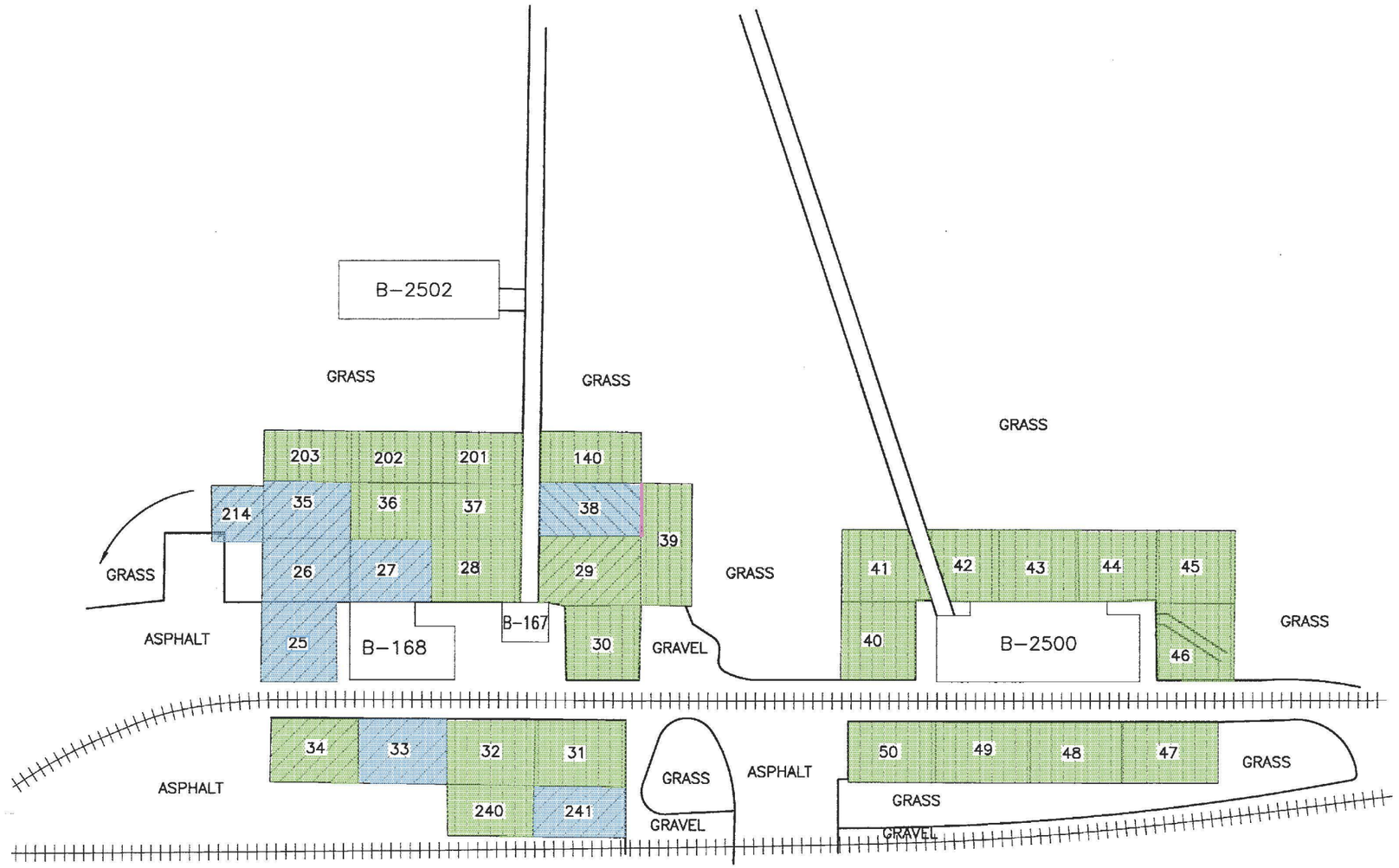
NAVFAC

CONTRACT NO.	7448
OWNER NO.	0000
APPROVED BY	DATE
DRAWING NO.	FIGURE 1-5
REV.	0

ACAD:7448CP01.dwg 01/26/05 DM PIT

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD: 7448CP06.dwg 06/23/05 HJB PIT



N

LEGEND:

- MEETS RESIDENTIAL CLEANUP GOALS
- MEETS INDUSTRIAL CLEANUP GOALS
- EXCEEDS INDUSTRIAL CLEANUP GOALS
- SIDEWALL BETWEEN GRIDS 38 & 39 EXCEEDS INDUSTRIAL CLEANUP GOALS
- RAILROAD TRACKS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE G-2 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 50 100

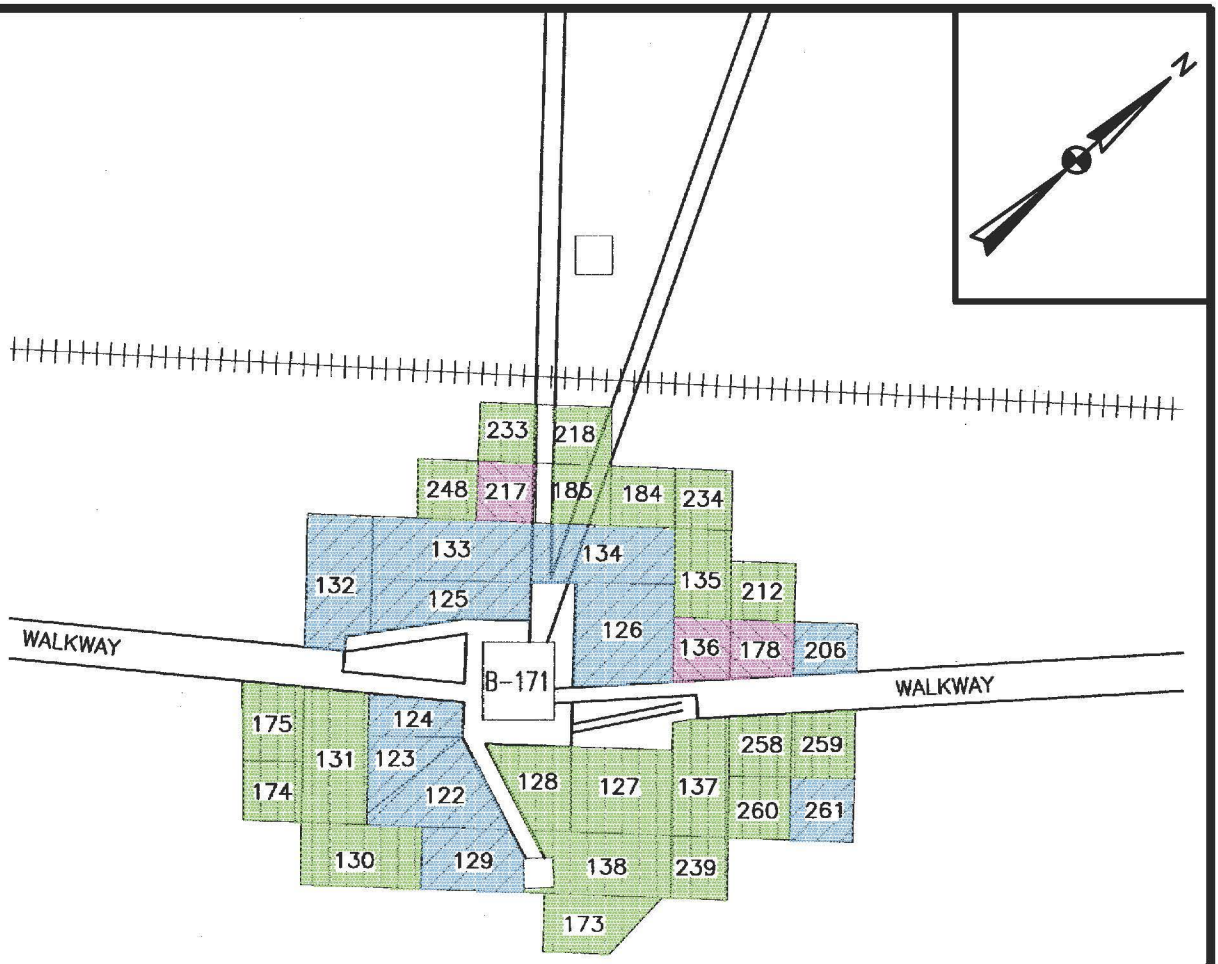
GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 2/1/05	POST-EXCAVATION SAMPLING GRID LOCATION MAP BUILDINGS 167/168/2500, MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-6 / REV. 0

NAVFAC

FORM CADD NO. SDIV-BH.DWG - REV 1 - 9/10/98

ACAD: 7448CP03.dwg 06/23/05 HJB PIT



LEGEND:

- MEETS RESIDENTIAL CLEANUP GOALS
- MEETS INDUSTRIAL CLEANUP GOALS
- EXCEEDS INDUSTRIAL CLEANUP GOALS
- RAILROAD TRACKS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE G-3 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 60 120

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 1/26/05	POST-EXCAVATION SAMPLING GRID LOCATION MAP BUILDING 171, MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-7 / REV. 0

NAVFAC

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD: 7448CP08.dwg 06/23/05 HJB PIT

LEGEND:

- MEETS RESIDENTIAL CLEANUP GOALS
- MEETS INDUSTRIAL CLEANUP GOALS
- EXCEEDS INDUSTRIAL CLEANUP GOALS
- SIDEWALL EXCEEDS CLEANUP GOALS
- RAILROAD TRACKS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE G-4 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 50 100

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 2/1/05	POST-EXCAVATION SAMPLING GRID LOCATION MAP BUILDINGS 172/173/2501, MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-8 / REV. 0

NAVFAC

FORM CADD NO. SDIV-BH.DWG - REV 1 - 9/10/98

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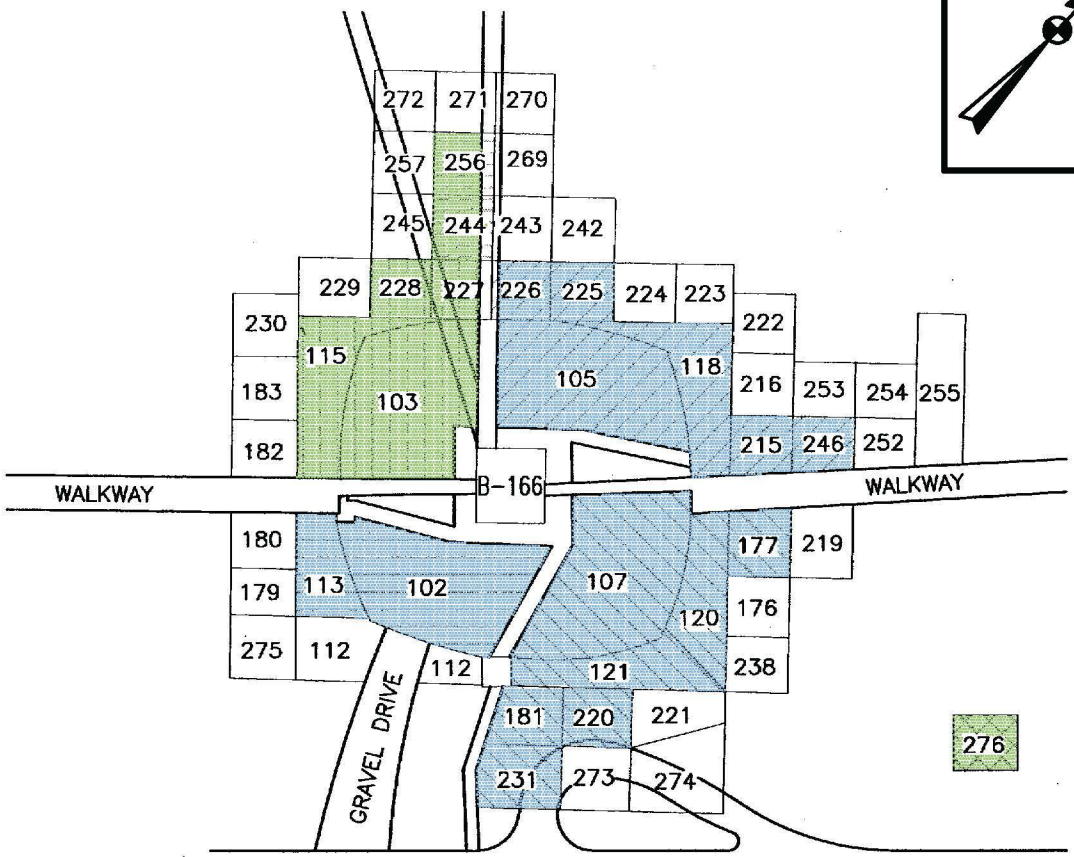


LEGEND:

- AVERAGE WINDROW CONCENTRATION MEETS RESIDENTIAL CLEANUP GOALS
- AVERAGE WINDROW CONCENTRATION MEETS INDUSTRIAL CLEANUP GOALS
- NOT EXCAVATED MEETS CLEANUP GOALS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE J-1 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 60 120

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 1/26/05
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

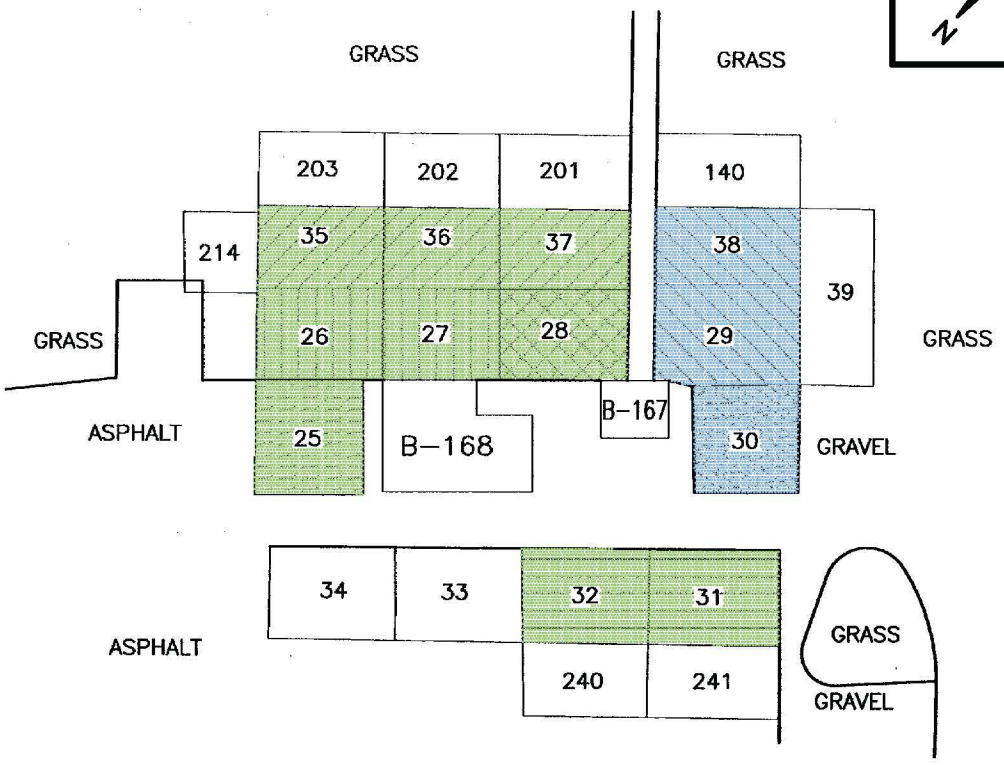
NAVFAC

GRIDS BACKFILLED
WITH BIOREMEDIATED SOIL
BUILDING 166, MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 1-9	REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD:7448CP05.dwg 06/23/05 HJB PIT



LEGEND:

- AVERAGE WINDROW CONCENTRATION MEETS RESIDENTIAL CLEANUP GOALS
- AVERAGE WINDROW CONCENTRATION MEETS INDUSTRIAL CLEANUP GOALS
- NOT EXCAVATED MEETS CLEANUP GOALS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE J-2 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 50 100

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 2/1/05
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

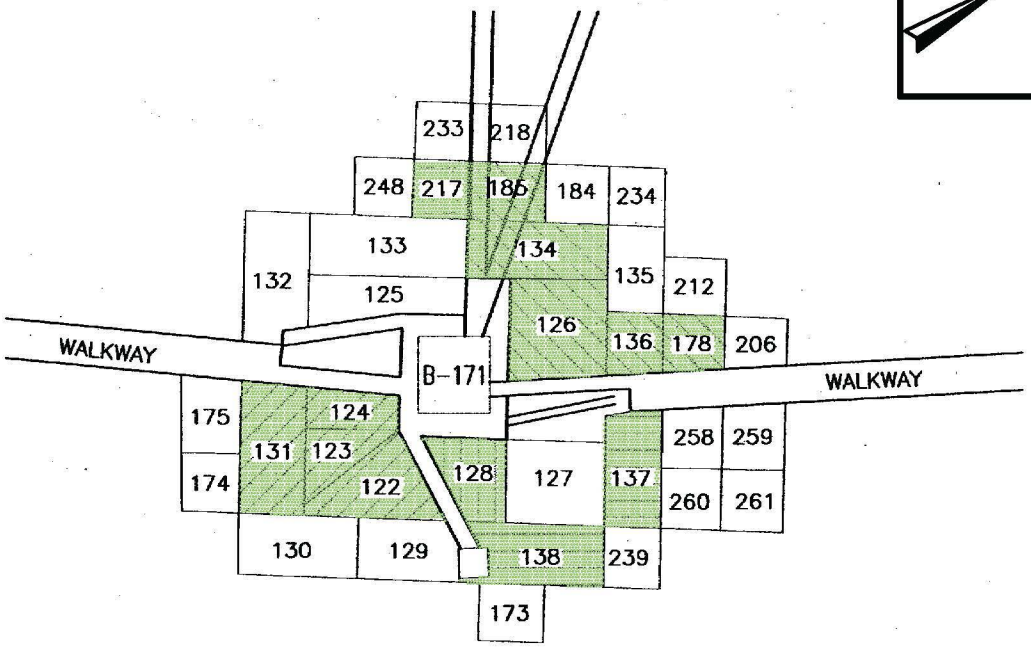
NAVFAC

GRIDS BACKFILLED
WITH BIOREMEDIATED SOIL
BUILDINGS 167/168, MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 1-10	REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD:7448CP04.dwg 06/23/05 HJB PIT



LEGEND:

AVERAGE WINDROW CONCENTRATION MEETS RESIDENTIAL CLEANUP GOALS

NOT EXCAVATED
MEETS CLEANUP GOALS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE J-3 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT.

0 60 120

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 2/1/05	GRIDS BACKFILLED WITH BIOREMEDIATED SOIL BUILDING 171, MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-11 REV. 0

NAVFAC

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

ACAD: 7448GP07.dwg 02/01/05 DM PIT

LEGEND:

- AVERAGE WINDROW CONCENTRATION MEETS RESIDENTIAL CLEANUP GOALS
- AVERAGE WINDROW CONCENTRATION MEETS INDUSTRIAL CLEANUP GOALS
- NOT EXCAVATED MEETS CLEANUP GOALS

NOTE:

THIS FIGURE IS ADAPTED FROM FIGURE J-4 OF THE IMR (TOLTEST INC., JULY 2002). THE CROSS HATCHING SHOWN IN THE FIGURE IS NOT RELEVANT TO THIS REPORT

0 50 100

GRAPHIC SCALE IN FEET

DRAWN BY DM	DATE 2/1/05
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

NAVFAC

GRIDS BACKFILLED
WITH BIOREMEDIATED SOIL
BUILDINGS 172/173/2501, MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 1-12	REV. 0

FORM CADD NO. SDIV-BH.DWG - REV 1 - 9/10/98

2.0 FIELD INVESTIGATION

This section describes the sampling activities, procedures, and documentation utilized during the RFI field investigation events that were performed in 2003, 2004, 2005, and 2006 for NSWC Crane SWMU 13.

2.1 OVERVIEW

RFI field activities for SWMU 13 were conducted over several separate field investigation events. These investigations include the following:

- Round 1: Groundwater, surface water, sediment, and soil sampling: March/April/May 2003.
- Round 2: Groundwater, surface water, sediment, and soil sampling: October, November/December 2003, and January 2004.
- Round 3: Groundwater, surface water, sediment, soil, and vegetation sampling: July through November 2004.
- Sediment Sampling: Additional sediment samples collected in response to U.S. EPA Region 5 comments on potential ecological risk at locations nearest to permanent aquatic habitat: May 2005.
- External Sump/Drainage Investigation: Overburden Groundwater (temporary wells), surface water (sumps), sediment (sludge), and soil sampling: February 2006.
- PCB Delineation: Sediment and soil sampling: June and August/September 2006.

All work performed for Round 1 was conducted in accordance with the procedures and methodologies described in the U.S. EPA-approved QAPP [Tetra Tech NUS, Inc. (TtNUS), 2003a]. Work performed for Round 2 was done in accordance with the procedures and methodologies described in Addendum No. 1 to the approved QAPP (TtNUS, 2003b). Work performed for Round 3 was conducted in accordance with the procedures and methodologies described in Addendum No. 2 to the approved QAPP (TtNUS, 2004). Work performed for the external sump/drainage investigation was done in accordance with the QAPP Addendum No. 4 (TtNUS, 2006). Work performed for the PCB delineation investigations were done in accordance with correspondence sent to the U.S. EPA regarding additional sampling at SWMU 13 to adequately delineate PCB contamination for an accurate estimation of the quantity of soils for possible

removal. Standard operating procedures (SOPs) that governed the field work are included in Appendix H of the approved QAPP (TtNUS, 2003a), Appendix E of Addendum No. 1 to the approved QAPP (TtNUS, 2003b), and Appendix C of Addendum No. 2 to the approved QAPP (TtNUS, 2004). Select photographs of SWMU 13, copies of all field forms, records, field logbooks, and health and safety documentation associated with the field investigations are provided in Appendices A through F of this document (Volumes II and III).

2.2 MOBILIZATION/DEMOBILIZATION

Following approval of the respective QAPP, TtNUS began mobilization activities. All field team members reviewed the approved QAPP associated appendices, and the respective Health and Safety Plan (HASP) prior to the start of project activities. In addition, the Field Operations Leader (FOL) held field team orientation meetings to ensure that personnel were familiar with the scope of the field activities. Health and safety documentation is contained in Appendix F.

Prior to the initiation of fieldwork for each field activity, the FOL arrived at the site and began on-site mobilization activities. These activities included coordination with base personnel and utility clearance of all proposed boring locations through the NSWC Crane Public Works Office. The equipment required for the field activities was shipped to the site. At the conclusion of each field activity, the FOL completed the decontamination and demobilization of all equipment.

2.3 SUBSURFACE INVESTIGATION METHODOLOGIES AND PROCEDURES

2.3.1 Drilling

All borings were installed in accordance with SOP CTO 166-04 and logged in accordance with SOPs CTO 166-07 and CTO 166-11. Boring logs can be found in Appendix B.1. Drilling methods used during each field event, along with boring dates, boring depths, and depth intervals for soil sampling, are presented in Table 2-1.

Round 1

Fifteen borings for soil sampling and 26 borings for monitoring well installation were drilled using direct-push technology (DPT), hand auger, Rotosonic, and hollow-stem auger (HSA) methods.

Round 2

Ten borings for soil sampling and 21 borings for monitoring well installation were drilled using hand auger, Rotosonic, and HSA methods.

Round 3

Twenty-two borings for soil sampling and four borings for monitoring well installation were drilled using DPT and HSA/air rotary (AR) methods.

External Sump/Drainage Investigation

Twenty-four borings for soil sampling at SWMU 13 were drilled mostly utilizing DPT. Hand augering was used at one location.

PCB Delineation

Thirty-three borings for soil sampling at SWMU 13 were dug utilizing a hand auger. One sample (13SS760001) was collected using a hand trowel from a mound of soil on a concrete floor within an enclosed transport corridor.

2.3.1.1 Direct-Push Technology Borings

DPT involves pushing small-diameter sampling tools hydraulically and/or mechanically downward into the ground to the desired depth. Soil samples were collected from DPT borings for chemical analyses and for lithologic logging. All samples obtained from the boreholes were screened with a photoionization detector (PID) immediately upon opening. All PID readings were recorded on the boring logs (Appendix B.1). Soil sample collection information is provided in Section 2.5.1.

DPT was used to complete 13 soil borings at SWMU 13 during Round 1, 22 borings during Round 3, and 24 borings during the external sump/drainage investigation. Figure 2-1 shows the locations of all soil borings completed as part of the RFI at SWMU 13 during Rounds 1, 2, 3, and the PCB delineation investigations. Figure 2-5 includes all soil boring locations completed as part of the external sump/drainage investigation. DPT soil borings at SWMU 13 were advanced to total depths of 12 feet, to the water table, or to refusal. Actual sample depths for SWMU 13 soil samples are listed in Table 2-1. DPT was not used during Round 2 field activities or during the PCB delineation investigations at SWMU 13.

2.3.1.2 Rock Drilling

Two types of drilling techniques were used to drill through rock, collect rock cores, and install monitoring wells in the bedrock. Rotosonic drilling was used for the majority of well drilling sites. The second technique used was conventional diamond coring followed by reaming of the borehole with a roller bit.

For Rotosonic drilling, the drill bit was attached to the base of the 4-inch inside diameter (ID), 4.5-inch outside diameter (OD), 10-foot-long core barrel. The core barrel was connected to a drill pipe of the same ID. When the core barrel reached the desired depth, a larger 6-inch OD drill pipe was centered on the core barrel and advanced to the same depth to act as a temporary outer casing. Core runs were limited to 5 feet to maximize sample recovery. The inner core barrel and drill pipe were retrieved, and the core was extruded from the inner core barrel using vibration and/or hydraulic pressure. Each sampled interval was extruded into a clear plastic sleeve. This technique facilitated lithologic classification, environmental sample collection, and vapor monitoring using a PID. All PID readings were recorded on the boring logs. This process was repeated to the termination point of each well boring. The drill cuttings not retained for analytical or classification purposes were disposed in accordance with the approved QAPP (TtNUS, 2003a) and Addenda No. 1 and No. 2 to the approved QAPP (TtNUS, 2003b and 2004). Section 2.14 provides more information regarding the handling of investigation-derived waste (IDW). The final hole diameter produced by Rotosonic drilling was approximately six inches. As a result, these boreholes were sufficiently large in diameter after coring to install a monitoring well without additional reaming.

In Rotosonic borings where continuous coring was not required, a 4-inch ID displacement bit was attached to the base of the core barrel. This technique used both vibration and water to drill through the overburden and bedrock.

Controlled amounts of water were added where necessary to remove cuttings from the borehole. Any excess water generated during this process was collected in a container and transported to and disposed at an NSWC Crane-approved sanitary sewer. The Rotosonic drilling rig was also used for collection of soil samples as listed in Table 2-1 for both Rounds 1 and 2. All boring depths are listed in Table 2-1 for Rounds 1, 2, and 3.

Twenty-five Round 1 and 15 Round 2 Rotosonic borings were converted into bedrock monitoring wells at SWMU 13. Rotosonic was not used as a drilling method during Round 3. Appendix B.1 contains boring logs, including those for wells drilled using Rotosonic techniques.

A conventional drilling rig with diamond coring capabilities was used as a second type of drilling techniques at SWMU 13. Once the 2-inch diameter NX core (nominal) was collected and the final depth of the boring was reached, the entire length of the boring was reamed to 5.5-inches in diameter, the hole was cleaned with pressurized air, and a 2-inch diameter monitoring well was installed.

Continuous rock cores were collected from 8 (Round 1), 16 (Round 2), and 1 (Round 3) bedrock well borings at SMWU 13 for lithologic description purposes. Select cores that were retained were placed into labeled core boxes, photographed, and turned over to the NSWC Crane Environmental Protection Department (EPD) for storage.

2.3.1.3 Hollow-Stem Augering

HSA drilling included the use of 4.25-inch ID HSAs, with split-spoon samplers used to obtain soil samples. Split-spoon samplers had a minimum ID of 2 inches and were 2 feet long. The split-spoon sampler was driven to the required depth with a rig-mounted hammer weighing 140 pounds and falling 30 inches. All soil samples obtained from boreholes drilled using the HSA method were screened with a PID immediately upon opening. All PID readings were recorded on the boring logs (Appendix B.1). Drill cuttings were disposed in accordance with the approved QAPP (TtNUS, 2003a) and Addenda No. 1 and No. 2 to the approved QAPP (TtNUS, 2003b, 2004). See Section 2.14 for more information regarding the handling of IDW.

2.3.1.4 Hand Augering

The hand augering equipment consisted of a stainless steel bucket auger (6½ inches long and 3¼ inches in diameter) and a stainless steel extension rod with a cross handle. Hand augering was typically used at locations not accessible by other drilling methods or at isolated locations where its use was more practical. The borings were augered to the desired depth or until refusal was encountered (see Table 2-1 for actual total depths). Soil sample collection information is provided in Section 2.5.1. All samples obtained from the boreholes were screened with a PID immediately upon retrieval from the borehole. All PID readings were recorded on the boring logs.

One Round 1, 10 Round 2, one external sump/drainage investigation, and 33 PCB delineation soil borings were installed using the hand auger method at SMWU 13 (See Table 2-1). No hand augering was required at SWMU 13 during Round 3.

2.3.2 Borehole and Sample Logging

A TtNUS geologist maintained a log for each boring in accordance with SOP CTO 166-07 (Borehole and Soil Sample Logging) and SOP CTO 166-11 (Drilling and Geologic Logging of Boreholes in Rock). The boring logs for each investigation can be found in Appendix B.1 and contain the following information as appropriate:

- Well identification (where applicable).
- Boring identification.
- Name of geologist logging the boring.
- Name of drilling contractor.
- Sample number and type.
- Sample depth.
- Sample recovery and sample interval.
- Soil density or cohesiveness.
- Soil color.
- Unified Soil Classification System (USCS) material descriptions.
- Rock type and description, recovery, and rock quality designation (RQD).
- Location of boring.
- Drilling and/or well construction problems or deviations from the project-specific approved QAPP or the Addenda No. 1 and No. 2 to the approved QAPP.
- Date(s) of drilling.
- Screening instrument readings.

In addition, depths of changes in lithology, sample moisture observations, depth to water, PID readings, drilling methods, and total depth of each borehole were included on each log, as well as any other pertinent observations.

2.3.3 Borehole Abandonment

All soil borings at SWMU 13 were backfilled with bentonite chips and hydrated in accordance with the manufacturer's specifications. The ground surface at each boring location was restored to its original condition.

2.4 MONITORING WELL INSTALLATION AND DEVELOPMENT

2.4.1 Well Installation

Monitoring wells were installed during Rounds 1, 2, and 3 RFI field operations at SWMU 13 in accordance with SOP CTO 166-12. After each well boring was drilled to the desired depth, a 2-inch-diameter polyvinyl chloride (PVC) Schedule 40 well screen and riser pipe was lowered into the boring through the steel isolation casing. For all deep monitoring wells [greater than 45 feet below ground surface (bgs)], a permanent steel isolation casing was installed to isolate the overburden soil and uppermost bedrock before deeper strata were cored. For shallow wells, a temporary steel casing was used to isolate the overburden while the uppermost bedrock was drilled. Well screens ranged in length from 5 to 10 feet, depending on well depth, with a slot size of 0.20 inch. After the screen and the riser pipe were in place, the annulus of the boring was backfilled with clean silica sand from the bottom of the boring to 1 to 2 feet above the top of the well screen. A bentonite seal was then installed either in pellet (shallow wells) or slurry form (deep wells), and the pellets were allowed to hydrate in accordance with the manufacturer's recommendations. The remainder of the annulus of the borehole (from the bentonite seal to the ground surface) was filled with cement-bentonite grout to approximately 1 foot bgs.

The depth of the backfill materials was continuously monitored during the installation of the monitoring wells using a weighted steel tape measure to ensure that the sand pack and bentonite did not bridge during the installation process.

Indiana State well installation requirements described in 310 Indiana Administrative Code (IAC) 16 were followed for all well installation activities. Well construction logs were completed for each well and are presented in Appendix B.1. Refer to Section 2.3.1 for the drilling methods. Monitoring well construction information and water level measurements are presented in Table 2-2 for each round. Figure 2-2 presents all well locations.

Twelve temporary groundwater wells were installed in soil borings where water was encountered during the External Sump/Drainage Investigation for sampling the overburden groundwater. A 1-inch-diameter PVC Schedule 40 well screen and riser pipe were set into the borings. Well screens ranged in length from 5 to 10 feet, depending on boring depth, with a slot size of 0.010 inch. After the screen and riser pipe were set in place, the boring was backfilled with clean silica sand from the bottom of the boring to just above the top of the well screen. The temporary wells were then sampled utilizing a peristaltic pump and dedicated Teflon tubing. Upon completion of sampling the well, the tubing and 1-inch PVC was removed

and the remainder of the boring was filled with bentonite pellets which were then hydrated in accordance with the manufacturer's recommendations.

2.4.2 Monitoring Well Protection

After each permanent monitoring well was installed and the annulus grouted to the land surface, a 4-inch-square, 5 foot long, steel protective casing with a locking cap was cemented in place over the riser pipe. This stick-up-type protective casing extended approximately 3 feet above and 2 feet below the ground surface. A drain hole was drilled into the protective casing approximately 6 inches above the ground surface. Pea gravel was used to fill the space between the outer protective casing and the riser pipe. A 4-foot-square (2-foot square along railroad corridor due to travel restrictions) and 6-inch-thick concrete apron was cemented in place around the protective casing, and two to four safety yellow barrier posts (nominal 4-inch-diameter, 5-foot-long steel pipes buried 2 feet deep and filled with concrete) were cemented around the outside of the concrete apron. Stainless steel well plates indicating well ID, depth, date, etc. were installed on the outside of each protective well casing. To maintain well security, a locking cap was placed on each well.

2.4.3 Monitoring Well Repair and Development

Repairs to monitoring wells were not required because no existing TtNUS wells were present at SWMU 13 at the initiation of the Round 1 field investigation.

Well Development

All newly installed permanent monitoring wells were developed by surging and pumping methods no sooner than 24 hours after installation to remove fine material from around the well screen and the sand pack that surrounds the well screen. The period of development for each well was approximately 1 hour. If the well was pumped dry, TtNUS personnel typically waited 20 to 30 minutes, noted the rate of recharge, and then pumped the well dry a minimum of two more times in an effort to maximize the amount of fine material removed. Development continued and was considered complete when one of the following was achieved: the development water was clear to the unaided eye, five well volumes were removed, or the well was pumped dry three times.

Wells were developed by up to three surging and purging techniques (a surge block with Whale® pump, a bailer, or a check valve method). The surge block/Whale® pump method consisted of inserting a 2-inch surge block into the well and surging over the length of the saturated screen for a minimum of 5 minutes. Immediately after surging, the Whale® pump was lowered into the well and was pumped in accordance

with SOP CTO 166-10. The bailer method consisted of purging the well over the length of the saturated screen and removing water and fines. The check valve method involved attaching a decontaminated foot valve to new, dedicated, ¾-inch polyethylene tubing, extending the tubing to the bottom of the well, and both surging and purging by moving the tubing in an up and down motion. On the downward stroke, the ball in the foot valve lifts and the tubing fills with water, and on the upward stroke, the ball is set and surged groundwater is forced out of the tubing and into a purge bucket. Section 2.14 describes the disposal of all IDW including development fluids.

Water-quality parameters [pH, specific conductivity, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity], pumping rates, volumes of groundwater removed, recharge rates, and water levels were recorded on monitoring well development records. Monitoring well development records for Rounds 1, 2 and 3 can be found in Appendix C of this document.

2.5 SAMPLING OPERATIONS

This section discusses the methodology for soil, surface water, sediment, and groundwater sampling activities and aquifer testing performed at SWMU 13. Table 2-3 provides a summary of all proposed versus actual samples collected during each round, as well as a list of the analyses. Table 2-3 also provides the reasoning as to why a proposed sample was not collected or why additional samples were collected.

2.5.1 Soil Sample Collection

During the RFI investigations, 29 soil samples were collected from 15 sampling locations during Round 1, 19 soil samples were collected from 10 sampling locations during Round 2, 39 soil samples were collected from 22 sampling locations during Round 3, 67 soil samples were collected from 25 sampling locations during the external sump/drainage investigation, and 58 soil samples were collected from 34 sampling locations during the PCB delineation investigations. Soil samples were collected in accordance with SOP CTO 166-08. See Figures 2-1 and 2-5 for all soil boring locations. Soil sample log sheets are included in Appendix C.1 of this document.

2.5.1.1 Surface Soil Sampling

Surface soil samples were collected from the ground surface to a maximum depth of 2 feet bgs unless refusal was encountered prior to the 2 feet bgs using DPT, Rotosonic, or hand augering methods. Upon retrieval, all samples were monitored for the presence of VOCs using a PID. The results of this screening were recorded on boring logs and/or soil sample log sheets (included in Appendix B.1 and Appendix C.1,

respectively, of this document). Samples for VOC analyses were collected first from the 0.5- to 1.0- or 2.0-foot bgs interval that had the highest PID reading. Samples to be analyzed for VOCs were collected using 5-gram EnCore™ samplers. Sample aliquots for the other analyses were collected from the remaining soil core within the 0- to 2-foot depth interval and placed in the appropriate containers following homogenization.

Round 1

Fifteen of the proposed 16 surface soil samples were collected at SWMU 13 during Round 1. One surface soil sample was collected from each of the 15 soil borings from the ground surface to depths of 1 to 2 feet bgs using DPT, Rotosonic, or hand augering methods. Surface soil sample 13SS160002 was not collected during Round 1; however, a sample at this proposed location was collected during Round 2.

Round 2

All 10 proposed surface soil samples were collected at SWMU 13 during Round 2. One surface soil sample was collected from each of the 10 soil borings from the ground surface to depths of 1 to 2 feet bgs using hand augering.

Round 3

All 13 proposed surface soil samples were collected at SWMU 13 utilizing DPT during Round 3.

External Sump/Drainage Investigation

All 25 of the proposed surface soil samples were collected at SWMU 13 during the external sump/drainage investigation. All locations but one were drilled using DPT.

PCB Delineation Investigations

Thirty-two of the proposed 33 surface soil samples were collected at SWMU 13 during the PCB delineation investigation. All locations but one were bored utilizing a hand auger. One sample was collected via a hand trowel.

2.5.1.2 Subsurface Soil Sampling

Upon retrieval, all subsurface samples were monitored for the presence of VOCs using a PID. The results of this screening were recorded on the boring logs and/or soil sample log sheets. Samples for VOC

analyses were collected first from the interval that had the highest PID reading using 5-gram EnCore™ samplers. The remaining soil core material was then homogenized, and soil to be analyzed for other parameters was placed into the required containers. Subsurface soil sample intervals for SWMU 13 are listed in Table 2-1 for Rounds 1, 2, 3, the external sump/drainage investigation, and the PCB delineation investigation.

Round 1

Fourteen of the proposed 16 subsurface soil samples were collected at SWMU 13 during Round 1. Proposed sample 13SB140204 was not obtained due to refusal encountered before reaching the target depth (2 to 4 feet) for subsurface soil sample collection. Proposed sample 13SB160204 was not collected during Round 1 because of refusal at 1 foot. Subsurface samples were collected from a 2-foot interval between 2 to 10 feet bgs using DPT, Rotosonic drilling, or hand augering.

Round 2

Nine of the proposed 10 subsurface soil samples were collected at SWMU 13 during Round 2. Sample 13SB200204 was not collected due to encountering refusal before reaching the target depth (2 to 4 feet). All subsurface soil samples collected during Round 2 were obtained from a 2-foot interval between 2 to 4 feet bgs using hand augering.

Round 3

Twenty-six subsurface soil samples were collected from 22 soil boring locations at SWMU 13 during Round 3. All subsurface soil samples were collected from 2-foot intervals between 2 to 8 feet bgs using DPT.

External Sump/Drainage Investigation

Forty-two of the 73 proposed subsurface soil samples were collected at SWMU 13 during the external sump/drainage investigation. The actual depth of the subsurface sample varied depending on the depth at refusal, or if the boring was associated with a sump, the sample was collected at a two foot interval equal to the depth of the bottom of the sump. All locations but one were drilled using DPT.

PCB Delineation Investigations

Twenty-seven of the 38 proposed subsurface soil samples were collected at SWMU 13 during the PCB delineation investigation. The maximum depth of a subsurface sample was 8 feet bgs utilizing a hand auger.

2.5.2 Surface Water/Seep Sampling

Surface water samples were collected from intermittent streams, drainage ditches, and surface runoff locations throughout SWMU 13 during Rounds 1, 2, and 3. During the external sump/drainage investigation, water samples were collected within catch basins and sumps. Seep samples were also collected during Round 2. All sample locations were marked with a labeled, wooden survey stake. Fluorescent flagging was tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for surveying purposes. All surface water samples were collected in accordance with the respective approved QAPP. All pertinent field data, including water quality parameters, sampling methods, and locations were recorded on a surface water sample log sheet (see Appendix C). See Figure 2-3A (Rounds 1, 2, 3, and PCB delineation investigations) and Figure 2-5 (external sump/drainage investigation) for all surface water, sump, and seep sampling locations. Note that all water samples collected during the external sump/drainage investigation are labeled as SU (sump).

Round 1

All 13 proposed surface water samples were collected at SWMU 13 during Round 1.

Round 2

Twenty-two of the 23 proposed surface water sample locations at SWMU 13 were collected. Sample 13SW2901 was not collected due to the absence of water at the time of sampling. Four of the five proposed seep samples were sampled during Round 2. Location 13SP0501 was not sampled due to dry conditions.

Round 3

All 11 proposed surface water sample locations at SWMU 13 were collected during Round 3. Seven of the 11 locations were initially found to be dry during the sampling period in early October 2004. However, after significant rainfalls over a 2-week period, the locations were revisited in November 2004, and the remaining seven samples were collected.

External Sump/Drainage Investigation

Two of the nine proposed sump water samples were collected at SWMU 13 during the external sump/drainage investigation. Samples were collected within concrete catch basins or sumps via direct fill when possible, or by utilizing a stainless steel scoop which was field decontaminated between samples.

PCB Delineation Investigations

No surface water samples were proposed during either of the PCB delineation investigations.

2.5.3 Sediment Sampling

Sediment samples were collected from intermittent streams, drainage ditches, and surface runoff locations at SWMU 13 during Rounds 1, 2, 3, and PCB delineation investigation. Sediment samples collected during the external sump/drainage investigation were collected within concrete catch basins and sumps. Based on previous results at SWMU 13 regarding potential ecological risk resulting from metals in sediment samples, U.S. EPA Region 5 commented that sediment samples should also be collected at a location of the nearest permanent aquatic habitat. Therefore, 10 additional sediment samples (13SD3601 to 13SD4501) were collected at SWMU 13 during Round 5 for metals analysis. All samples were collected in depositional areas that contained predominantly fine (clay and silt) particles. All sediment samples were collected at a depth of 0 to 4 inches bgs. Round 1 sediment samples were collected in accordance with the approved QAPP (TtNUS, 2003a). Round 2 sediment samples were collected in accordance with Addendum No. 1 to the approved QAPP (TtNUS, 2003b). Round 3 sediment samples were collected in accordance with Addendum No. 2 to the approved QAPP (TtNUS, 2004). Sediment samples collected during the external sump/drainage and PCB delineation investigations were collected in accordance with the approved QAPP Addendum No. 4. All locations were marked with a labeled, wooden survey stake. Fluorescent flagging was tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for surveying purposes. All pertinent field data, including sampling methods, depths, descriptions, and locations were recorded on sediment sample log sheets (see Appendix C.2). Figure 2-3A shows all sediment sample locations for Rounds 1, 2, 3, and the PCB delineation investigations. Figure 2-3B shows the additional periphery sediment sample locations, and Figure 2-5 shows all sediment sample locations during the external sump/drainage investigation. Note that all sediment samples collected during the external sump/drainage investigation are labeled as SL (sludge).

Round 1

Twenty-three sediment samples were collected at SWMU 13 during Round 1. Originally, 22 locations were proposed; however, sample location 13SD23 was added based on field observations (an additional culvert located near the northern corner of the site was discovered and sampled during the field investigation).

Round 2

Nine sediment samples were collected at SWMU 13 during Round 2. Six of the nine new sampling locations were located in drainage gullies southeast of SWMU 13, and three were located northeast of SWMU 13. These locations are all downstream of SWMU 13 and were used to evaluate how far contaminants may have migrated from the site.

Round 3

All eight proposed sediment locations were sampled at SWMU 13 during Round 3. Many of the sample locations were dry; however, sediment samples were collected in areas where the finest particles were found.

Additional Sediment Sampling

All ten proposed sediment locations were sampled at SWMU 13 during the additional sediment sampling event.

External Sump/Drainage Investigation

All 9 proposed sediment (sludge) samples were collected at SWMU 13 during the external sump/drainage investigation. Samples were collected within concrete catch basins or sumps via stainless steel hand trowels when possible, or by utilizing a stainless steel scoop which was field decontaminated between samples.

PCB Delineation Investigations

Thirty-one of the 33 originally proposed sediment samples were collected at SWMU 13 during the PCB delineation investigations. Four additional samples were added during the field investigation based on a suspected hydrocarbon odor (two depths at 13SD51 and two depths at 13SD52). Sample location

13SD47 was inside a concrete basin and did not contain any sediment. Sample location 13SD58 was dropped during the field investigation.

2.5.4 Groundwater Purging and Sampling

Purging and stabilization of wells prior to sampling was accomplished using low-flow techniques in accordance with SOP CTO 166-15 and SOP CTO 166-16. Sampling was accomplished in accordance with SOP CTO 166-05. Sample analytes are provided in Table 2-3.

Wells were purged prior to sampling using a peristaltic pump or bladder pump, depending on the static water level, well depth, and recharge information obtained during well development. In general, bladder pumps were used to sample wells with a static water level greater than 28 feet bgs, and peristaltic pumps were used to sample wells with a static water level less than 28 feet bgs. Based on historical data and proposed future quarterly monitoring, six monitoring wells were outfitted with dedicated bladder pumps and tubing during Round 3.

Groundwater quality parameters including pH, specific conductance, temperature, DO, and ORP were measured during purging at 5- to 10-minute intervals using a YSI Model 600 series multi-parameter water quality meter and flow-through cell. Longer intervals were used for slower pumping wells. Turbidity readings were measured using a LaMotte 2020 turbidity meter. Water levels and pumping rates were also measured during purging at 5- to 10-minute intervals. Purging continued until a minimum of one well volume was removed and the above parameters stabilized, or until the well had been purged for 4 hours, in accordance with SOP CTO 166-16 and SOP CTO 166-15. To the extent possible, the pumping rates were adjusted to prevent drawdown from exceeding 0.3 foot during purging. Copies of the monitoring well low-flow purge data sheets and groundwater sample log sheets for all locations are provided in Appendix C.4 of this document.

Monitoring wells were sampled with the same pump (peristaltic or bladder) and tubing used during well purging. Immediately following the purging process and before sampling, the temperature, pH, specific conductance, DO, ORP, and turbidity were measured and recorded on the groundwater sample log sheets (included in Appendix C.4).

Sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Samples for VOC analysis were collected by the straw method when using the peristaltic pump and by direct pumping when using the bladder pump. These samples were immediately sealed in 40-mL vials so that no headspace existed. Samples for SVOCs, explosives,

explosive picrates, total metals, total mercury, ammonia, nitrate, dissolved metals, and dissolved mercury were collected next and in the order listed (when applicable). Samples with turbidity values greater than 10 nephelometric turbidity units (NTUs) were field filtered for dissolved metals analyses prior to sample preservation using a 0.45 micron in-line filter. All pertinent field data, including sampling methods, purge information, pump intake depths, and locations were recorded on low-flow purge data sheets and groundwater sample log sheets (see Appendix C). See Figure 2-2 for all groundwater sampling locations.

During Rounds 2 and 3, several wells were also sampled for natural attenuation field parameters including DO, alkalinity, carbon dioxide, ferrous iron, hydrogen sulfide, sulfide, nitrite, and manganese.

Round 1

Twenty-eight groundwater samples were collected at SWMU 13 during Round 1. Twenty-six new wells (13MWT01 through 13MWT26) were installed, developed, and sampled, and monitoring wells 13MWT09 and 13MWT20 were sampled twice for SVOCs only due to low surrogate recoveries during laboratory analysis. Monitoring wells 13MWT06 and 13MWT25 were slow-recovering wells, and it took several days to fill the required containers.

Round 2

Forty-seven groundwater samples were collected at SWMU 13 during Round 2. Twenty-one new wells (13MWT27 through 13MWT47) were installed, developed, and sampled during Round 2. Monitoring wells 13MWT06 and 13MWT45 were slow-recovering wells, and it took several days to fill the required containers. Monitoring well 13MWT28 went dry after purging and the collection of a 1-liter explosives sample. The remaining samples for 13MWT28 were collected the following day.

Round 3

Fifty-one groundwater samples were collected at SWMU 13 during Round 3. Four new wells were installed (13MWT48 through 13MWT51), developed, and sampled during Round 3. Sample 13GWT0603 was a very slow-recovering well, and sampling was completed over a 3-day period. Dedicated bladder pumps and associated tubing were installed in monitoring wells 13MWT01, 13MWT11, 13MWT17, 13MWT34, 13MWT40, and 13MWT51.

External Sump/Drainage Investigation

Twelve temporary groundwater monitoring wells were placed in soil borings that exhibited water bearing tendencies at SWMU 13 during the external sump/drainage investigation. Due to the temporary wells having low water levels and slow recharge rates all waters withdrawn from the wells were used for samples.

PCB Delineation Investigation

No groundwater monitoring wells were proposed for sampling during the PCB delineation investigations.

2.5.5 Vegetation Sampling

Nine vegetation samples were collected from nine locations in the wooded area on the western side of SWMU 13 during Round 3 from the two most abundant tree species (sugar maple and white oak) and the most abundant herbaceous species (white snake root). An acorn sample (approximately 40 grams) was also collected from a white oak for analysis. Recently fallen acorns were collected from the ground surface within the canopy of the tree because collection from the tree itself was not implementable. All samples were collected in accordance with SOP CTO 166-24 (TtNUS, 2004). All proposed vegetation samples (species and rinsate) were collected during Round 3 at SWMU 13 (see Table 2-3). See Figure 2-4 for the nine vegetation sampling locations and Appendix C.5 for the plant tissue sample log sheets.

2.6 FIELD SAMPLE DOCUMENTATION

Sample documentation consisted of the completion of boring logs, matrix-specific sample log sheets, sample bottle tags, chain-of-custody records, field task modification request (FTMR) forms, equipment calibration log sheets, field logbooks, and health and safety documentation. Field documentation was completed as per SOP CTO 166-03. The sample log sheets contain information such as sample location and sample ID, container requirements and analyses to be performed, sample type, time, date, and method of sample collection. Any unusual circumstances encountered during sample collection were noted on the form. Sample log sheets can be found in Appendix C of this document. Chain-of-custody records (see Appendix C.6) were used to track each sample from collection to receipt and analysis at the laboratory. FTMRs (see Appendix C.10) were used to document deviations from the approved QAPP and Addenda No. 1 and 2 to the approved QAPP. Equipment calibration log sheets are discussed in Section 2.9.1 and can be found in Appendix C.11 of this document. Upon completion of sample analyses, sample bottle tags were forwarded by laboratory personnel to the NSWC Crane EPD for storage.

2.7 SAMPLE HANDLING, PACKAGING, AND SHIPPING

Sample handling activities included field-related considerations concerning the selection of sample containers, preservatives, allowable holding times, sample custody, and maintaining samples at the appropriate storage temperature. Sampling containers were sealed in Ziploc® plastic bags, and glass containers were wrapped in plastic bubble wrap to minimize the possibility of breakage during transport. The sample containers were then placed in a cooler lined with a large plastic garbage bag. The cooler was packed with a cushioning material (bubble wrap) to prevent container breakage. Samples were cooled immediately after collection with ice placed over the sample containers. A temperature blank was placed in each cooler prior to shipment. The plastic garbage bag was sealed with a knot, and the chain-of-custody form was sealed in a Ziploc® bag and taped to the inside of the cooler lid. A signed and dated custody seal was applied to each end of the cooler and then covered with strapping tape to provide a tamper-evident seal. A Federal Express® airbill was applied to the shipping cooler. TtNUS maintained custody of the samples until they were relinquished to Federal Express®. The Federal Express® tracking number (airbill number) was recorded on the chain-of-custody form, and the sender's copy of the airbill was maintained for shipment tracking, if needed. All samples were shipped to the laboratory for overnight delivery and were received within sample holding times. Sample bottle tags were removed from each sample bottle by laboratory personnel and forwarded to the NSWC EPD.

2.8 QUALITY CONTROL SAMPLES

Quality assurance (QA)/quality control (QC) samples were generated and collected during sampling activities to monitor both field and laboratory procedures. These procedures are detailed in the approved QAPP and QAPP Addenda. QA/QC samples included field duplicates, equipment rinsate blanks, trip blanks, source water blanks, and temperature blanks. Field duplicate results are tabulated in Appendix G (Analytical Data) of this document. These types of QA/QC samples are briefly described below.

- Field Duplicates - Field duplicates consisted of two samples collected either independently at a sampling location at approximately the same time in the case of soil or sediment VOC samples, groundwater, and surface water or as a single sample split into two portions in the case of non-VOC soil and sediment samples. Field duplicates were collected at the rate of 1 in 10 per medium during Round 1 and Round 2 and 1 in 20 per medium during Round 3 and the external sump/drainage investigation and were used to assess the overall precision of the sampling and analysis program.

- Equipment Rinsate Blanks - Equipment rinsate blanks were obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through or over

sample collection equipment after decontamination and before use. When pre-cleaned, dedicated, or disposable sampling equipment was used (no decontamination was required), one equipment rinsate blank was collected as a batch blank. Additionally, bladder pump equipment rinsate blanks were collected at a rate of one equipment rinsate blank for every five samples (see the FTMR form in Appendix C.10). Equipment rinsate blanks were analyzed for the same chemical constituents as the associated environmental samples.

- Trip blanks - Trip blanks were used to determine whether contamination of VOC samples had occurred during transit or storage. Trip blanks consisted of analyte-free water taken from the laboratory to the site and returned to the laboratory. One trip blank was submitted to the laboratory in each cooler that contained samples for VOC analyses and was analyzed for VOCs only.

- Source water blanks - Source water blanks were obtained by sampling the analyte-free water and potable water source(s) used for decontamination of sampling equipment. Source water blanks were used to determine whether analyte-free water or potable water (used for steam cleaning, etc.) contributed to sample contamination.

- Temperature blanks - Temperature blanks were used to determine if samples were adequately cooled during shipment. Temperature blanks consisted of analyte-free water poured into a clean sample container at the site or supplied by the fixed-based laboratory. One temperature blank was submitted to the laboratory in each cooler, and the temperature was checked upon receipt at the laboratory.

2.9 FIELD INSTRUMENT MEASUREMENTS

Field measurements taken and recorded during field sampling operations included water temperature, pH, specific conductance, ORP, DO, turbidity, and groundwater level measurements. Ambient air measurements included monitoring of organic vapors in the breathing zone during intrusive field investigation activities and monitoring of organic vapors emanating from site sources such as soil samples and well casings. Several instruments were used during field activities to obtain these measurements including the following:

- PID
- Multi-parameter water-quality meter
- LaMotte 2020 turbidity meter
- M-scope water level indicator

2.9.1 Equipment Calibration

Instruments used in the field were calibrated daily prior to use according to manufacturers' requirements and in accordance with applicable SOPs. Equipment calibration logs can be found in Appendix C.11.

2.9.2 Field Investigation Preventive Maintenance Procedures/Schedule

Field instruments for this project included the PID, YSI water-quality meter, LaMotte 2020 turbidity meter, and water level indicator. The specific preventive maintenance procedures followed for field equipment were those recommended by the equipment manufacturers.

An appropriate maintenance check was performed daily on each piece of equipment. If damaged or defective parts were identified during the maintenance check, and it was determined that the damage could have an impact on the instrument's performance, the instrument was removed from service until the defective parts were repaired or replaced. Critical spare parts were kept on site to reduce downtime. Spare parts included batteries, a DO probe membrane kit (membranes and a bottle of solution), and air particle filters for the PID. Back-up instruments and equipment were available on site or were shipped within 1 day via overnight courier to avoid delays in the field schedule.

2.10 SURVEYING

All monitoring well, soil boring, surface water/sediment, staff gauge, seep, and sump sampling locations were surveyed. The top of the riser pipe (where the uncapped well riser is marked), the top of the protective casing, and the ground surface at each monitoring well location were surveyed to within 0.01-foot vertical accuracy. For all other locations (soil boring, sediment, seeps, vegetation, and staff gauges), the ground surface elevation was surveyed to the nearest 0.10-foot. Staff gauge reference point elevations were also surveyed to the nearest 0.01 foot. Vertical elevations were referenced to the 1988 North American Vertical Datum (NAVD88). Existing survey monuments at NSWC Crane were used as reference points. Horizontal locations of samples, borings, wells, and sump pumps were surveyed to Indiana State Plane coordinates to the nearest 0.10 foot and referenced to the 1927 North American Datum (NAD27). All surveying was performed by a surveyor professionally licensed in the State of Indiana. Copies of the survey data can be found in Appendix D.3.

2.11 DECONTAMINATION

The nondedicated, nondisposable equipment involved in field sampling activities was decontaminated before beginning work, during drilling and sampling activities, and at the completion of each round of RFI

activities in accordance with SOP CTO 166-16. This equipment included drilling rigs, down-hole tools, augers, and soil and water sampling equipment.

2.11.1 Major Equipment

All down-hole equipment, including down-hole drilling tools, were steam cleaned with high-pressure hot water prior to beginning work, between borings, and at the conclusion of each shift of drilling. Well riser pipe and screens were supplied at the site in certified-clean packaging. All decontamination activities took place at a predetermined area within NSWC Crane.

2.11.2 Sampling Equipment

All nondedicated (reusable) equipment used for collecting samples was decontaminated before field sampling, between sample collections, and at the end of each sampling event. This equipment included stainless steel trowels, stainless steel mixing bowls, bladder pumps, etc. The following decontamination steps were taken:

- Potable water and phosphate-free detergent wash (scrub if necessary)
- Potable water rinse
- Deionized (DI) water rinse
- Air dry (if possible)
- Wrap in aluminum foil (if not to be used immediately)

An isopropanol rinse was not necessary because no oily residue was evident on the sampling equipment.

Field analytical equipment such as pH, conductivity, and temperature probes were rinsed first with analyte-free water then with the sample prior to making measurements. Water level measurement devices were rinsed with DI water.

2.12 WATER LEVEL MEASUREMENTS AND AQUIFER TESTING

2.12.1 Groundwater Level Measurements

Water level measurements were obtained from each monitoring well prior to development and purging. In addition, complete synoptic rounds of water levels including all the wells were taken at the end of each round of field activities. Each round of synoptic water level measurements was obtained within a 24 to 48 hour time period. Measurements were taken with an electrical water level indicator (M-scope), using

the top of the riser pipe as the reference point to determine water depth for monitoring wells and using a surveyed mark for staff gauge measurements. All measurements were taken in accordance with the specific SOP contained each respective QAPP. A mark was placed at the top of the riser pipe to ensure that measurements were taken from a consistent reference point. Water level measurements and staff gauge measurements were recorded to the nearest 0.01 foot on groundwater level measurement forms, which are provided in Appendix C of this document. Table 2-2 contains water level/elevation data for each round.

2.12.2 Staff Gauge Installation and Estimation of Stream Flow

A total of 18 staff gauges were installed at the culverts of drainage ditches and intermittent streams where flowing water was observed by either a metal stake or painted mark on the concrete culvert. Marks were placed on each of these permanent structures denoting the staff gauge number and the point where measurements would be taken. Refer to Figure 2-3A for staff gauge locations at SWMU 13.

Stream flow estimates were made based on visual observations and can be found in Appendix C. Due to shallow depths, dense grassy cover, and/or natural features interfering with adequate unrestricted stream/drainage ditch runs, stream flow measurement SOP CTO 166-20 could not be followed at many sampling locations.

2.12.3 Aquifer Testing

Slug tests were performed at SWMU 13 to determine the hydraulic characteristics of the formation in the immediate vicinity of the wells. Slug tests were performed in eight monitoring wells (13MWT02, 08, 11, 14, 15, 17, 20, and 26) at SWMU 13 during Round 1, 11 wells (13MWT30, 32, 33, 34, 35, 37, 38, 42, 45, 46, and 47) during Round 2, and four wells (13MWT48, 49, 50, and 51) during Round 3 (see Appendix E). Slug test data evaluation results are discussed in Section 4.6.

During slug testing, the change in water level in the wells was induced by withdrawing (rising head) or introducing (falling head) a solid PVC slug with a volume equivalent to approximately 2 to 3 feet of displacement in a 2-inch well. In some instances, one or two bailers (one bailer induces approximately 1.5 feet of displacement in a 2-inch well) were used to withdraw water to initiate the water level change. Monitoring wells with a water level below the top of the well screen were tested using the rising head method and in most cases using a bailer to induce the water level change. Monitoring wells with 3 feet or less of standing water were not slug tested.

Prior to performing each slug test, the static water level in the monitoring well was measured using an electronic water level indicator. Water levels were recorded with a pressure transducer at linear and logarithmic intervals of time via a programmed electronic data logger as the water level returned to the original static water level. The time and rate of change required for the water level to return to the original static water level are functions of the transmissivity and hydraulic conductivity of the aquifer. The resulting drawdown data from the slug tests were evaluated using the Hvorslev Method (Fetter, 1998). The geometric mean is the best measure of central tendency; therefore, the average hydraulic conductivity for the site was presented as the geometric mean of the test results.

2.13 FIELD CORRECTIVE ACTION

Corrective action includes the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or "out of QC" performance that can affect data quality, and the process of modifying procedures to address unexpected/unusual field conditions encountered.

Corrective action in the field resulted when substantive changes were made to the sampling network (i.e., more/fewer samples collected, sampling locations other than those specified, etc.) and when sampling procedures or field analytical procedures required modification. Project personnel reported all suspected technical or QA nonconformance or suspected deficiencies of any activity or issued document to the FOL or designee. The Task Order Manager (TOM) was responsible for assessing the suspected problems in consultation with the project QA/QC Manager and for making a decision based on the potential for the situation to affect the quality of the resulting data. If it was determined that the situation warranted a reportable nonconformance requiring corrective action, a nonconformance report was initiated by the TOM.

No nonconformances or suspected deficiencies occurred during any of the field investigations. However, 14 deviations from the approved QAPP occurred during the Round 1 RFI activities, and one deviation from the Addendum No. 1 to the approved QAPP occurred during Round 2. No deviations from the Addendum No. 2 to the approved QAPP occurred during Round 3. Deviations were addressed using FTMR forms, copies of which are included in Appendix C.

2.14 INVESTIGATION-DERIVED WASTE HANDLING

The field investigations generated several types of potentially contaminated wastes including personal protective equipment (PPE), decontamination fluids from the drill rig, backhoe, and bulldozer, sampling

equipment decontamination fluids, DPT plastic sleeves, development and purge water, and soil cuttings. Management of each residue was performed as follows:

PPE, Pump Tubing, and DPT Plastic Sleeves – All PPE, tubing, and plastic sleeves were decontaminated, double bagged, and placed in NSWC Crane trash receptacles (i.e., dumpsters).

Purge Water, Development Water, Drill and Sampling Equipment Decontamination Fluids – All well development and purge waters and equipment decontamination fluids were collected and discharged to the NSWC Crane permitted waste treatment plant.

Waste Cuttings and Rock Cores from Drilling Activities – For each boring, the cuttings produced were scanned for VOCs. VOC readings were at background levels for all borings, and cuttings were therefore used as backfill if the boring terminated above the water table. Any remaining cuttings were spread on the ground in the immediate vicinity of the boring.

Additional requirements for IDW handling can be found in the specific IDW SOP contained in the appendix of each respective QAPP.

2.15 SITE MANAGEMENT AND FACILITY SUPPORT

The FOL was designated as the lead in coordinating all day-to-day activities during the investigation. The FOL was responsible for ensuring that all field team members (including subcontractors) were familiar with the approved QAPP for Round 1, Addendum No. 1 to the approved QAPP for Round 2, Addendum No. 2 to the approved QAPP for Round 3, and the HASP that was in effect during each round. Additionally, the FOL was responsible for all sampling operations, QA/QC, field documentation requirements, and field change orders. The FOL reported to the TOM on a daily basis regarding the status of fieldwork.

All site preparation, mobilization/demobilization, and sampling activities were coordinated through NSWC Crane personnel through pre-visit communication and daily meetings during field work.

2.16 RECORDKEEPING

Various hardcover, bound record books were maintained for each field activity in accordance with SOP CTO 166-03. The Master Site Logbook served as the overall record of field activities. Information recorded daily in the Master Site Logbook included daily field activities, weather conditions, identity and

arrival and departure times of personnel, management issues, etc. Various field notebooks were also maintained. For example, the site geologist supervising monitoring well installation operations maintained a field notebook. Copies of field log books are included in Appendix D. Daily electronic activity logs were also maintained during some of the field events and copies can also be found in Appendix D.

The FOL was responsible for the maintenance and security of all field records. Eventually, all field records, chain-of-custody forms, sample log sheets, field forms, logbooks, and notebooks were docketed and incorporated in the central project file for CTO 0279 and CTO 0343.

2.17 RESTORATION AND REVEGETATION

Site restoration and revegetation was conducted in areas impacted by drilling activities and/or heavy equipment (i.e. backhoe and bulldozer) operations at SWMU 13.

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[(1)]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
Groundwater Monitoring Wells				
13MWT01	15.0	RS	30-Mar-03	NA
13MWT02	27.0	RS	29-Mar-03	NA
13MWT03	15.0	RS	30-Mar-03	NA
13MWT04	15.0	RS	30-Mar-03	NA
13MWT05	16.0	RS	29-Mar-03	NA
13MWT06	15.0	RS	7-Apr-03	NA
13MWT07	15.0	RS	29-Mar-03	NA
13MWT08	15.0	RS	30-Mar-03	NA
13MWT09	20.0	RS	1-Apr-03	NA
13MWT10	25.0	RS	27-Mar-03	NA
13MWT11	15.0	RS	28-Mar-03	NA
13MWT12	20.0	RS	27-Mar-03	NA
13MWT13	19.0	HSA	23-Apr-03	NA
13MWT14	23.0	RS	31-Mar-03	NA
13MWT15	25.0	RS	25-Mar-03	NA
13MWT16	15.0	RS	27-Mar-03	NA
13MWT17	18.0	RS	26-Mar-03	NA
13MWT18	30.0	RS	26-Mar-03	NA
13MWT19	19.0	RS	31-Mar-03	NA
13MWT20	20.0	RS	1-Apr-03	NA
13MWT21	15.0	RS	24-Mar-03	NA
13MWT22	15.0	RS	28-Mar-03	NA
13MWT23	21.5	RS	1-Apr-03	NA
13MWT24	22.0	RS	1-Apr-03	NA
13MWT25	15.0	RS	28-Mar-03	NA
13MWT26	20.0	RS	28-Mar-03	NA
13MWT27	21.0	RS	05-Nov-03	NA
13MWT28	88.0	RS	03-Nov-03	NA
13MWT29	20.0	HSA	04-Nov-03	NA
13MWT30	25.0	HSA	06-Nov-03	NA
13MWT31	20.0	HSA	05-Nov-03	NA
13MWT32	25.0	RS	10-Oct-03	NA
13MWT33	20.0	HSA	06-Nov-03	NA
13MWT34	20.5	HSA	11-Nov-03	NA
13MWT35	69.0	RS	19-Nov-03	NA
13MWT36	26.0	HSA	05-Nov-03	NA
13MWT37	25.0	RS	24-Oct-03	NA
13MWT38	80.0	RS	04-Nov-03	NA

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[(1)]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
13MWT39	25.0	RS	04-Nov-03	NA
13MWT40	25.5	RS	23-Oct-03	NA
13MWT41	66.0	RS	10-Nov-03	NA
13MWT42	25.0	RS	22-Oct-03	NA
13MWT43	21.0	RS	06-Nov-03	NA
13MWT44	88.0	RS	06-Nov-03	NA
13MWT45	84.0	RS	10-Nov-03	NA
13MWT46	68.0	RS	22-Nov-03	NA
13MWT47	21.0	RS	19-Nov-03	NA
13MWT48	10.5	HSA	28-Jul-04	NA
13MWT49	9.5	HSA	27-Jul-04	NA
13MWT50	26.0	HSA/AR	27-Jul-04	NA
13MWT51	16.0	HSA	27-Jul-04	NA
Soil Borings				
13SB01	4.0	DPT	25-Mar-03	0-2, 2-4
13SB02	4.0	DPT	25-Mar-03	0-2, 2-4
13SB03	4.0	DPT	25-Mar-03	0-2, 2-4
13SB04	4.0	DPT	25-Mar-03	0-2, 2-4
13SB05	4.0	DPT	25-Mar-03	0-2, 2-4
13SB06	4.0	DPT	25-Mar-03	0-2, 2-4
13SB07	10.0	DPT	26-Mar-03	0-2, 8-10
13SB08	8.0	RS	30-Mar-03	0-2, 6-8
13SB09	4.0	DPT	26-Mar-03	0-2, 2-4
13SB10	4.0	DPT	26-Mar-03	0-2, 2-4
13SB11	4.0	DPT	26-Mar-03	0-2, 2-4
13SB12	4.0	DPT	26-Mar-03	0-2, 2-4
13SB13	4.0	DPT	26-Mar-03	0-2, 2-4
13SB14	2.0	HA	10-Apr-03	0-2
13SB15	4.0	DPT	10-Apr-03	0-2, 2-4
13SB16	4.0	HA	8-Dec-03	0-2, 2-4
13SB17	4.0	HA	8-Dec-03	0-2, 2-4
13SB18	4.0	HA	8-Dec-03	0-2, 2-4
13SB19	3.0	HA	8-Dec-03	0-2, 2-3
13SB20	1.0	HA	8-Dec-03	0-1
13SB21	4.0	HA	8-Dec-03	0-2, 2-4
13SB22	4.0	HA	8-Dec-03	0-2, 2-4
13SB23	4.0	HA	8-Dec-03	0-2, 2-4
13SB24	3.0	HA	8-Dec-03	0-2, 2-3

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[(1)]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
13SB25	4.0	HA	8-Dec-03	0-2, 2-4
13SB26	4.0	DPT	10-Aug-04	0-2, 2-4
13SB27	4.0	DPT	10-Aug-04	0-2, 2-4
13SB28	8.0	DPT	10-Aug-04	2-4, 4-6
13SB29	4.0	DPT	10-Aug-04	0-2, 2-4
13SB30	4.0	DPT	11-Aug-04	0-2, 2-4
13SB31	8.0	DPT	10-Aug-04	4-6, 6-8
13SB32	4.0	DPT	10-Aug-04	0-2, 2-4
13SB33	4.0	DPT	10-Aug-04	0-2, 2-4
13SB34	4.0	DPT	10-Aug-04	0-2, 2-4
13SB35	4.0	DPT	10-Aug-04	0-2, 2-4
13SB36	4.0	DPT	10-Aug-04	0-2, 2-4
13SB37	4.0	DPT	10-Aug-04	0-2, 2-4
13SB38	4.0	DPT	10-Aug-04	0-2, 2-4
13SB39	4.0	DPT	10-Aug-04	0-2, 2-4
13SB40	4.0	DPT	10-Aug-04	0-2, 2-4
13SB41	8.0	DPT	10-Aug-04	4-6, 6-8
13SB42	8.0	DPT	10-Aug-04	4-6, 6-8
13SB43	4.0	DPT	10-Aug-04	2-4
13SB44	4.0	DPT	10-Aug-04	2-4
13SB45	8.0	DPT	11-Aug-04	4-6
13SB46	8.0	DPT	10-Aug-04	4-6
13SB47	4.0	DPT	11-Aug-04	2-4
13SB48	4.0	DPT	14-Feb-06	0-2, 2-4
13SB49	8.0	DPT	14-Feb-06	0-2, 2-4, 6-8
13SB50/13TW001	9.0	DPT	14-Feb-06	0-2, 3-5, 7-9
13SB51	7.0	DPT	14-Feb-06	0-2, 4-6, 6-7
13SB52/13TW009	8.0	DPT	15-Feb-06	0-2, 4-6, 6-8
13SB53	4.0	DPT	15-Feb-06	0-2, 2-4
13SB54/13TW010	7.0	DPT	15-Feb-06	0-2, 3-5, 5-7
13SB55	8.0	DPT	15-Feb-06	0-2, 4-6, 6-8
13SB56/13TW007	5.0	DPT	15-Feb-06	0-2, 3-5
13SB57/13TW006	12.0	DPT	15-Feb-06	0-2, 4-6, 9-11, 11-12
13SB58	3.0	DPT	15-Feb-06	0-2, 2-3
13SB59/13TW005	4.0	DPT	15-Feb-06	0-2, 2-4
13SB60/13TW011	12.0	DPT	15-Feb-06	0-2, 4-6, 8-10, 10-12
13SB61	4.0	DPT	15-Feb-06	0-2, 2-4
13SB62/13TW002	6.0	DPT	14-Feb-06	0-2, 3-5, 5-6
13SB63	9.0	DPT	14-Feb-06	0-2, 5-7, 7-9

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[(1)]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
13SB64/13TW008	8.0	DPT	15-Feb-06	0-2, 4-6, 6-8
13SB65	9.0	DPT	15-Feb-06	0-2, 3-5, 7-9
13SB66	8.0	DPT	15-Feb-06	0-2, 4-6, 6-8
13SB67	9.0	DPT	15-Feb-06	0-2, 3-5, 7-9
13SB68/13TW003	4.0	DPT	14-Feb-06	0-2, 2-4
13SB69	5.0	DPT	14-Feb-06	0-2, 2-4
13SB70/13TW004	5.0	DPT	14-Feb-06	0-2, 3-5
13SB71	7.0	DPT	14-Feb-06	0-2, 3-5, 5-7
13SB72/13TW012	5.0	HA	21-Feb-06	0-2, 3-5
13SB73	4.0	HA	6-Jun-06	0-2, 2-4
13SB74	2.0	HA	6-Jun-06	0-2
13SB75	1.0	HA	6-Jun-06	0-1
13SB76	1.0	HT	6-Jun-06	0-1
13SB77	4.0	HA	6-Jun-06	0-2, 2-4
13SB78	4.0	HA	6-Jun-06	0-2, 2-4
13SB79	4.0	HA	6-Jun-06	0-2, 2-4
13SB80	4.0	HA	6-Jun-06	0-2, 2-4
13SB81	4.0	HA	6-Jun-06	0-2, 2-4
13SB82	2.0	HA	6-Jun-06	0-2
13SB83	4.0	HA	6-Jun-06	0-2, 2-4
13SB84	4.0	HA	6-Jun-06	0-2, 2-4
13SB85	8.0	HA	25-Aug-06	4-6, 6-8
13SB86	8.0	HA	25-Aug-06	4-6, 6-8
13SB87	6.0	HA	25-Aug-06	0-2, 2-4, 5-6
13SB88	1.0	HA	24-Aug-06	0-1
13SB89	1.0	HA	24-Aug-06	0-1
13SB90	3.0	HA	23-Aug-06	0-2, 2-3
13SB91	1.0	HA	24-Aug-06	0-1
13SB92	Not Sampled			
13SB93	2.0	HA	24-Aug-06	0-2
13SB94	2.0	HA	24-Aug-06	0-2
13SB95	2.0	HA	24-Aug-06	0-1, 1-2
13SB96	4.0	HA	23-Aug-06	0-2, 2-4
13SB97	3.0	HA	23-Aug-06	0-2, 2-3
13SB98	4.0	HA	23-Aug-06	0-2, 2-4
13SB99	4.0	HA	23-Aug-06	0-2, 2-4
13SB100	4.0	HA	23-Aug-06	0-2, 2-4
13SB101	4.0	HA	23-Aug-06	0-2, 2-4
13SB102	2.0	HA	25-Aug-06	0-2

TABLE 2-1

INSTALLATION DATES AND DEPTHS OF MONITORING WELLS AND SOIL BORINGS, AND DEPTHS OF SOIL SAMPLES COLLECTED
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Boring or Well No.	Total Depth (feet bgs)	Drilling Method[(1)]	Date Drilled	Depth Interval(s) of Soil Samples (feet bgs)
13SB103	2.0	HA	25-Aug-06	0-2
13SB104	6.0	HA	26-Aug-06	0-2, 2-4, 4-6
13SB105	6.0	HA	26-Aug-06	0-2, 2-4, 4-6
13SB106	2.0	HA	27-Aug-06	0-2
13SB107	2.0	HA	27-Aug-06	0-2

1 HA = Hand Auger, DPT = Direct Push Technology, RS = Rotosonic, HSA = Hollow-Stem Auger. AR = Air Rotary HT = Hand Trowel.
NA - Not applicable (no sample collected).
bgs - Below ground surface.

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		February 2006	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
MONITORING WELLS																					
13MWT01	3/30/2003	1310541.57	3025015.94	713.10	715.34	15.00	5.00	15.00	708.10	698.10	Puz	6.21	709.13	5.82	709.52	7.55	707.79	7.56	707.78	NA	NA
13MWT02	3/29/2003	1310776.56	3024743.55	702.10	704.72	27.00	17.00	27.00	685.10	675.10	Puz	17.15	687.57	17.10	687.62	16.24	688.48	15.88	688.84	NA	NA
13MWT03	3/30/2003	1310240.95	3024891.66	718.34	721.10	15.00	5.00	15.00	713.34	703.34	Puz	8.79	712.31	8.88	712.22	9.98	711.12	12.17	708.93	NA	NA
13MWT04	3/30/2003	1310383.40	3024546.11	704.37	706.84	15.00	5.00	15.00	699.37	689.37	Puz	12.98	693.86	12.75	694.09	14.09	692.75	15.42	691.42	NA	NA
13MWT05	3/29/2003	1310758.93	3024380.03	693.61	696.44	16.00	6.00	16.00	687.61	677.61	Puz	5.42	691.02	4.13	692.31	5.78	690.66	8.73	687.71	NA	NA
13MWT06	4/7/2003	1309916.18	3024495.27	715.30	717.93	15.00	5.00	15.00	710.30	700.30	Puz	15.11	702.82	15.62	702.31	11.91	706.02	14.78	703.15	NA	NA
13MWT07	3/29/2003	1310539.32	3024094.13	684.38	687.22	15.00	5.00	15.00	679.38	669.38	Puz	3.12	684.10	3.10	684.12	4.21	683.01	4.84	682.38	NA	NA
13MWT08	3/30/2003	1310247.86	3024337.56	698.42	700.56	15.00	5.00	15.00	693.42	683.42	Puz	3.17	697.39	2.92	697.64	3.88	696.68	3.87	696.69	NA	NA
13MWT09	4/1/2003	1309662.07	3024049.03	703.29	705.90	20.00	10.00	20.00	693.29	683.29	Puz	7.74	698.16	7.40	698.50	8.77	697.13	8.64	697.26	NA	NA
13MWT10	3/27/2003	1309979.69	3024001.26	697.77	700.15	25.00	15.00	25.00	682.77	672.77	Puz	13.65	686.50	13.11	687.04	14.96	685.19	16.11	684.04	NA	NA
13MWT11	3/28/2003	1310233.72	3023750.09	679.76	682.29	15.00	5.00	15.00	674.76	664.76	Puz	7.87	674.42	7.00	675.29	8.76	673.53	8.82	673.47	NA	NA
13MWT12	3/27/2003	1310080.21	3023574.95	679.96	682.12	20.00	10.00	20.00	669.96	659.96	Puz	7.88	674.24	7.78	674.34	10.75	671.37	11.50	670.62	NA	NA
13MWT13	4/23/2003	1309441.27	3024163.61	699.28	701.98	19.00	8.00	18.00	691.28	681.28	Puz	3.62	698.36	3.18	698.80	4.93	697.05	4.40	697.58	NA	NA
13MWT14	3/31/2003	1309142.23	3024110.17	703.15	705.50	23.00	13.00	23.00	690.15	680.15	Puz	13.25	692.25	13.08	692.42	14.17	691.33	14.69	690.81	NA	NA
13MWT15	3/25/2003	1309565.52	3023717.80	694.27	696.65	25.00	15.00	25.00	679.27	669.27	Puz	12.88	683.77	12.63	684.02	14.59	682.06	15.49	681.16	NA	NA
13MWT16	3/27/2003	1309854.28	3023341.92	682.13	684.35	15.00	5.00	15.00	677.13	667.13	Puz	8.49	675.86	8.61	675.74	11.01	673.34	14.29	670.06	NA	NA
13MWT17	3/26/2003	1309605.27	3023123.97	690.68	693.01	18.00	8.00	18.00	682.68	672.68	Puz	8.70	684.31	8.09	684.92	8.89	684.12	9.04	683.97	NA	NA
13MWT18	3/26/2003	1309326.98	3023293.42	700.05	702.92	30.00	20.00	30.00	680.05	670.05	Puz	19.06	683.86	19.04	683.88	20.21	682.71	20.52	682.40	NA	NA
13MWT19	3/31/2003	1308893.97	3023834.57	703.10	705.82	19.00	9.00	19.00	694.10	684.10	Puz	8.31	697.51	6.80	699.02	10.96	694.86	11.31	694.51	NA	NA
13MWT20	4/1/2003	1309066.76	3023527.23	699.33	702.07	20.00	10.00	20.00	689.33	679.33	Puz	4.22	697.85	4.00	698.07	5.00	697.07	5.23	696.84	NA	NA
13MWT21	3/28/2003	1309391.01	3022916.22	688.37	690.74	15.00	5.00	15.00	683.37	673.37	Puz	7.69	683.05	7.34	683.40	9.09	681.65	9.20	681.54	NA	NA
13MWT22	3/28/2003	1308936.34	3022785.67	669.53	671.96	15.00	5.00	15.00	664.53	654.53	Puz	7.44	664.52	7.25	664.71	8.18	663.78	9.13	662.83	NA	NA
13MWT23	4/1/2003	1308708.02	3023245.12	696.66	699.14	22.00	11.50	21.50	685.16	675.16	Puz	7.45	691.69	7.17	691.97	8.50	690.64	9.25	689.89	NA	NA

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		February 2006	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
13MWT24	4/1/2003	1308397.23	3022916.48	691.33	693.93	22.00	12.00	22.00	679.33	669.33	Puz	8.45	685.48	8.23	685.70	9.25	684.68	10.04	683.89	NA	NA
13MWT25	3/28/2003	1308625.62	3022677.44	678.87	681.57	15.00	5.00	15.00	673.87	663.87	Puz	16.00	665.57	16.61	664.96	7.05	674.52	6.79	674.78	NA	NA
13MWT26	3/28/2003	1308232.69	3022690.14	684.86	687.49	20.00	10.00	20.00	674.86	664.86	Puz	9.10	678.39	8.93	678.56	10.05	677.44	11.09	676.40	NA	NA
13MWT27	11/5/2003	1309786.55	3023829.07	696.09	698.13	21.00	10.00	20.00	686.09	676.09	Puz	NA	NA	NA	NA	9.31	688.82	9.86	688.27	NA	NA
13MWT28	11/19/2003	1309678.62	3024066.67	703.54	705.55	88.00	78.00	88.00	625.54	615.54	Plz	NA	NA	NA	NA	79.63	625.92	78.38	627.17	NA	NA
13MWT29	11/4/2003	1309538.75	3024290.72	698.10	700.44	20.00	9.00	19.00	689.10	679.10	Puz	NA	NA	NA	NA	5.82	694.62	5.46	694.98	NA	NA
13MWT30	11/6/2003	1309174.84	3024237.45	696.57	698.94	25.00	14.00	24.00	682.57	672.57	Puz	NA	NA	NA	NA	11.72	687.22	11.37	687.57	NA	NA
13MWT31	11/5/2003	1308631.83	3023583.85	693.56	696.21	20.00	10.00	20.00	683.56	673.56	Puz	NA	NA	NA	NA	10.65	685.56	10.74	685.47	NA	NA
13MWT32	10/29/2003	1308214.11	3023162.00	693.62	696.04	25.00	8.00	18.00	685.62	675.62	Puz	NA	NA	NA	NA	9.52	686.52	10.55	685.49	NA	NA
13MWT33	11/6/2003	1308749.27	3023868.77	700.14	701.97	20.00	10.00	20.00	690.14	680.14	Puz	NA	NA	NA	NA	10.63	691.34	11.54	690.43	NA	NA
13MWT34	11/11/2003	1309304.31	3023084.25	693.35	695.93	20.50	10.00	20.00	683.35	673.35	Puz	NA	NA	NA	NA	5.42	690.51	6.45	689.48	NA	NA
13MWT35	11/19/2003	1310254.91	3023773.29	679.51	681.73	69.00	57.00	67.00	622.51	612.51	Plz	NA	NA	NA	NA	63.96	617.77	64.40	617.33	NA	NA
13MWT36	11/5/2003	1309053.39	3022677.86	664.91	667.21	26.00	15.00	25.00	649.91	639.91	Puz	NA	NA	NA	NA	19.26	647.95	19.56	647.65	NA	NA
13MWT37	10/24/2003	1309402.93	3022617.27	659.96	662.29	25.00	14.50	24.50	645.46	635.46	Puz	NA	NA	NA	NA	14.37	647.92	14.71	647.58	NA	NA
13MWT38	11/4/2003	1309376.76	3022619.53	659.03	661.04	80.00	55.00	65.00	604.03	594.03	Plz	NA	NA	NA	NA	61.90	599.14	62.33	598.71	NA	NA
13MWT39	11/4/2003	1309804.48	3022589.03	652.42	654.44	25.00	14.00	24.00	638.42	628.42	Puz	NA	NA	NA	NA	14.25	640.19	13.84	640.60	NA	NA
13MWT40	10/23/2003	1309622.33	3022833.33	664.93	667.18	25.50	15.00	25.00	649.93	639.93	Puz	NA	NA	NA	NA	18.55	648.63	18.74	648.44	NA	NA
13MWT41	11/10/2003	1309645.20	3022819.00	663.65	665.67	66.00	55.00	65.00	608.65	598.65	Plz	NA	NA	NA	NA	66.58	599.09	67.05	598.62	NA	NA
13MWT42	10/22/2003	1309862.28	3023113.22	668.05	670.31	25.00	11.00	21.00	657.05	647.05	Puz	NA	NA	NA	NA	21.14	649.17	21.21	649.10	NA	NA
13MWT43	11/6/2003	1310558.56	3023939.45	688.88	690.90	21.00	10.00	20.00	678.88	668.88	Puz	NA	NA	NA	NA	8.50	682.40	9.70	681.20	NA	NA
13MWT44	11/10/2003	1310621.14	3023530.33	682.11	683.82	88.00	73.00	83.00	609.11	599.11	Plz	NA	NA	NA	NA	64.57	619.25	64.80	619.02	NA	NA
13MWT45	11/10/2003	1309373.68	3022901.38	688.76	690.59	84.00	70.00	80.00	618.76	608.76	Plz	NA	NA	NA	NA	72.75	617.84	69.83	620.76	NA	NA
13MWT46	11/22/2003	1309812.02	3022565.94	651.64	653.61	68.00	55.00	65.00	596.64	586.64	Plz	NA	NA	NA	NA	58.10	595.51	58.25	595.36	NA	NA
13MWT47	11/20/2003	1309389.47	3024437.45	675.41	677.23	21.00	8.00	18.00	667.41	657.41	Puz	NA	NA	NA	NA	7.32	669.91	7.02	670.21	NA	NA

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		February 2006	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
13MWT48	7/28/2004	1309618.82	3021409.02	546.20	548.67	10.50	5.00	10.00	541.20	536.20	Valley Fill[2]	NA	NA	NA	NA	NA	NA	10.02	538.65	NA	NA
13MWT49	7/27/2004	1309795.96	3021713.21	551.05	553.90	9.50	4.00	9.00	547.05	542.05	Valley Fill[2]	NA	NA	NA	NA	NA	NA	7.21	546.69	NA	NA
13MWT50	7/27/2004	1310002.40	3022085.22	557.77	560.49	26.00	15.00	25.00	542.77	532.77	Valley Fill[2]	NA	NA	NA	NA	NA	NA	7.02	553.47	NA	NA
13MWT51	7/27/2004	1310206.30	3022381.03	569.28	571.36	16.00	5.00	15.00	564.28	554.28	Valley Fill[2]	NA	NA	NA	NA	NA	NA	3.77	567.59	NA	NA
13TW001	2/14/2006	1309815.54	3024077.9	704.54	705.50	9.04	4.00	9.00	700.54	695.54	OS	NA	NA	NA	NA	NA	NA	NA	NA	3.71	701.79
13TW002	2/14/2006	1309791.85	3024013.7	699.7	703.66	6.04	1.00	6.00	698.70	693.70	OS	NA	NA	NA	NA	NA	NA	NA	NA	5.66	698.00
13TW003	2/15/2006	1310130.88	3023854.32	681.97	683.64	3.33	0.00	4.00	681.97	677.97	OS	NA	NA	NA	NA	NA	NA	NA	NA	4.02	679.62
13TW004	2/15/2006	1309355.05	3023111.96	691.4	691.55	4.85	0.00	5.00	691.40	686.40	OS	NA	NA	NA	NA	NA	NA	NA	NA	0.20	691.35
13TW005	2/28/2006	1309094.47	3023402.28	696.02	697.27	3.75	0.00	4.00	696.02	692.02	OS	NA	NA	NA	NA	NA	NA	NA	NA	4.40	692.87
13TW006	2/16/2006	1309051.2	3023356.77	693.97	697.72	11.25	6.50	11.50	687.47	682.47	OS	NA	NA	NA	NA	NA	NA	NA	NA	9.52	688.20
13TW007	2/16/2006	1308989.67	3023355.47	689.68	690.16	4.52	0.00	4.50	689.68	685.18	OS	NA	NA	NA	NA	NA	NA	NA	NA	1.61	688.55
13TW008	2/16/2006	1308586.09	3022920.62	682.92	686.00	6.92	3.00	8.00	679.92	674.92	OS	NA	NA	NA	NA	NA	NA	NA	NA	4.42	681.58
13TW009	2/16/2006	1308991.98	3023485.02	697.92	700.40	7.52	2.50	7.50	695.42	690.42	OS	NA	NA	NA	NA	NA	NA	NA	NA	7.45	692.95
13TW010	2/16/2006	1309071.8	3023492.82	697.54	699.39	8.15	2.00	7.00	695.54	690.54	OS	NA	NA	NA	NA	NA	NA	NA	NA	5.25	694.14
13TW011	3/1/2006	1309713.37	3024174.91	709.04	712.26	11.78	2.00	12.00	707.04	697.04	OS	NA	NA	NA	NA	NA	NA	NA	NA	7.33	704.93
13TW012	2/28/2006	1308968.06	3023397.43	693.43	698.67	4.76	0.00	4.75	693.43	688.68	OS	NA	NA	NA	NA	NA	NA	NA	NA	8.49	690.18
STAFF GAUGES																					
13SG01	3/29/2003	1310836.89	3024771.44	698.35	NA	NA	NA	NA	NA	NA	(3)	NA	NA	1.73	696.62	1.77	696.58	1.76	696.59	NA	NA
13SG02	3/29/2003	1310746.57	3024854.37	701.95	NA	NA	NA	NA	NA	NA	Puz	NA	NA	3.64	698.31	3.68	698.27	3.71	698.24	NA	NA
13SG03	3/29/2003	1309585.70	3024436.89	696.24	NA	NA	NA	NA	NA	NA	Puz	NA	NA	1.96	694.28	1.87	694.37	1.95	694.29	NA	NA
13SG04	3/29/2003	1309478.26	3024317.86	688.99	NA	NA	NA	NA	NA	NA	Puz	NA	NA	2.38	686.61	2.45	686.54	2.46	686.53	NA	NA
13SG05	3/29/2003	1309341.46	3024185.40	692.94	NA	NA	NA	NA	NA	NA	Puz	NA	NA	3.89	689.05	3.90	689.04	3.92	689.02	NA	NA
13SG06	3/29/2003	1308991.98	3023849.68	704.88	NA	NA	NA	NA	NA	NA	(3)	NA	NA	2.37	702.51	2.35	702.53	2.35	702.53	NA	NA
13SG07	3/29/2003	1308164.25	3022622.07	680.30	NA	NA	NA	NA	NA	NA	Puz	NA	NA	1.50	678.80	1.47	678.83	1.55	678.75	NA	NA

TABLE 2-2

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		February 2006	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
13SG08	3/29/2003	1308846.74	3022744.78	665.95	NA	NA	NA	NA	NA	NA	Puz	NA	NA	5.05	660.90	5.08	660.87	5.10	660.85	NA	NA
13SG09	3/29/2003	1309868.61	3023412.15	675.30	NA	NA	NA	NA	NA	NA	Puz	NA	NA	4.15	671.15	4.15	671.15	4.18	671.12	NA	NA
13SG10	3/29/2003	1310366.98	3023821.25	676.10	NA	NA	NA	NA	NA	NA	Puz	NA	NA	4.78	671.32	4.82	671.28	4.96	671.14	NA	NA
13SG11	1/19/2004	1309388.01	3024416.84	675.36	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	2.74	672.62	2.30	673.06	NA	NA
13SG12	10/19/2004	1312371.18	3022662.06	595.28	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	6.87	588.41	NA	NA
13SG13	10/19/2004	1311077.60	3022704.86	572.52	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	5.87	566.65	NA	NA
13SG14	10/19/2004	1310424.91	3022481.79	567.75	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	6.37	561.38	NA	NA
13SG15	10/19/2004	1309660.62	3021524.54	544.18	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	9.97	534.21	NA	NA
13SG16	10/19/2004	1309270.46	3021074.88	537.01	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Dry	NA	NA
13SG17	10/19/2004	1309034.25	3020747.93	532.48	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Dry	NA	NA
13SG18	10/19/2004	1308276.51	3019633.62	524.23	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	8.16	516.07	NA	NA

Notes:
1 = Total depth of boring, total depth of well may be less.
2 = Valley Fill includes alluvium, colluvium, and weathered siltstone directly below fill material. Total thickness of these materials is 26 feet or less.
3 = Staff gauge measured surface water level that appears to be perched above groundwater in the Pennsylvanian geologic unit immediately adjacent to or underlying the drainageway.
bgs = Below ground surface.
btor = Below top of riser/reference point.
amsl = Above mean sea level (NAVD88).
NA = Not applicable.
NAVD88 = North American Vertical Datum of 1988.
Puz = Upper Pennsylvanian water-bearing zone.
Plz = Lower Pennsylvanian water-bearing zone.
OS = Overburden Soil

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Groundwater (Round 1) April/May 2003																						
13GWT0101					X		X	X	X	X												
13GWT0201					X		X	X	X	X												
13GWT0301					X		X	X	X	X												
13-GWT0301-F							X	X														
13GWT0401					X		X	X	X	X												
13GWT0501					X		X	X	X	X												
13GWT0501-F							X	X														
13GWT0601					X		X	X	X	X												
13GWT0601-F							X	X														
13GWT0701					X		X	X	X	X												
13GWT0801					X		X	X	X	X												
13GWT0901	X				X	X	X	X	X	X	X	X	X									
13GWT0902											X											
13GWT1001					X		X	X	X	X												
13GWT1101					X		X	X	X	X												
13GWT1201					X		X	X	X	X												
13GWT1201-F							X	X														
13GWT1301					X		X	X	X	X												
13GWT1401					X		X	X	X	X												
13GWT1501					X		X	X	X	X												
13GWT1601					X		X	X	X	X												
13GWT1701					X		X	X	X	X												
13GWT1801					X		X	X	X	X												
13GWT1801-F						X	X															
13GWT1901					X		X	X	X	X												
13GWT2001	U				X	U	X	X	X	X	U	U	U			U						Optional sample
13GWT2001-F							X	X														
13GWT2002											X											
13GWT2101					X		X	X	X	X												
13GWT2201					X		X	X	X	X												

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13GWT2301					X		X	X	X	X												
13GWT2401					X		X	X	X	X												
13GWT2501					X		X	X	X	X												
13GWT2501-F						X	X															
13GWT2601					X		X	X	X	X												
Analyzed	1	0	0	0	26	3	33	31	26	26	3	1	1	0	0	0	0	0	0	0	0	
Unscheduled	1	0	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	
Omitted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
GW TOTALS	**2**	**0**	**0**	**0**	**26**	**4**	**33**	**31**	**26**	**26**	**4**	**2**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	

Groundwater (Round 2) November/December 2003

13GWT0102					X			X	X	X												
13GWT0202					X			X	X	X									X			
13GWT0302					X			X	X	X							X		X			
13GWT0302-F								X														
13GWT0402					X			X	X	X												
13GWT0502					X			X	X	X									X			
13GWT0502-F								X														
13GWT0602					X			X	X	X												
13GWT0602-F								X														
13GWT0702					X			X	X	X												
13GWT0802					X			X	X	X									X			
13GWT0802-F								X														
13GWT0903					X			X	X	X									X			
13GWT1002					X			X	X	X							X		X			
13GWT1102					X			X	X	X									X			
13GWT1202					X			X	X	X									X			
13GWT1302					X			X	X	X									X			
13GWT1402					X			X	X	X												
13GWT1502					X			X	X	X							X		X			
13GWT1502-F								X														
13GWT1602					X			X	X	X												

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13GWT1702					X			X	X	X									X			
13GWT1802					X			X	X	X									X			
13GWT1802-F								X														
13GWT1902					X			X	X	X												
13GWT2003					X			X	X	X									X			
13GWT2102					X			X	X	X									X			
13GWT2202					X			X	X	X									X			
13GWT2302					X			X	X	X									X			
13GWT2402					X			X	X	X									X			
13GWT2502					X			X	X	X												
13GWT2502-F								X														
13GWT2602					X			X	X	X									X			
13GWT2701					X			X	X	X												
13GWT2801					X			X	X	X									X			
13GWT2801-F								X														
13GWT2901					X			X	X	X									X			
13GWT3001					X			X	X	X												
13GWT3101					X			X	X	X												
13GWT3201					X			X	X	X												
13GWT3301					X			X	X	X												
13GWT3301-F								X														
13GWT3401					X			X	X	X									X			
13GWT3501					X			X	X	X									X			
13GWT3501-F								X														
13GWT3601					X			X	X	X									X			
13GWT3701					X			X	X	X												
13GWT3801					X			X	X	X									X			
13GWT3801-F								X														
13GWT3901					X			X	X	X												
13GWT3901-F								X														
13GWT4001					X			X	X	X												

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13GWT4101					X			X	X	X												
13GWT4101-F								X														
13GWT4201					X			X	X	X												
13GWT4201-F								X														
13GWT4301					X			X	X	X												
13GWT4401					X			X	X	X												
13GWT4501					X			X	X	X												
13GWT4501-F								X														
13GWT4601					X			X	X	X												
13GWT4701					X			X	X	X												
Analyzed	**0**	**0**	**0**	**0**	**47**	**0**	**0**	**62**	**47**	**47**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**24**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
GW TOTALS	**0**	**0**	**0**	**0**	**47**	**0**	**0**	**62**	**47**	**47**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**24**	**0**	**0**	

Groundwater (Round 3) July/August 2004

13GWT0103					X																	
13GWT0203					X																	
13GWT0303					X																	
13GWT0403					X																	
13GWT0503					X		X	X														
13GWT0503-F							X	X														
13GWT0603					X																	
13GWT0703					X																	
13GWT0803					X																	
13GWT0904					X																	
13GWT1003					X																	
13GWT1103					X																	
13GWT1203					X																	
13GWT1303					X																	
13GWT1403					X																	
13GWT1503					X																	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13GWT1603					X																	
13GWT1703					X																	
13GWT1803					X																	
13GWT1903					X																	
13GWT2004					X		X	X														
13GWT2103					X																	
13GWT2203					X																	
13GWT2303					X																	
13GWT2403					X																	
13GWT2503					X		X	X														
13GWT2503-F							X	X														
13GWT2603					X																	
13GWT2702					X																	
13GWT2802					X																	
13GWT2902					X																	
13GWT3002					X																	
13GWT3102					X																	
13GWT3202					X																	
13GWT3302					X		X	X														
13GWT3302-F							X	X														
13GWT3402					X																	
13GWT3502					X																	
13GWT3602					X																	
13GWT3702					X																	
13GWT3802					X																	
13GWT3902					X																	
13GWT4002					X																	
13GWT4102					X																	
13GWT4202					X																	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13GWT4302					X																	
13GWT4402					X																	
13GWT4502					X																	
13GWT4602					X																	
13GWT4702					X		X	X														
13GWT4801					X		X	X														
13GWT4901					X		X	X														
13GWT5001					X		X	X														
13GWT5101					X		X	X														
13GWT5101-F							X	X														
Analyzed	**0**	**0**	**0**	**0**	**51**	**0**	**13**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
GW TOTALS	**0**	**0**	**0**	**0**	**51**	**0**	**13**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Temporary Groundwater (External Sump/Drainage Investigation) February 2006

13GWTW001					X																	
13GWTW002					X																	
13GWTW003					X																	
13GWTW004					X																	
13GWTW005					X																	
13GWTW006					X																	
13GWTW007					X																	
13GWTW008					X																	
13GWTW009					X																	
13GWTW010					X																	
13GWTW011					X																	
13GWTW012					X																	
Analyzed	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
TOTALS	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Surface Soil (Round 1) March/April 2003																						
13SS010002				X		X					X		X	X								
13SS020002				X		X					X		X	X								
13SS030002				X		X					X		X	X								
13SS040002				X		X					X		X	X								
13SS050002				X		X					X		X	X								
13SS060002	X			X		X					X	X	X	X								
13SS070002			X						O						X		X					Optional sample
13SS080002			X						O						X		X					Optional sample
13SS090002				X		X					X		X	X								
13SS100002				X		X					X		X	X								
13SS110002				X		X					X		X	X								
13SS120002				X		X					X		X	X								
13SS130002				X		X					X		X	X								
13SS140002				X		X					X		X	X								
13SS150002	U			O		O					O	U	O	O								Optional sample
13SS160002				O		O					O		O	O								Missed sample. Collected in Round 2.
Analyzed	**1**	**0**	**2**	**12**	**0**	**12**	**0**	**0**	**0**	**0**	**12**	**1**	**12**	**12**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	
Unscheduled	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**0**	**2**	**0**	**2**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SS TOTALS	**2**	**0**	**2**	**12**	**0**	**12**	**0**	**0**	**0**	**0**	**12**	**2**	**12**	**12**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	
Surface Soil (Round 2) December 2003																						
13SS160002														X								
13SS170002														X								
13SS180002														X								
13SS190002														X								
13SS200002														X								
13SS210002														X								
13SS220002														X								
13SS230002														X								

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SS240002														X								
13SS250002														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SS TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Surface Soil (Round 3) August 2004

13SS260002														X								
13SS270002														X								
13SS290002														X								
13SS300002														X								
13SS320002														X								
13SS330002														X								
13SS340002														X								
13SS350002														X								
13SS360002														X								
13SS370002														X								
13SS380002														X								
13SS390002														X								
13SS400002														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SS TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Surface Soil (External Sump/Drainage Investigation) February 2006																						
13SS480002					X																	
13SS490002					X																	
13SS500002					X																	
13SS510002					X																	
13SS520002					X																	
13SS530002					X																	
13SS540002					X																	
13SS550002					X																	
13SS560002					X																	
13SS570002					X																	
13SS580002					X																	
13SS590002					X																	
13SS600002					X																	
13SS610002					X																	
13SS620002					X																	
13SS630002					X																	
13SS640002					X																	
13SS650002					X																	
13SS660002					X																	
13SS670002					X																	
13SS680002					X																	
13SS690002					X																	
13SS700002					X																	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SS710002					X																	
13SS720002					X																	
Analyzed	**0**	**0**	**0**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SS TOTALS	**0**	**0**	**0**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Surface Soil (PCB Delineation) June/August 2006																						
13SS730002														X								
13SS740002														X								
13SS750001														X								
13SS760001														X								
13SS770002														X								
13SS780002														X								
13SS790002														X								
13SS800002														X								
13SS810002														X								
13SS820002														X								
13SS830002														X								
13SS840002														X								
13SS85																						Not proposed
13SS86																						Not proposed
13SS870002														X								
13SS880001														X								
13SS890001														X								
13SS900002														X								
13SS910001														X								
13SS92														O								Refusal
13SS930002														X								
13SS940002														X								
13SS950001														X								
13SS960002														X								

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SS970002														X								
13SS980002														X								
13SS990002														X								
13SS1000002														X								
13SS1010002														X								
13SS1020002														X								
13SS1030002														X								
13SS1040002														X								
13SS1050002														X								
13SS1060002														X								
13SS1070002														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**32**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SS TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**32**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Subsurface Soil (Round 1) March/April 2003

13SB010204				X		X					X		X	X								
13SB020204				X		X					X		X	X								
13SB030204				X		X					X		X	X								
13SB040204				X		X					X		X	X								
13SB050204				X		X					X		X	X								
13SB060204	X			X		X					X	X	X	X								
13SB070810			X						O						X		X					Missed sample

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SB080608			X						O						X		X					Missed sample
13SB090204				X		X					X		X	X								
13SB100204				X		X					X		X	X								
13SB110204				X		X					X		X	X								
13SB120204				X		X					X		X	X								
13SB130204				X		X					X		X	X								
13SB140204				O		O					O		O	O								Refusal
13SB150204	U			O		O					O	U	O	O								Optional sample
13SB160204				O		O					O		O	O								Refusal
Analyzed	**1**	**0**	**2**	**11**	**0**	**11**	**0**	**0**	**0**	**0**	**11**	**1**	**11**	**11**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	
Unscheduled	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**2**	**0**	**3**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SB TOTALS	**2**	**0**	**2**	**11**	**0**	**11**	**0**	**0**	**0**	**0**	**11**	**2**	**11**	**11**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	

Subsurface Soil (Round 2) December 2003

13SB160204														X								
13SB170204														X								
13SB180204														X								
13SB190204														X								
13SB200204														O								Refusal
13SB210204														X								
13SB220204														X								
13SB230204														X								
13SB240204														X								
13SB250204														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SB TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Subsurface Soil (Round 3) August 2004																						
13SB260204														X								
13SB270204														X								
13SB280204														X								
13SB280406														X								
13SB290204														X								
13SB300204														X								
13SB310406														X								
13SB310608														X								
13SB320204														X								
13SB330204														X								
13SB340204														X								
13SB350204														X								
13SB360204														X								
13SB370204														X								
13SB380204														X								
13SB390204														X								
13SB400204														X								
13SB410406														X								
13SB410608														X								
13SB420406														X								
13SB420608														X								
13SB430406														X								
13SB440406														X								
13SB450406														X								

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SB460406														X								
13SB470406														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SB TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Subsurface Soil (External Sump/Drainage Investigation) February 2006																						
13SB480204					X																	
13SB480810					O																	Refusal at 4 feet
13SB48xxxx					O																	Refusal at 4 feet
13SB490204					X																	
13SB490608					X																	
13SB49xxxx					O																	Refusal at 8 feet
13SB500305					X																	
13SB500709					X																	
13SB50xxxx					O																	Refusal at 9 feet
13SB510406					X																	
13SB510607					X																	
13SB51xxxx					O																	Refusal at 7 feet
13SB520406					X																	
13SB520608					X																	
13SB52xxxx					O																	Refusal at 8 feet
13SB530204					X																	
13SB530810					O																	Refusal at 4 feet
13SB53xxxx					O																	Refusal at 4 feet
13SB540305					X																	
13SB540507					X																	
13SB54xxxx					O																	Refusal at 7 feet
13SB550406					X																	
13SB550608					X																	
13SB55xxxx					O																	Refusal at 8 feet

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SB560305					X																	
13SB560810					O																	Refusal at 5 feet
13SB56xxxx					O																	Refusal at 5 feet
13SB570406					X																	
13SB570911					X																	
13SB571112					X																	
13SB580203					X																	
13SB580810					O																	Refusal at 3 feet
13SB58xxxx					O																	Refusal at 3 feet
13SB590204					X																	
13SB590810					O																	Refusal at 4 feet
13SB59xxxx					O																	Refusal at 4 feet
13SB600406					X																	
13SB600810					X																	
13SB601012					X																	
13SB610204					X																	
13SB610810					O																	Refusal at 4 feet
13SB61xxxx					O																	Refusal at 4 feet
13SB620305					X																	
13SB620506					X																	
13SB62xxxx					O																	Refusal at 6 feet
13SB630507					X																	
13SB630709					X																	
13SB63xxxx					O																	Refusal at 9 feet
13SB640406					X																	
13SB640608					X																	
13SB64xxxx					O																	Refusal at 8 feet
13SB650305					X																	
13SB650709					X																	
13SB65xxxx					O																	Refusal at 9 feet
13SB660406					X																	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SB660608					X																	
13SB66xxxx					O																	Refusal at 8 feet
13SB670305					X																	
13SB670709					X																	
13SB67xxxx					O																	Refusal at 9 feet
13SB680204					X																	
13SB680810					O																	Refusal at 4 feet
13SB68xxxx					O																	Refusal at 4 feet
13SB690204					X																	
13SB690810					O																	Refusal at 4 feet
13SB69xxxx					O																	Refusal at 4 feet
13SB700305					X																	
13SB700810					O																	Refusal at 5 feet
13SB70xxxx					O																	Refusal at 5 feet
13SB710305					X																	
13SB710507					X																	
13SB71xxxx					O																	Refusal at 7 feet
13SB720305					X																	
13SB720810					O																	Refusal at 5 feet
13BS72xxxx					O																	Refusal at 5 feet
Analyzed	**0**	**0**	**0**	**0**	**42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**33**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
TOTALS	**0**	**0**	**0**	**0**	**42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Subsurface Soil (PCB Delineation) June/August 2006																						
13SB730204														X								
13SB740204														O								Refusal at 2 feet
13SB750204														O								Refusal at 1 foot
13SB760204														O								Refusal at 1 foot
13SB770204														X								
13SB780204														X								
13SB790204														X								
13SB800204														X								
13SB810204														X								
13SB820204														O								Refusal at 2 feet
13SB830204														X								
13SB840204														X								
13SB850406														X								
13SB850608														X								
13SB860406														X								
13SB860608														X								
13SB870204														X								
13SB870506														X								
13SB88														O								Refusal
13SB89														O								Refusal
13SB900203														X								
13SB91														O								Refusal
13SB92														O								Refusal
13SB93														O								Refusal
13SB940204														X								
13SB950102														X								
13SB960204														X								
13SB970203														X								
13SB980204														X								
13SB990204														X								

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SB1000204														X								
13SB1010204														X								
13SB102														O								Refusal
13SB103														O								Refusal
13S01040204														X								
13SB1040406														X								
13SB1050204														X								
13SB1050406														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Surface Water (Round 1) March 2003

13SW0101					X		X	X	X	X												
13SW0101-F							X	X														
13SW0201					X		X	X	X	X												
13SW0201-F							X	X														
13SW0301					X		X	X	X	X												
13SW0301-F							X	X														
13SW0401					X		X	X	X	X												
13SW0401-F							X	X														
13SW0501					X		X	X	X	X												
13SW0501-F							X	X														
13SW0601					X		X	X	X	X												
13SW0601-F							X	X														
13SW0701					X		X	X	X	X												
13SW0701-F							X	X														
13SW0801					X		X	X	X	X												
13SW0801-F							X	X														

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SW0901					X	X	X	X	X	X	X		X									
13SW0901-F							X	X														
13SW1001					X		X	X	X	X												
13SW1001-F							X	X														
13SW1101					X		X	X	X	X												
13SW1101-F							X	X														
13SW1201					X		X	X	X	X												
13SW1201-F							X	X														
13SW1301					X		X	X	X	X												
13SW1301-F							X	X														
Analyzed	**0**	**0**	**0**	**0**	**13**	**1**	**26**	**26**	**13**	**13**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SW TOTALS	**0**	**0**	**0**	**0**	**13**	**1**	**26**	**26**	**13**	**13**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

Surface Water (Round 2) October 2003

13SW0702					X		X	X	X	X												
13SW0702-F								X														
13SW0802					X		X	X	X	X												
13SW0802-F								X														
13SW0902					X		X	X	X	X												
13SW0902-F								X														
13SW1002					X		X	X	X	X												
13SW1002-F								X														
13SW1102					X		X	X	X	X												
13SW1102-F								X														
13SW1202					X		X	X	X	X												
13SW1202-F								X														
13SW1302					X		X	X	X	X												
13SW1302-F								X														
13SW1401					X		X	X	X	X												
13SW1401-F								X														

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SW1501					X		X	X	X	X												
13SW1501-F								X														
13SW1601					X		X	X	X	X												
13SW1601-F								X														
13SW1801					X		X	X	X	X												
13SW1801-F								X														
13SW1901					X		X	X	X	X												
13SW1901-F								X														
13SW2001					X		X	X	X	X												
13SW2001-F								X														
13SW2201					X		X	X	X	X												
13SW2201-F								X														
13SW2401					X		X	X	X	X												
13SW2401-F								X														
13SW2501					X		X	X	X	X										X		
13SW2501-F								X														
13SW2601					X		X	X	X	X												
13SW2601-F								X														
13SW2701					X		X	X	X	X												
13SW2701-F								X														
13SW2801					X		X	X	X	X												
13SW2801-F								X														
13SW2901					O		O	O	O	O												Dry
13SW3001					X		X	X	X	X												
13SW3001-F								X														
13SW3101					X		X	X	X	X												

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SW3101-F								X														
13SW3201																				X		
Analyzed	**0**	**0**	**0**	**0**	**21**	**0**	**21**	**42**	**21**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SW TOTALS	**0**	**0**	**0**	**0**	**21**	**0**	**21**	**42**	**21**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	

Surface Water (Round 3) October 2004

13SW0102							X	X														
13SW0102-F							X	X														
13SW1402					X					X												
13SW1502					X					X												
13SW1602					X					X												
13SW2202							X	X														
13SW2202-F							X	X														
13SW2802							X	X														
13SW2802-F							X	X														
13SW3002					X		X	X		X												
13SW3002-F							X	X														
13SW3102							X	X														
13SW3102-F							X	X														
13SW3301					X					X												
13SW3401					X					X												
13SW3501					X					X												
Analyzed	**0**	**0**	**0**	**0**	**7**	**0**	**10**	**10**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SW TOTALS	**0**	**0**	**0**	**0**	**7**	**0**	**10**	**10**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Sump Water (External Sump/Drainage Investigation) February 2006																						
13SU001					O																	Dry
13SU002					O																	Dry
13SU003					O																	Dry
13SU004					O																	Dry
13SU005					O																	Dry
13SU006					O																	Dry
13SU007					X																	
13SU008					O																	Dry
13SU009					X																	
Analyzed	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SW TOTALS	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Seep (Round 2) October 2003																						
13SP0101					X		X	X	X	X												
13SP0101-F								X														
13SP0201					X		X	X	X	X												
13SP0201-F								X														
13SP0301					X		X	X	X	X												
13SP0301-F								X														
13SP0401					X		X	X	X	X												
13SP0401-F								X														
13SP0501					O		O	O	O	O												Dry
Analyzed	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**8**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SP TOTALS	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**8**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Sediment (Round 1) March 2003																						
13SD010004					X		X	X														
13SD020004		X	X		X		X	X							X		X					
13SD030004					X		X	X														
13SD040004					X	X	X	X			X		X									
13SD050004		X	X		X	X	X	X			X		X		X		X					
13SD060004					X	X	X	X			X		X									
13SD070004					X		X	X														
13SD080004		X	X		X		X	X							X		X					
13SD090004					X		X	X														
13SD100004					X		X	X														
13SD110004		X	X		X		X	X							X		X					
13SD120004					X		X	X														
13SD130004					X		X	X														
13SD140004		X	X		X		X	X							X		X					
13SD150004					X		X	X														
13SD160004					X		X	X														
13SD170004		X	X		X		X	X							X		X					
13SD180004					X		X	X														
13SD190004					X		X	X														
13SD200004		X	X		X		X	X							X		X					
13SD210004					X		X	X														
13SD220004					X		X	X														
13SD230004					U		U	U														Added based on field observations. Additional culvert located
Analyzed	**0**	**7**	**7**	**0**	**22**	**3**	**22**	**22**	**0**	**0**	**3**	**0**	**3**	**0**	**7**	**0**	**7**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**7**	**7**	**0**	**23**	**3**	**23**	**23**	**0**	**0**	**3**	**0**	**3**	**0**	**7**	**0**	**7**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Sediment (Round 2) October 2003																						
13SD240004					X		X	X														
13SD250004					X		X	X												X		
13SD260004					X		X	X														
13SD270004					X		X	X														
13SD280004					X		X	X														
13SD290004					X		X	X														
13SD300004					X		X	X														
13SD310004					X		X	X														
13SD320004																				X		
Analyzed	**0**	**0**	**0**	**0**	**8**	**0**	**8**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**0**	**0**	**0**	**8**	**0**	**8**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	
Sediment (Round 3) October 2004																						
13SD0102							X	X														
13SD2202							X	X														
13SD2802							X	X														
13SD3002							X	X														
13SD3102							X	X														
13SD3301							X	X														
13SD3401							X	X														
13SD3501							X	X														
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Sediment - sludge (External Sump/Drainage Investigation) February 2006																						
13SL001010006					X																	
13SL002010006					X																	
13SL003010006					X																	
13SL004010006					X																	
13SL005010006					X																	
13SL006010006					X																	
13SL007010006					X																	
13SL008010006					X																	
13SL009010006					X																	
Analyzed	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Sediment - Additional Metals Delineation/Toxicity Testing May 2005																						
13SD3601								X														
13SD3701								X														
13SD3801								X														
13SD3901								X														
13SD4001								X														
13SD4101								X														
13SD4201								X														
13SD4301								X														
13SD4401								X														
13SD4501								X														
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																				Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Sediment (PCB Delineation) June/August 2006																						
13SD460024														X								
13SD470006														O								No sediment present in basin
13SD480006														X								
13SD480612														X								
13SD490012														X								
13SD500012														X								
13SD510024														X							U	Added in field based on hydrocarbon odor
13SD512448														X							U	Added in field based on hydrocarbon odor
13SD520024														X							U	Added in field based on hydrocarbon odor
13SD522448														X							U	Added in field based on hydrocarbon odor
13SD530024														X								
13SD532436														X								
13SD540006														X								
13SD550012														X								
13SD551224														X								
13SD560012														X								
13SD570006														X								
13SD580006														O								Location dropped
13SD590012														X								
13SD591224														X								
13SD600012														X								
13SD601224														X								
13SD610006														X								
13SD620012														X								
13SD621224														X								
13SD630006														X								
13SD630612														X								
13SD631224														X								
13SD640006														X								
13SD640612														X								

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
13SD641224														X								
13SD650006														X								
13SD650612														X								
13SD651224														X								
13SD660006														X								
13SD670006														X								
13SD680006														X								
Analyzed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**35**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unscheduled	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	
Omitted	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
SD TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**35**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	

Vegetation (Round 3) September 2004

13VG001010001					X																	
13VG002020001					X																	
13VG003010001					X																	
13VG004020001					X																	
13VG005030001					X																	
13VG006010001					X																	
13VG007020001					X																	
13VG008030001					X																	
13VG009010001					X																	
13VG010030001					X																	
13VG011020001					X																	
13VG012010001					X																	
13VG013020001					X																	
13VG014030001					X																	
13VG015040001					X																	
13VG016030001					U																	Additional sample collected
13VR017010001					X																	
13VR018XX0001					O																	Not collected

TABLE 2-3

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction																					Reasoning Why Sample Was Not Collected
	ALC	AVS/SEM	CEC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PH	PIC	TOC	MEE	MNA	SIM	TPH	
Analyzed	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Unscheduled	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Omitted	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
VG TOTALS	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

X = Analyzed
U = Unscheduled
O = Omitted
ALC - 1,4-dioxane, acetonitrile, isobutyl alcohol, and propionitrile as determined by Method 8015B.
AVS - Acid volatile sulfide.
AVS/SEM - Acid volatile/simultaneously extracted metals.
CEC - Cation exchange capacity.
DIOX - Dioxins.
EXP - Explosives.
GW - Groundwater.
SS - Surface Soil.
SB - Soil Boring.
SW - Surface Water.
SP - Seep.
SD - Sediment.
VG - Vegetation.
VR - Vegetation Rinsate.
HERB - Herbicides.
HG - Mercury.
MEE - Methane, ethane, and ethene
NH3 - Ammonia.
NTIA - Nitrite/nitrate.
SVOC - Semivolatile organic compounds.
VOC - Volatile organic compounds.
PAH - Polynuclear aromatic hydrocarbons.
PCB - Polychlorinated biphenyls.
PIC - Picrates, (picric acid, picrimic acid).
SEM - Simultaneously extracted metals.
TOC - Total organic carbon.
SIM - Sectioned ion monitoring
SU - Water from Sump/Catch Basin
SL - Sediment from Sump/Catch Basin
Water samples with a -F designation were filtered in the field prior to preparation.
Metals - U.S. EPA Contract Laboratory Program Target Analyte List metals.

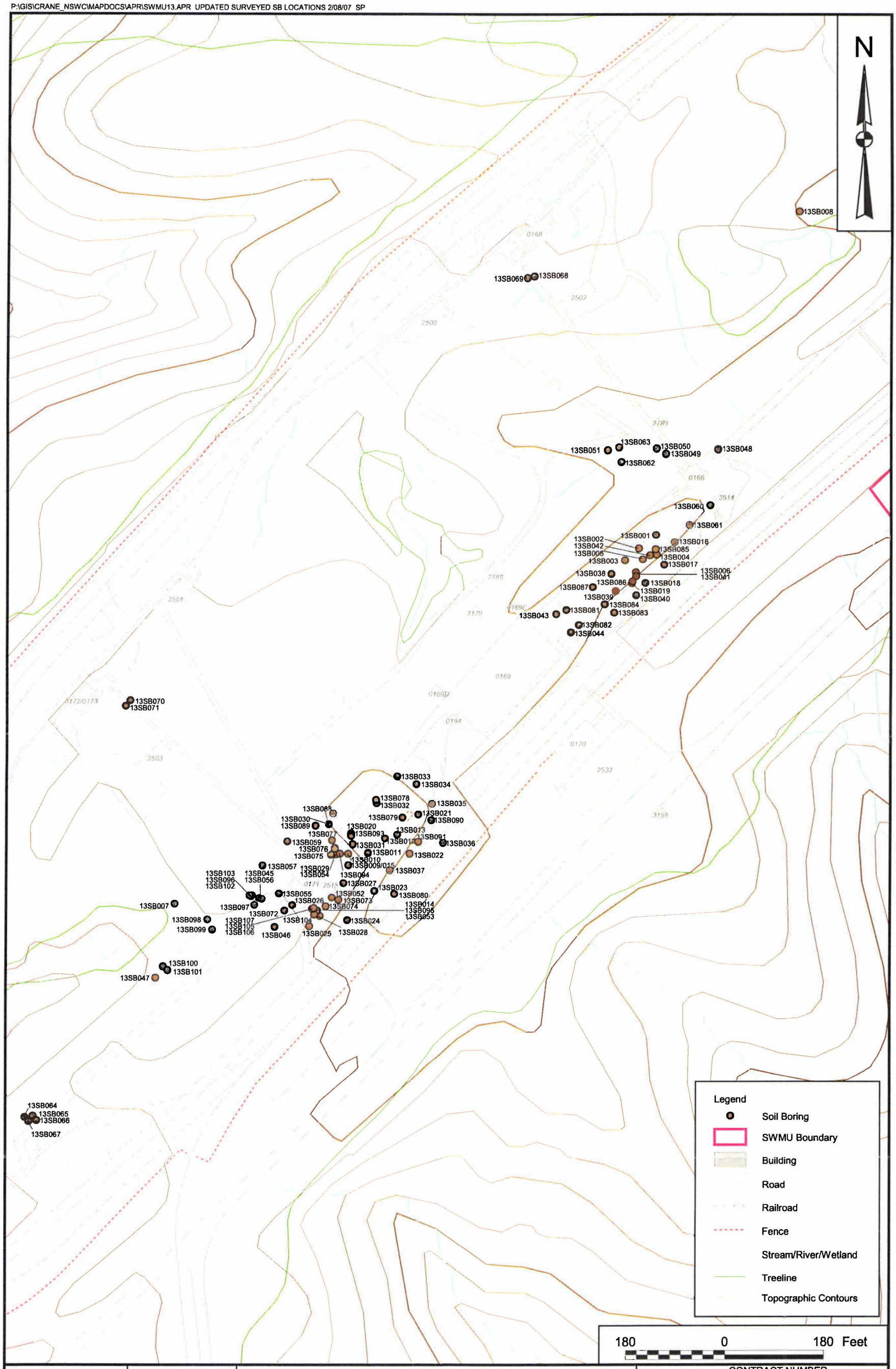
TABLE 2-4

RATIONALE FOR OMITTED AND UNSCHEDULED SAMPLING
SWMU 13 - MINE FILL B
ROUNDS 1, 2, AND 3
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction													RATIONALE
	ALC	DIOX	EXP	HERB	HG	METALS	NH3	NTIA	SVOC	VOC	PAH	PCB	PIC	
Groundwater (Round 1)														
13GWT2001	U			U					U	U	U		U	Optional sample
Surface Soil (Round 1)														
13SS070002							O							Optional sample
13SS080002							O							Optional sample
13SS150002	U	O		O					O	U	O	O		Optional sample
13SS160002		O		O					O		O	O		Missed sample. Collected during Round 2.
Subsurface Soil (Round 1)														
13SB070810							O							Missed sample
13SB080608							O							Missed sample
13SB140204		O		O					O		O	O		Not taken due to refusal
13SB150204	U	O		O					O	U	O	O		Optional sample
13SB160204		O		O					O		O	O		Not taken due to refusal
Subsurface Soil (Round 2)														
13SB200204												O		Not taken due to refusal
Surface Water (Round 2)														
13SW2901			O			O	O	O						Dry
Seep (Round 2)														
13SP0501			O			O	O	O						Dry
Sediment (Round 1)														
13SD230004			U		U	U								Added based on field observations. Additional culvert located
Vegetation (Round 1)														
13VG016030001			U											Additional sample collected.
13VRNNNXX0001			O											Not collected.

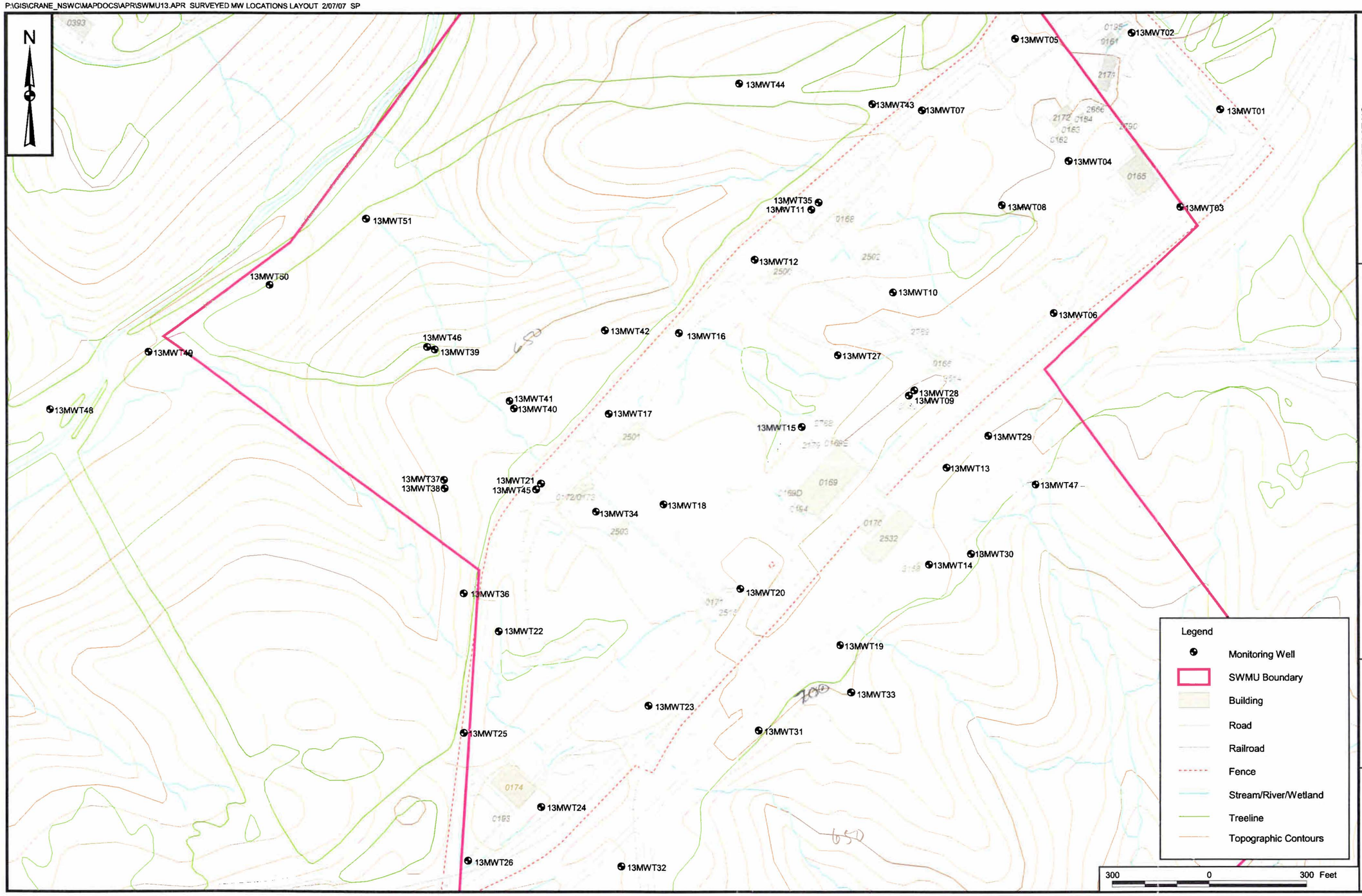
U - Unscheduled sample
O - Omitted sample

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR UPDATED SURVEYED SB LOCATIONS 2/08/07 SP



DRAWN BY C. FOSTER	DATE 12/29/04	SOIL BORING LOCATIONS SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER CTO 0357
CHECKED BY J. GOERDT	DATE 2/08/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 2 - 1 REV 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SURVEYED MW LOCATIONS LAYOUT 2/07/07 SP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 2 - 2 REV —

MONITORING WELL LOCATIONS
SWMU 13 MINE FILL B
NWSC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 12/29/04

CHECKED BY J. GOERDT DATE 2/07/07

COST/SCHED-AREA

SCALE AS NOTED

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N

13SG12
13SW/SD31
13SG13 13SP03 13SW/SD29
13SP04 13SW/SD22
13SW/SD23
13SW/SD01 13SG01
13SG02 13SW/SD02
13SW/SD35
13SW/SD21
13SG14
13SW/SD13 13SG10
13SP02
13SW/SD14
13SW/SD15
13SW/SD34
13SW/SD12 13SG09 13SW/SD56 13SW/SD55
13SW/SD03
13SW/SD26 13SW/SD27
13SP01
13SG15
13SW/SD65 13SW/SD68 13SW/SD67 13SW/SD66 13SW/SD64 13SW/SD63
13SW/SD48 13SW/SD46
13SG03 13SW/SD04
13SG04 13SW/SD05
13SG11
13SG05 13SW/SD06
13SW/SD16
13SD11 13SW11
13SG16
13SG17 13SW/SD30
13SW/SD36
13SW/SD28
13SW/SD57 13SW/SD51 13SW/SD49 13SW/SD50 13SW/SD59 13SW/SD52 13SW/SD60 13SW/SD53 13SW/SD54 13SW/SD61 13SW/SD62
13SG08 13SW/SD10
13SW/SD08
13SG06 13SW/SD07
13SW/SD32
13SW/SD24
13SW/SD37
13SW/SD33
13SG18
13SG07 13SW/SD09
13SW/SD17
13SW/SD19
13SW/SD20
13SW/SD38
13SW/SD39
13SW/SD25
13SW/SD18

Legend

- Surface Water Sediment Seep Staff Gauge
- 13SW/SD14 MNA Sample Location
- SWMU Boundary
- Building
- Road
- Railroad
- Fence
- Stream/River/Wetland
- Treeline
- Topographic Contours

600 0 600 Feet

CONTRACT NO. CTO 0357

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 2 - 3A

REV 0

SURFACE WATER/SEDIMENT, SEEP, AND STAFF GAUGE LOCATIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY A. JANOCHA DATE 11/17/05

CHECKED BY J. GOERDT DATE 2/08/07

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SURVEYED SW/SD/SG LOCATIONS PERIPHERY MNA LAYOUT 2/07/07 SP

N

SWMU 13

△ 13SW/SD40

△ 13SW/SD41

△ 13SW/SD42

△ 13SW/SD45

△ 13SW/SD44

△ 13SW/SD43

Legend

- △ Surface Water Sediment
- SWMU Boundary
- Building
- Road
- Railroad
- Fence
- Stream/River/Wetland
- Treeline
- Topographic Contours

1500 0 1500 Feet

PERIPHERY SURFACE WATER/SEDIMENT LOCATIONS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY A. JANOCHA	DATE 11/21/05	
CHECKED BY J. GOERDT	DATE 2/07/07	
COST/SCHED-AREA		SCALE AS NOTED

CONTRACT NO. CTO 0357

APPROVED BY _____ DATE _____

APPROVED BY _____ DATE _____

DRAWING NO. FIGURE 2 - 3B

REV 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SURVEYED VEG LOCATIONS LAYOUT 2/07/07 SP

N

13VG01
13VG02
13VG03
13VG04
13VG05
13VG06
13VG07
13VG08
13VG09

Legend
- Vegetation Sample
- SWMU Boundary
- Building
- Road
- Railroad
- Fence
- Stream/River/Wetland
- Treeline
- Topographic Contours

100 0 100 Feet

CONTRACT NO.
CTO 0357

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 2 - 4

REV 0

VEGETATION LOCATIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 12/29/04

CHECKED BY J. GOERDT DATE 2/07/07

COST/SCHED-AREA

SCALE AS NOTED

3.0 DATA PRESENTATION AND QUALITY

This section describes the data and summarizes the data quality for four separate data sets. Data presentation is provided in Section 3.1; data quality is described in Section 3.2.

3.1 DATA PRESENTATION

Data were collected by TT during composting operations conducted on SWMU 13 soils. These surface and subsurface soils were first characterized using field screening and laboratory confirmation analyses. After identifying areas of unacceptably high explosives concentrations, soil was excavated from the areas of contamination and sent to the composting facility at NSWC Crane that was built specifically for the treatment of explosives in soils. After treatment and verification that explosives concentrations had been satisfactorily reduced, the soils were returned to the SWMU 13 excavations. Similar operations were conducted at SWMU 12 in the same time frame. Southwest Laboratory of Oklahoma and Severn Trent Laboratory of Sacramento conducted the laboratory analyses for composting operations at SWMU 12 and SWMU 13. The resulting data were validated independently. Details of these operations are provided in MK (2000 and 2001) and TT (2002). For quality control data that were available electronically, a tabulation of quantitative data quality characteristics is provided in Appendix H of this report.

RFI data were collected by TtNUS in three rounds as described in Section 2.0 This was supplemented in later field campaigns with sampling and analyses for explosives (External Sumps/Drainage Investigation) and PCB analyses (PCB delineation sampling). In addition, samples were collected to better delineate metals contamination in the main streams located to the east and west of the SWMU 13 ridge and to support toxicity testing for ecological risk assessment. These sediment samples are identified in Table 2-3 as belonging to RFI Round 5. There are no Round 4 data because this round is associated with long term groundwater monitoring. Section 2.0 provides more details on the sequence of sampling, the samples collected, and the analyses performed for each set of samples. Laucks Testing Laboratory conducted all of the laboratory analyses. Validation and quality review of the data were conducted by TtNUS as described in Section 3.2 except that a comparative review of data quality indicators was conducted on ES/DI and PCB delineation data because those data sets were small. This comparative review did not include tallies of the DQIs. Tables 3-1 through 3-46 present summary statistics as well as individual results for chemicals detected at least once in particular environmental media. The subsections below present descriptions of available background data and SWMU 13 site data, with more detailed explanations of the information contained in Tables 3-1 through 3-46. Complete printouts of all field sample results are presented in Appendix G, Tables G-1 through G-7.

3.1.1 Background Data Set Descriptions

3.1.1.1 SWMU 13 Surface Soil Background Concentrations

In addition to the composting and RFI data collections described above, soil samples were previously collected and analyzed in an effort to establish the concentrations of metals representative of the entire NSWC Crane complex (TtNUS, 2001). All metals likely to be included in NSWC Crane environmental investigations were analyzed in that effort. The intent was to provide background soil data sets that could be used to gain perspective on whether observed metal concentrations in SWMU soils are indicative of background concentrations.

Soil samples were classified into Soil Groups that uniquely represent the chemical and physical soil characteristics that cause the various NSWC Crane soils to differ. Those characteristics are:

- Geological parent material (referred to as Depositional Environment in TtNUS, 2001)
- Depth (surface or subsurface)
- Grain size

The details of sample collection and data generation are provided in TtNUS, 2001. For SWMU 13 there is one Depositional Environment (Pennsylvanian), and two depths (surface and subsurface). In the subsurface there are three distinct grain sizes. After chemical analyses and extensive statistical testing, one distinct soil emerged as representing SWMU 13 surface soils:

- Soil Group 3 – Alluvial, Mississippian, and Pennsylvanian surface soil

Tables 3-1 and 3-2 of this RFI report present summaries of the NSWC Crane surface soil background data. These tables were taken from TTNUS, 2001. Table 3-1 shows concentration ranges and related statistics for all of NSWC Crane soils, regardless of Depositional Environment, depth, or grain size. This table helps the data user understand how individual an SWMU-specific background data set compares to all of NSWC Crane. Table 3-2 presents surface soil background data summaries specific to SWMU 13 (Alluvial, Mississippian, and Pennsylvanian surface soil)

The tables indicate the metals that were analyzed, the frequencies of detection, the measured concentration ranges, simple summary statistics, the location of maximum observed concentrations, an

estimate of the statistical distribution shape, and an estimate of the concentration (95% upper tolerance limit) that encompasses 95 percent of the data, on average.

3.1.1.2 SWMU 13 Subsurface Soil Background Concentrations

Similar to surface soils, the NSWC Crane basewide background soil collection effort yielded distinct soil groups that represent SWMU 13 subsurface soil metal concentrations for background soils:

- Soil Group 8 – Pennsylvanian Subsurface Clay and Silt
- Soil Group 9 – Pennsylvanian Subsurface Sand

Tables 3-3 and 3-4 present the data associated with these soil groups. The presentation is similar to the data presentations of Tables 3-1 and 3-2, described in Section 3.1.1, above.

3.1.1.3 Sump Water and Sediment Upgradient and Background Concentrations

Because sumps are related to site operations, there are no upgradient sump conditions representative of the natural environment. Therefore, there are no upgradient or background data for Sump water or sediments.

3.1.1.4 SWMU 13 Surface Water, Sediment, and Groundwater Upgradient Concentrations

For mobile environmental media such as surface water, sediment, and groundwater, “background” concentrations are represented by upgradient locations and data. These locations represent concentrations of chemicals that are unaffected by SWMU operations. The upgradient locations are not necessarily free from contamination, but they do represent locations that are free from site-related contamination for the site of interest (in this case, SWMU 13).

During this investigation, no groundwater wells were identified as being upgradient to SWMU 13. SWMU 13 is located on a ridge top and therefore SWMU 13, itself, is the most upgradient location in the investigated area. For similar reasons, few upgradient sediment or surface water samples could be collected. Location 13SW/SD31 was selected to represent upgradient conditions for mainstream surface water and sediment samples. Location 13SW/SD28 was selected to represent upgradient conditions for gully samples. These two locations are upgradient of their respective site sampling locations and were selected because they are in areas that appear to be free of influence from SWMU 13 operations. The

gullies are on steeper slopes and drain more quickly than the mainstream areas. In the Appendix G tables each upgradient sample is marked as "upgradient."

By random chance, alone, when the same population (e.g., stream sediments) is sampled to yield two data sets containing an unequal number of samples, the data set with the greater number of samples has the greater chance of exhibiting the highest (or the lowest) concentration. There are more samples in the SWMU 13 downgradient data set than in the upgradient data set. Therefore, the maximum observed chemical concentrations are almost certain to be contained in the site (i.e., SWMU 13) surface water and sediment data (rather than the upgradient data) even if the SWMU 13 data represent the same material as the upgradient conditions. This is a result of having far fewer upgradient samples than downgradient samples. Nevertheless, the available upgradient data do provide some insight into conditions that are upgradient of SMWU 13, when one takes into account the relative sizes of the site and upgradient data sets. The significance of this is case-specific and is addressed where appropriate throughout this report.

3.1.1.5 Seep and Vegetation Background Data

These media do not have upgradient or background data sets. At times, however, it may be appropriate to gain perspective on seep data by comparing those data to groundwater and surface water data. Seeps are an expression of groundwater and the seep water typically becomes surface water.

3.1.2 SWMU 13 Data Set Descriptions

3.1.2.1 SWMU 13 Surface Soil Site Data

Surface soil samples were analyzed extensively for energetic compounds and, to a lesser extent for metals and VOCs, during the composting operations. Surface soil data generated during the composting operations are summarized in the IMRs (MK, 2000 and 2001, and TT, 2002). Graphical representations of the soil explosives concentrations that were left in place at the completion of the composting effort are provided in Section 1.0.

In RFI Rounds 1 through 3, select surface soil samples were collected for dioxin and furan, herbicide, pesticide, SVOC, VOC, and PCB analyses as described in Section 2.0. After Round 1 the analyte list was limited to PCBs only because few detections were observed for anything but the PCBs. The PCBs were detected at relatively high concentrations in Round 1 and their detections are consistent with SWMU 13 operational history. The subsequent sampling rounds were designed to delineate the vertical and horizontal extent of PCB contamination and, in doing so, typically generated lower concentrations than the previously collected samples.

Some surface soil samples were not collected as scheduled. Explanations for why certain samples were not collected or were collected in addition to the scheduled sample collections are provided in Section 2.0 and Table 2-3. The Round 1 through Round 3 and PCB Delineation data for SMWU 13 surface soils are summarized in Tables 3-5 and 3-6. Appendix Table G-1 is a list of all surface and subsurface soil data generated during Rounds 1, 2, 3, and PCB Delineation. Table 3-5 indicates how often each chemical was detected, the location of the maximum and minimum, etc. Table 3-6 is similar to Table G-1 but displays results only for chemicals that were detected at least once in surface or subsurface soil. For each chemical that falls into this category, all results, including non-detects and rejected values, are shown in Table 3-6.

3.1.2.2 SWMU 13 Subsurface Soil Site Data

Subsurface soil samples were analyzed extensively for energetic compounds and, to a lesser extent for metals and VOCs, during the composting operations. Subsurface soil data generated during the composting operations are summarized in the IMRs (MK, 2000 and 2001, and TT, 2002). Graphical representations of the soil explosives concentrations that were left in place at the completion of the composting effort are provided in Section 1.0.

In RFI Rounds 1 through 3, select subsurface soil samples were collected for dioxin and furan, herbicide, pesticide, SVOC, VOC, PCB, and miscellaneous analyses as described in Section 2.0. After Round 1 the analyte list was limited to PCBs only because few detections were observed for anything but the PCBs. The PCBs were detected at relatively high concentrations in Round 1 and their detections are consistent with SWMU 13 operational history. The subsequent sampling rounds were designed to bound the extent of PCB contamination and, in doing so, typically generated lower concentrations.

Some subsurface soil samples were not collected as scheduled. Explanations for why certain samples were not collected or were collected in addition to the scheduled sample collections are provided in Section 2.0 and Table 2-3. The Round 1 through Round 3 and PCB Delineation data for SMWU 13 subsurface soils are summarized in Tables 3-7 and 3-8. Table G-1 is a list of all surface and subsurface soil data generated during Rounds 1, 2, 3, and PCB Delineation. Table 3-7 indicates how often each chemical was detected, the location of the maximum and minimum, etc. Table 3-8 is similar to Table G-1 but displays results only for chemicals that were detected at least once in surface or subsurface soil. For each chemical that falls into this category, all results, including non-detects and rejected values, are shown in Table 3-8.

3.1.2.3 SWMU 13 Sump Water, Surface Water and Seep Site Data

Sump water, surface water, and seep samples were not collected during the composting operation. Data collected for sump water during the ES/DI and for surface water and seeps in Rounds 1 through 3 are summarized in Tables 3-9 through 3-17. Frequencies of detection and other statistics for sump water samples are summarized in Table 3-9 and individual results are displayed in Table 3-17. The sump samples were analyzed for explosives only. The natural drainage channel surface water and seep samples were analyzed for various combinations of energetic compounds, SVOCs, herbicides, total and dissolved metals, and water quality parameters (e.g., temperature and pH), and miscellaneous inorganic parameters. Details of the analytical scheme are presented in Table 2-3.

After data collection, the surface water sample data for natural drainage channels were divided into two data sets. One data set (Gullies) represents samples that were collected on the steeper hillsides and generally represents drainage channels that are typically dry, except for storm events. Frequencies of detection and other statistics for these data are presented in Tables 3-10 through 3-13. The second subdivision comprises data from samples collected in streams with more frequent occurrences of flowing water (i.e., mainstream). Similar statistics for these data are presented in Tables 3-14 through 3-16. Summaries of mainstream and Gully surface water data are presented in Tables 3-18 and 3-19, respectively. Upgradient samples are labeled as “upgradient” in these tables.

Seep data are summarized in Tables 3-20 and 3-21. The summary formats for surface water and seeps are similar to those described for surface and subsurface soils (see Sections 3.1.2.1 and 3.1.2.2). A complete printout of all Round 1 through Round 3 surface water data is presented in Appendix Table G-2. A complete printout of all Round 1 through Round 3 seep data is presented in Appendix Table G-3. Upgradient samples are labeled as “upgradient” in those tables. Sump water data are presented in Table G-5.

3.1.2.4 SWMU 13 Sediment Site Data

Sediment samples were not collected during the composting operation. Sediment samples were collected from sumps during the ES/DI and from natural drainage channels during Rounds 1 through 3 and PCB Delineation. Similar to the surface water samples, sediment sample data for natural drainage channels were divided into two data sets: Gullies and mainstream. No sediment samples were collected at seep locations. Sediments collected for PCB Delineation are divided into surface sediments and subsurface sediments. These sediment samples are located in shallow drainage channels that are not continually full of water, hence the sediments are similar to soil samples. PCB Delineation surface

samples are 0-2 feet and subsurface samples are greater than 2 feet. Depending on the sampling round, sediment samples were analyzed for various combination of acid volatile sulfide/simultaneously extracted metal (AVS/SEM), energetic compounds, herbicides, metals, miscellaneous inorganic parameters, PCBs, and SVOCs (see Table 2-3). Descriptive statistics for these data are summarized in Table 3-22 through 3-26A.

Results for target analytes that were detected at least once are summarized in Table 3-27 for sumps, Tables 3-28 through 3-31 for natural drainage channel sediments, and Table 3-31A for PCB Delineation. The summary formats are similar to those described for surface and subsurface soils (see Sections 3.1.2.1 and 3.1.2.2). Appendix Table G-4 presents all sediment data generated during Rounds 1 through 3 and PCB Delineation. Upgradient samples are appropriately labeled as "upgradient" in those printouts.

3.1.2.5 SWMU 13 Groundwater Site Data

No groundwater data were collected during the composting operation. During Rounds 1 through 3, samples were collected from an increasing number of wells until a total of 51 wells were sampled in Round 3. During the ES/DI, groundwater samples were collected from temporary wells to represent groundwater at the overburden-bedrock interface. Depending on the sampling round, groundwater samples were analyzed for various combinations of energetic compounds, herbicides, total and dissolved metals, miscellaneous inorganic parameters, SVOCs, VOCs, and water quality parameters. One of the objectives of the data collection was to delineate the extent of contamination in groundwater.

The groundwater collected from overburden temporary wells is designated as perched groundwater or overburden groundwater. The bedrock groundwater wells are identified as Puz (Pennsylvanian, Upper Zone), Plz (Pennsylvanian, Lower Zone) or Valley on Table 2-2. The largest group of wells is the Puz wells, which represent shallow groundwater on or near to the ridge top and down the side slopes of the ridge toward the valley. The Plz wells represent deeper groundwater underneath the Upper Zone wells. The Valley wells represent shallow groundwater immediately beneath the "valley" floor near the mainstream surface water channels. The significance of these classifications becomes evident later in this report.

Summary statistics for overburden groundwater data are summarized in Table 3-22. Summary statistics for bedrock groundwater data collected in Rounds 1 through 3 are summarized in Tables 3-33 through 3-40. Data for all chemicals detected at least once in overburden and bedrock groundwater are presented in Tables 3-41 through 3-44. Appendix Table G-6 presents all groundwater data generated

during Rounds 1 through 3. These data are arranged so that each round of data within a well location is side by side to facilitate an understanding of temporal concentration trends within each well.

3.1.2.6 Vegetation Site Data

Vegetation samples were collected only during Round 3 and the associated analytical data are summarized in Tables 3-45 and 3-46. Tabulation format is similar to those described for other media. The vegetation samples were analyzed only for energetic compounds to determine whether these compounds were being assimilated by the plants. Appendix Table G-7 presents all vegetation data generated during Round 3.

The rest of this report is devoted to an interpretation of the data for purposes of completing the RFI. This interpretation begins in Section 3.2 with a summary of the data quality.

3.2 DATA QUALITY SUMMARY

TtNUS collected data at NSWC Crane SWMUs 12, 13, and 16 at various times in support of this RFI. Data collection was concurrent at three SWMUs: 12, 13, and 16. Consequently, samples from more than one SWMU, but of a similar matrix, may have arrived at the analytical laboratory in a similar time frame. This means that samples from the different SWMUs, but of similar matrix, may have been combined into the same sample preparation or analysis groups and these samples “share” QC data. The number of QC results obtained under such circumstances is greater than if only SWMU 13 QC data were available. This provides more robust estimates of analytical performance, especially for quantitative measures such as accuracy and precision, than could be obtained from SMWU 13 QC data alone. Although this was not explicitly planned, no disadvantages of using this approach were identified. A tabulation of data quality characteristics and detailed QC data review for the three rounds of data generation at SWMU 13 are presented in Appendix H of this report. The titles of the data tables (Table H-1 through H-13) identify which SWMUs are represented by the data.

Based on the reviews in Appendix H and a less rigorous comparative data quality review for subsequent data the following summaries (Sections 3.2.1 through 3.2.4) were prepared to describe SWMU 13 data quality. Sample collection and analysis completeness was generally satisfactory with a few exceptions for Rounds 1 through 3 (see Appendix H, Section H.3.1) and for subsequent data. Composting data were of sufficient quality to support the composting operation and the risk assessments included in this RFI. The Round 1 through 3 data were generally of sufficient quality to support this RFI, although explosives data appear to have suffered from a sporadic failure to detect compounds that may have been present in

vegetation. The ES/DI and other subsequent data did not suffer from this minor deficiency. No other matrices were similarly affected. Significant deficiencies and limiting data quality characteristics are to be considered when using the data. The PCB Delineation field and laboratory PCB results did not correlate well, but in most cases the field and laboratory results were in agreement with respect to whether sample concentrations were greater than or less than the 1 mg/kg action level. If a field PCB concentration was greater than the action level then the laboratory concentration was also greater. With the exception of two samples, non-detects by field analysis resulted in laboratory non-detects or concentrations less than the action level. More field and laboratory data points would be needed to better understand quantitatively how the different analyses compare to each other but the data are sufficient to determine whether concentrations exceed 1 mg/Kg.

3.2.1 Precision and Accuracy

Composting Data

Explosives – These data were satisfactory and no explosives results were rejected.

Volatile Organic Chemicals – These data were satisfactory. The VOC concentrations were generally very low, indicating that there was no significant VOC contamination.

Metals – Analytical performance for the metals analyses was generally within expectations. Relative percent difference (RPD) values, which reflect analytical precision (laboratory duplicates) or field precision (field duplicates) occasionally exceeded the 50 percent point of reference, however, there was no consistent indication of an analytical problem with respect to accuracy, precision, or any other QC measure. No metals results from the composting operation were rejected.

Details of composting data quality are provided in Appendix H and in MK (2000 and 2001) and TT (2002).

Round 1

Explosives – The compound 2-amino-4,6-dinitrotoluene in sample 13SW1101 and picramic acid in samples 16SS150002 and 16SS210002 were rejected for the explosive analyses for Round 1. The picramic acid results were non-detected and were rejected because of low matrix spike recoveries. The low matrix spike recoveries may be due to a difficult sample matrix and they indicate that picramic acid results are generally biased low in solid matrices. The bias is moderate to severe, but this chemical has no particular importance for SMWU 13, therefore, the impact is negligible.

A slight to moderate low bias [average percent recovery = 59.2 for matrix spike (MS) and matrix spike duplicate (MSD), and 88.4 for laboratory control sample (LCS)] was detected in aqueous RDX concentrations. The low bias indicates that reported RDX concentrations are, on average, less than actual site concentrations. Results for other explosive compounds in aqueous and solid sample matrices were not biased significantly low and may be biased slightly high in some cases, though not significantly.

Herbicides – Hexachloropentadiene and pentachlorophenol are not herbicides but were analyzed by an herbicide method to obtain lower than normal detection limits. Results are very uncertain at levels near the detection limits and exhibit a negative bias. The bias is moderate to severe in solid and aqueous media.

Metals - The total metals, overall, exhibit no bias to a slightly high bias, with an apparent but probably false indication of moderately high bias for calcium, chromium, titanium, and zinc (see Table H-8). The filtered metals exhibit an overall slightly low bias and the total metals do not exhibit significant bias (see Table H-8). Precision in aqueous media was especially good as indicated by few RPD values in excess of 35 percent in Table H-11. Some high RPD values were obtained for solid matrices, however, the laboratory and field duplicated data are comparable as expected. The range of observed RPD values is evidently a reflection of natural sample heterogeneity.

Miscellaneous Parameters [ammonia, AVS, SEM, Cation Exchange Capacity, nitrite/nitrate and total organic carbon (TOC)] – The data are generally of acceptable quality although the ammonia nitrogen results occasionally exhibit an uncertainty that is greater than expected.

PCBs – These data are of acceptable quality without qualification.

SVOCs – The compounds 2,3,4,6-tetrachlorophenol; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol; 2,4-dichlorophenol; 2,6-dichlorophenol; 2,4-dinitrophenol; 2,4-dimethylphenol; 2-chlorophenol; 2-methylphenol; 2-nitrophenol; 3&4-methylphenol; 3,3'-dichlorobenzidine; 4,6-dinitro-2-methylphenol; 4-chloro-3-methylphenol; 4-nitroquinoline-1-oxide; 4-nitrophenol; aramite; hexachlorocyclopentadiene; kepone; and phenol constitute all of the results rejected for the semivolatile analyses for Round 1. The majority (64 percent) of the results were rejected because several compounds (4-nitroquinoline-1-oxide; aramite; kepone; and 1,4-phenylenediamine) yield poor analytical responses. The remaining rejected semivolatile results were rejected due to one of the following reasons: low acid surrogate recovery representative of phenolic compound recoveries, low MS recovery, gross holding time exceedance, or low laboratory control sample recovery. The gross holding time exceedance and low laboratory control sample recovery are attributed to laboratory performance and the remaining reasons for data rejection

can be attributed to difficult sample matrices. The rejected semivolatile data points are from compounds that are not expected to be associated with MFB operations; therefore the impact on overall data quality is minimal. However, the rejected data constitute data voids and must be viewed as such when making decisions.

VOCs – Acrolein results were rejected in four soil and two groundwater samples, otherwise no other VOC results were rejected. These data were rejected because these compounds yield poor analytical responses. Because acrolein is not expected to be related to site operations these rejected have little negative impact on the project. In general, VOC results exhibited a slightly low bias, with 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and chloromethane exhibiting a moderately low bias for Round 1 soil and sediment samples. The volatile compounds overall show no significant bias in aqueous samples, with the exceptions of bromomethane, chloromethane, and vinyl chloride, which exhibit a moderately low bias for Round 1 aqueous samples.

Round 2

Explosives – explosives data were generally acceptable. 2,2',6,6'-tetranitro-4,4'-azoxytoluene results, however, exhibit a moderately low bias. In addition, 2,4-diamino-6-nitrotoluene and RDX exhibit a slight high bias in aqueous samples. The potential high RDX bias in Round 2 and the moderately low bias in Round 1 may cause Round 2 concentrations to appear greater than Round 1 concentrations when there is actually no difference.

Metals – These results exhibited no significant bias. Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (ammonia, chloride, nitrite/nitrate, sulfate and TOC) – The data are generally of acceptable quality although the ammonia nitrogen results occasionally exhibit a slight low bias.

Polynuclear Aromatic Hydrocarbons (PAHs) – There was a slight low bias for PAHs. The average percent recovery across all PAHs was approximately 70 percent. The minimum recoveries were MS and MSD results of 38.3 and 34.1 percent, respectively for anthracene; however, most recoveries (99 out of 105) were greater than 50 percent.

VOCs (U.S. EPA Methods 8015B and 8260B) – Round 2 soil sample VOC results were biased slightly less negative than the Round 1 results. Three ketones (2-butanone, 2-hexanone, and 4-methyl-2-pentanone) had slightly low mean MS and MSD recoveries ranging from 55 percent to 63 percent. In general, the aqueous samples had less bias than the soil samples. Overall, the biases are slight, with the exceptions of bromomethane, which had a moderate low bias in groundwater samples.

Round 3

Vegetation (the only solid matrix analyzed for explosives in Round 3) exhibited significant analyte recovery and precision problems for energetic compounds. The results for 2,2',6,6'-tetranitro-4,4'-azoxytoluene and hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX) showed a moderately low bias in aqueous samples. Tetryl was not recoverable from the vegetation matrix and all vegetation tetryl results were rejected. 3-Nitrotoluene; 2,4-diamino-6-nitrotoluene; and 2,6-diamino-4-nitrotoluene exhibited similar recovery problems in vegetation, although the recoveries were better, on average, than the tetryl recoveries (see Table H-8). One 2,4-diamino-6-nitrotoluene and one hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX) result were also rejected in vegetation.

For this project, tetryl is not expected to be a site-related compound so the impact of no recovery for tetryl is insignificant. Failure to detect the diamino compounds is potentially more significant, but only where demonstrating the occurrence of TNT degradation in vegetation is important. The poor recoveries were caused by poor chromatography and it is expected that other energetic compounds were rendered undetectable by the poor chromatography. It is impossible to determine which compounds might have gone undetected in any particular samples. These shortcomings do not prevent movement forward on this project, but they do hamper the ability to make assertions concerning the presence of certain energetic compounds in vegetation. Before any additional vegetation analyses would be undertaken with this analytical method, an investment in improving the performance of the method is recommended. In summary, reported detections of explosives in vegetation samples are of generally acceptable quality unless otherwise noted (e.g., for tetryl rejections), but some detectable levels of explosives and related compounds are expected to have gone undetected as a result of poor chromatography.

A small number of metals recoveries exhibited a high (aluminum and manganese) or low (iron and potassium) bias (see Tables H-9 and H-10) in solid and liquid matrices. These are the results of marginally valid QC spikes that did not increase the native sample concentration by at least 25 percent. When these marginally valid QC measures are eliminated from consideration, the metals data quality appears to be normal. In brief, Round 3 metals exhibit no significant biases for solid or aqueous matrices.

External Sump/Drainage Channel Investigation, Additional Metal Delineation, and PCB Delineation Samples Data

The precision and accuracy DQIs for these samples were compared through visual inspection to the DQIs for previous RFI data. There were no discernible differences in accuracy of the data sets so the data quality indicators were not tallied or summarized quantitatively. Laucks laboratory performed all analyses for this project so there are no inter-laboratory precision or biases concerns. The limited breadth of analyses for these sample samples (see Table 2-3) also limited the possible range of quality problems that could have occurred.

3.2.2 Representativeness

All samples, including ES/DI, additional metal delineation, and PCB delineation samples, appear to be representative of the intended environmental matrices. The samples that were collected were collected according to the QAPP. Lack of data where samples could not be collected or where data have been rejected, however, should be considered when evaluating representativeness of the areas or volumes of environmental media that were characterized. See Table 2-3 for a tally of samples that could not be collected for various reasons.

3.2.3 Comparability and Completeness

Sample collection deviated slightly from the proposed sampling strategy in all sampling rounds, but the deviations were a reflection of site conditions rather than investigative deficiencies. Uncollected samples during RFI Rounds 1 through 3 were generally not collected because surface water was not available at all planned locations or refusal was encountered during soil boring advancement. Accordingly, the percent completeness for surface water sample collection is less than 90 percent in several cases for RFI Rounds 1 through 3 (compare sample collection ratios in Table H-1). There were no data rejections in these cases, but the lack of data from the planned locations as well as locations where data have been rejected for quality reasons should be considered when interpreting the results of the investigation. For the ES/DI and PCB delineation sampling, all targeted surface soil samples were collected but several targeted subsurface soil samples could not be collected because refusal was encountered at depths shallower than the target depths (see Table 2-3). Two of nine planned sump water samples were collected because of limited availability of water but all nine planned sump sediment samples were collected.

Use of consistent and appropriate sampling and analysis methods, and collecting samples from the intended locations ensured that comparability was maintained among sampling rounds. Several analyses

did not achieve target detection limits or method detection limits (MDLs) for the RFI Rounds 1 through 3. he effect of this is described in Section 3.2.4.

During the PCB Delineation sampling event for August 2006, analysis of Total PCBs was performed in the field using quantitative immunoassay technology to better define the extent and depth of PCB contamination. Sixty-two samples were analyzed for PCBs in the field and 16 of these samples that had positive detections were sent to Lauck's Laboratory for confirmation of the field results. Quantitative agreement between the results was poor. In general, laboratory results were three to five times greater than the field results for positive detections. Samples 13SB1050406 and 13SD0591224 were non-detected by field PCB analysis and had detections greater than the 1 mg/kg surface soil clean-up level by fixed laboratory analysis. However, in all other cases, if the field PCB result was greater than 1 mg/kg then the laboratory result was also greater, and with the exception of samples 13SB1050406 and 13SD0591224 a non-detect by field analysis resulted in a laboratory result less than 1 mg/kg. Also, after the laboratory data were compared to the field data and poor data correlation was determined, two more samples were sent to the laboratory to confirm field non-detects. The laboratory did confirm that these samples were non-detect which bolstered confidence that non-detects determined in the field were also at concentrations less than the action level in the laboratory. So, in respect to the 1 mg/kg surface soil action limit, the field analysis could be used to determine if soil concentrations were greater than or less than the action level.

The cause of the difference in concentrations between the field and laboratory results could not be determined. However, there were instances where large concentration differences were noted in the laboratory results for field duplicates and sample re-analysis. Sample 13SB0950102 had a laboratory concentration of 64 mg/kg, the associated field duplicate 13SB0950102-D had a concentration of 400 mg/kg. Sample 13SD0660006 had a concentration of 7.7 mg/kg. The laboratory was asked to re-analyze the sample and reported a re-analysis concentration of 4.1 mg/kg. The laboratory's inability to reproduce results in certain samples indicates a possible heterogeneity or sample matrix interference.

3.2.4 Sensitivity

Various analyses yielded non-detect values during RFI Rounds 1 through 3 that exceeded the RBTLs presented in the SWMU 13 QAPP and subsequent QAPP revisions. The elevated non-detect values were a result of sample dilutions, a result of laboratory blank contamination, or other causes that reflect the current technology regarding laboratory analyses for the selected parameters in the matrices of interest. In those cases, the exceedances of RBTLs are not considered to be significant, although the inability to achieve the target concentrations must be considered when evaluating the data because the

significance may change with data use. The vegetation sampling, in particular, appears to have failed to detect explosives compounds in some samples because of poor chromatography. Whereas false negative results may have occurred, reported detections are considered to be true detections. Consideration should be given to using an improved analytical method for future explosives analyses in vegetation. Several analytical fractions exhibited detection limits for select analytes that were greater than the target levels but the exceedances were generally typical of environmental analyses. It would have been impracticable and unnecessary to seek or develop analytical methods with lower detection limits. Data from RFI Rounds 1 through 3 should be reviewed prior to the use if poor sensitivity is a concern (see Section H.3.2 and Tables H-4 through H-5). Data from the ES/DI (explosives only), additional metals delineation (metals only), and PCB delineation (PCBs only) were unaffected by poor sensitivity.

TABLE 3-1

DESCRIPTIVE STATISTICS FOR
COMPLETE BACKGROUND SOIL SAMPLE DATA SET
SWMU 13 - MINE FILL B[1]
NSWC CRANE
CRANE, INDIANA

Metal (mg/kg)	Frequency of Detection	Minimum Detection	Maximum Detection	Average of All Results	Average of Positive Detections	Distribution of Data	95% Upper Tolerance Limit
ALUMINUM	67/67	5,020	17,400	11,290	11,100	NORMAL	17,400
ANTIMONY	8/67	0.49	11.3	0.86	4.36	LOGNORMAL	2.88
ARSENIC	67/67	1.1	10.2	5.28	5.20	NORMAL	9.60
BARIUM	67/67	24.8	155	69.7	68.8	LOGNORMAL	147
BERYLLIUM	14/67	0.3	0.82	0.36	0.47	LOGNORMAL	0.85
CADMIUM	34/67	0.05	3.6	0.36	0.62	LOGNORMAL	2.05
CALCIUM	66/67	53.6	35,300	997	1,010	LOGNORMAL	3,350
CHROMIUM	67/67	7.7	30.6	16.4	16.1	LOGNORMAL	29.1
COBALT	67/67	1.8	27.1	8.70	8.62	LOGNORMAL	21.7
COPPER	67/67	3.5	23.8	10.2	10.0	LOGNORMAL	21.4
IRON	67/67	7,140	40,800	18,100	17,800	LOGNORMAL	34,500
LEAD	67/67	6.4	21.5	11.9	11.7	LOGNORMAL	19.7
LITHIUM	66/66	7.8	46.6	16.1	15.7	LOGNORMAL	29.4
MAGNESIUM	67/67	496	2,870	1,410	1,390	LOGNORMAL	3,060
MANGANESE	67/67	23.2	3,040	599	590	LOGNORMAL	3,270
MERCURY	17/67	0.04	0.14	0.033	0.062	LOGNORMAL	0.072
NICKEL	67/67	4.6	23.7	11.9	11.7	NORMAL	18.7
POTASSIUM	67/67	280	1,650	856	833	NORMAL	1,370
SELENIUM	15/67	0.28	0.88	0.33	0.53	LOGNORMAL	0.83
SILVER	48/67	0.04	0.11	0.049	0.055	LOGNORMAL	0.10
SODIUM	32/67	3.7	205	33.0	56.2	LOGNORMAL	232
STRONTIUM	66/66	4.2	63.2	12.3	12.1	LOGNORMAL	25.3
THALLIUM	66/67	0.05	0.31	0.18	0.18	NORMAL	0.29
TIN	0/67	NA	NA	0.32[2]	NA	NA	NA
THORIUM	66/66	4.1	11.7	7.24	7.11	LOGNORMAL	10.9
VANADIUM	67/67	14.1	48.5	26.5	26.2	LOGNORMAL	45.8
ZINC	50/67	9.4	60.2	28.1	32.0	NORMAL	54.0

NA - Not available
mg/kg - milligrams per kilogram

1- Taken from Table 4-1 of the Final Basewide Background Soil Investigation Report, NSWC Crane, Crane, Indiana, January, 2001.
2 - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit. This value was used for statistical analysis when no detections were encountered.

TABLE 3-2

DESCRIPTIVE STATISTICS FOR
SOIL GROUP 3 - ALLUVIAL, MISSISSIPPIAN, AND PENNSYLVANIAN SURFACE SOIL
SWMU 13 - MINE FILL B[1]
NSWC CRANE
CRANE, INDIANA

Metal (mg/kg)	Frequency of Detection	Minimum Detection	Maximum Detection	Average of All Results	Average of Positive Detections	Distribution of Data	95% Upper Tolerance Limit
ALUMINUM	15/15	6,770	17,400	10,238	10,238	LOGNORMAL	19,900
ANTIMONY	2/15	1.4	5.6	0.83	3.50	LOGNORMAL	6.9
ARSENIC	15/15	2.4	10.2	6.11	6.11	NORMAL	11.83
BARIUM	15/15	46.1	153	89.0	89.0	LOGNORMAL	211
BERYLLIUM	1/15	0.49	0.49	0.40	0.49	LOGNORMAL	0.93
CADMIUM	10/15	0.1	3.6	0.63	0.88	LOGNORMAL	6.05
CALCIUM	14/15	115	35,300	2,730	2,920	LOGNORMAL	55,200
CHROMIUM	15/15	8.5	21.7	14.6	14.6	LOGNORMAL	28.7
COBALT	15/15	6	27.1	12.9	12.9	LOGNORMAL	32.4
COPPER	15/15	5.4	17.1	8.85	8.85	LOGNORMAL	17.6
IRON	15/15	10,700	36,200	16,800	16,800	LOGNORMAL	37,400
LEAD	15/15	9.4	21.5	15.0	15.0	LOGNORMAL	27.0
LITHIUM	14/14	9.1	29.9	14.8	14.8	LOGNORMAL	30.0
MAGNESIUM	15/15	620	2,250	1,200	1,200	LOGNORMAL	2,800
MANGANESE	15/15	268	3,040	1,140	1,140	LOGNORMAL	5,700
MERCURY	7/15	0.04	0.07	0.037	0.051	NORMAL	0.077
NICKEL	15/15	9.2	20	13.4	13.4	LOGNORMAL	22.1
POTASSIUM	15/15	418	1,490	847	847	LOGNORMAL	1,970
SELENIUM	5/15	0.51	0.64	0.48	0.58	NORMAL	0.81
SILVER	15/15	0.05	0.11	0.065	0.065	LOGNORMAL	0.130
SODIUM	6/15	9.4	23.7	8.11	15.6	NORMAL	28
STRONTIUM	14/14	7.4	63.2	14.3	14.3	LOGNORMAL	46.4
THALLIUM	15/15	0.1	0.27	0.19	0.19	NORMAL	0.31
TIN	0/15	NA	NA	0.36[2]	NA	NA	NA
THORIUM	14/14	5.3	8.5	6.86	6.86	LOGNORMAL	10.2
VANADIUM	15/15	17.1	40	25.4	25.4	LOGNORMAL	51.2
ZINC	14/15	24.4	60.2	37.0	38.6	NORMAL	65.6

NA - Not available
mg/kg - milligrams per kilogram

1- Taken from Table 4-4 of the Final Basewide Background Soil Investigation Report, NSWC Crane, Crane, Indiana, January, 2001.
2 - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit. This value was used for statistical analysis when no detections were encountered.

TABLE 3-3

DESCRIPTIVE STATISTICS FOR
SOIL GROUP 8 - PENNSYLVANIAN SUBSURFACE CLAY AND SILT
SWMU 13 - MINE FILL B[1]
NSWC CRANE
CRANE, INDIANA

Metal (mg/kg)	Frequency of Detection	Minimum Detection	Maximum Detection	Average of All Results	Average of Positive Detections	Distribution of Data	95% Upper Tolerance Limit
ALUMINUM	9/9	9,070	16,200	13,019	13,019	NORMAL	20,600
ANTIMONY	1/9	11.3	11.3	1.83	11.30	LOGNORMAL	40.3
ARSENIC	9/9	1.4	8.5	5.51	5.51	NORMAL	12.5
BARIUM	9/9	25.1	83.4	57.0	57.0	NORMAL	115
BERYLLIUM	0/9	NA	NA	0.36 [2]	NA	NA	NA
CADMIUM	8/9	0.05	0.64	0.26	0.28	NORMAL	0.8
CALCIUM	9/9	85.2	970	470	470	LOGNORMAL	4,640
CHROMIUM	9/9	14.2	27.1	19.9	19.9	NORMAL	33.0
COBALT	9/9	5.2	12.5	8.32	8.32	LOGNORMAL	21.2
COPPER	9/9	11	23.8	15.3	15.3	LOGNORMAL	33.3
IRON	9/9	14,800	40,800	24,422	24,422	LOGNORMAL	60,200
LEAD	9/9	8.6	15.2	11.8	11.8	NORMAL	19.6
LITHIUM	9/9	13.7	46.6	23.2	23.2	LOGNORMAL	80.0
MAGNESIUM	9/9	1,100	2,870	1,958	1,958	NORMAL	3,410
MANGANESE	9/9	29	457	263	263	NORMAL	704
MERCURY	1/9	0.14	0.14	0.037	0.140	LOGNORMAL	0.18
NICKEL	9/9	10	23.7	13.6	13.6	LOGNORMAL	29.6
POTASSIUM	9/9	718	1290	974	974	LOGNORMAL	1,890
SELENIUM	8/9	0.37	0.88	0.47	0.51	NORMAL	1.07
SILVER	8/9	0.05	0.1	0.053	0.056	LOGNORMAL	0.14
SODIUM	6/9	10	205	64.0	79.1	LOGNORMAL	1,070
STRONTIUM	9/9	10	20.3	13.8	13.8	LOGNORMAL	30.9
THALLIUM	9/9	0.14	0.25	0.20	0.20	LOGNORMAL	0.33
TIN	0/9	NA	NA	0.35 [2]	NA	NA	NA
THORIUM	9/9	7.1	11.7	9.02	9.02	NORMAL	14.9
VANADIUM	9/9	20.9	48.5	33.2	33.2	LOGNORMAL	69.1
ZINC	9/9	24.3	58.2	37.1	37.1	LOGNORMAL	83.3

NA - Not available
mg/kg - milligrams per kiligram

1- Taken from Table 4-9 of the Final Basewide Background Soil Investigation Report, NSWC Crane, Crane, Indiana, January, 2001.
2 - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit. This value was used for statistical analysis when no detections were encountered.

TABLE 3-4

DESCRIPTIVE STATISTICS FOR
SOIL GROUP 9 - PENNSYLVANIAN SUBSURFACE SAND
SWMU 13 - MINE FILL B[1]
NSWC CRANE
CRANE, INDIANA

Metal (mg/kg)	Frequency of Detection	Minimum Detection	Maximum Detection	Average of All Results	Average of Positive Detections	Distribution of Data	95% Upper Tolerance Limit
ALUMINUM	1/1	5,430	5,430	5,430	5,430	NA	NA
ANTIMONY	0/1	NA	NA	0.38 [2]	NA	NA	NA
ARSENIC	1/1	2.9	2.9	2.90	2.90	NA	NA
BARIUM	1/1	24.8	24.8	24.8	24.8	NA	NA
BERYLLIUM	0/1	NA	NA	0.14 [2]	NA	NA	NA
CADMIUM	1/1	0.14	0.14	0.14	0.14	NA	NA
CALCIUM	1/1	53.6	53.6	54	54	NA	NA
CHROMIUM	1/1	7.7	7.7	7.7	7.7	NA	NA
COBALT	1/1	8.8	8.8	8.80	8.80	NA	NA
COPPER	1/1	5.6	5.6	5.6	5.6	NA	NA
IRON	1/1	11,300	11,300	11,300	11,300	NA	NA
LEAD	1/1	11.7	11.7	11.7	11.7	NA	NA
LITHIUM	1/1	8.6	8.6	8.6	8.6	NA	NA
MAGNESIUM	1/1	654	654	654	654	NA	NA
MANGANESE	1/1	327	327	327	327	NA	NA
MERCURY	0/1	NA	NA	0.02 [2]	NA	NA	NA
NICKEL	1/1	4.6	4.6	4.6	4.6	NA	NA
POTASSIUM	1/1	353	353	353	353	NA	NA
SELENIUM	1/1	0.28	0.28	0.28	0.28	NA	NA
SILVER	1/1	0.05	0.05	0.050	0.050	NA	NA
SODIUM	0/1	NA	NA	1.15 [2]	NA	NA	NA
STRONTIUM	1/1	5.4	5.4	5.4	5.4	NA	NA
THALLIUM	1/1	0.09	0.09	0.09	0.09	NA	NA
TIN	0/1	NA	NA	0.22	NA	NA	NA
THORIUM	1/1	4.9	4.9	4.90	4.90	NA	NA
VANADIUM	1/1	14.1	14.1	14.1	14.1	NA	NA
ZINC	1/1	11.4	11.4	11.4	11.4	NA	NA

NA - Not available
mg/kg - milligrams per kilogram

1- Taken from Table 4-10 of the Final Basewide Background Soil Investigation Report, NSWC Crane, Crane, Indiana, January, 2001.
2 - This value is the average of all detected and non-detected values. Non-detected values were represented by using one half the detection limit. This value was used for statistical analysis when no detections were encountered.

TABLE 3-5

DESCRIPTIVE STATISTICS FOR
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3 ES/DI AND PCB DELINEATION
SWMU 13 - MINE FIILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration		Maximum Concentration		Range of Non-Detects	Mean Concentration	Average of Positive Detects	Sample of Maximum Concentration
Dioxins (ng/kg)									
1,2,3,4,6,7,8,9-OCDD	12/12	813	J	4140			2294.25	2294.25	13SS060002
1,2,3,4,6,7,8,9-OCDF	4/12	0.55	J	9.5	J	0.2 - 2	4.09	1.63	13SS140001
1,2,3,4,6,7,8-HPCDD	12/12	6.2		45.4		-	19.36	19.36	13SS060002
1,2,3,4,6,7,8-HPCDF	4/12	0.57	J	3.1	J	0.09 - 4	2.02	0.93	13SS100002
1,2,3,4,7,8,9-HPCDF	1/12	1.3	J	1.3	J	0.1 - 0.7	1.30	0.26	13SS140001
1,2,3,4,7,8-HXCDD	3/12	0.42	J	0.63	J	0.1 - 0.7	0.55	0.24	13SS130002
1,2,3,4,7,8-HXCDF	2/12	1.8	J	6.4		0.07 - 1.2	4.10	0.87	13SS140001
1,2,3,6,7,8-HXCDD	2/12	0.69	J	0.84	J	0.1 - 1	0.77	0.27	13SS140001
1,2,3,6,7,8-HXCDF	1/12	1.6	J	1.6	J	0.07 - 0.41	1.60	0.23	13SS140001
1,2,3,7,8,9-HXCDD	5/12	0.72	J	1.6	J	0.1 - 2	1.22	0.67	13SS130002
1,2,3,7,8,9-HXCDF	2/12	0.31	J	0.33	J	0.09 - 0.5	0.32	0.15	13SS140001
1,2,3,7,8-PECDD	1/12	0.71	J	0.71	J	0.1 - 0.8	0.71	0.22	13SS130002
1,2,3,7,8-PECDF	2/12	0.36	J	2.5	J	0.09 - 0.4	1.43	0.33	13SS140001
2,3,4,6,7,8-HXCDF	4/12	0.21	J	1.8	J	0.07 - 0.4	0.78	0.32	13SS140001
2,3,4,7,8-PECDF	7/12	0.47	J	21.8		0.1 - 0.53	5.88	3.48	13SS140001
2,3,7,8-TCDD	1/12	0.52	J	0.52	J	0.1 - 1.2	0.52	0.21	13SS090002
2,3,7,8-TCDF	10/12	0.35	J	21		0.1 - 0.3	3.75	3.15	13SS140001
TEQ BIRD	12/12	0.08942		44.51305		-	7.11	7.11	13SS140001
TEQ BIRD HALFND	12/12	0.43942		44.68305		-	7.59	7.59	13SS140001
TEQ MAMMAL	12/12	0.16232		14.88895		-	2.76	2.76	13SS140001
TEQ MAMMAL HALFND	12/12	0.44682		15.05895		-	3.21	3.21	13SS140001
TOTAL HPCDD	12/12	11.8		112		-	42.71	42.71	13SS060002
TOTAL HPCDF	7/12	0.38	J	10.1	J	0.1 - 1.9	3.79	2.32	13SS140001
TOTAL HXCDD	11/12	0.77	J	15.7	J	1.1 - 1.1	5.52	5.10	13SS050002
TOTAL HXCDF	8/12	0.33		19.4	J	0.07 - 0.2	5.59	3.75	13SS140001
TOTAL PECDD	1/12	0.71		0.71		0.1 - 2.8	0.71	0.39	13SS130002
TOTAL PECDF	9/12	0.83		135	J	0.1 - 0.3	34.54	25.93	13SS140001
TOTAL TCDD	2/12	0.52		2.1	J	0.1 - 2.2	1.31	0.50	13SS060002
TOTAL TCDF	11/12	1.8		540	J	0.1 - 0.1	131.88	120.90	13SS140001
Volatile Organics (ug/kg)	/					-			
TRANS-1,2-DICHLOROETHENE	1/2	2	J	2	J	1.4 - 1.4	2.00	1.35	13SS060002
TRICHLOROFLUOROMETHANE	2/2	2	J	3	J	-	2.50	2.50	13SS150002

TABLE 3-5

DESCRIPTIVE STATISTICS FOR
SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3 ES/DI AND PCB DELINEATION
SWMU 13 - MINE FIILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration		Maximum Concentration		Range of Non-Detects	Mean Concentration	Average of Positive Detects	Sample of Maximum Concentration
Semivolatile Organics (ug/kg)	/					-			
ACENAPHTHENE	1/12	52	J	52	J	3.8 - 4.9	52.00	6.22	13SS090002
ANTHRACENE	2/12	5	J	210	J	3.8 - 4.9	107.50	19.63	13SS090002
BENZO(A)ANTHRACENE	7/12	4	J	1100	J	3.8 - 4.9	168.00	98.86	13SS090002
BENZO(A)PYRENE	6/12	6	J	1000	J	3.8 - 4.9	182.00	92.03	13SS090002
BENZO(B)FLUORANTHENE	7/12	7	J	1100	J	3.8 - 4	177.00	104.07	13SS090002
BENZO(G,H,I)PERYLENE	6/12	6	J	750	J	3.8 - 4.9	136.67	69.36	13SS090002
BENZO(K)FLUORANTHENE	7/12	5	J	640	J	3.8 - 4	101.71	60.15	13SS090002
BIS(2-ETHYLHEXYL)PHTHALATE	7/12	91	J	140	J	78 - 190	123.00	93.75	13SS090002
BIS(2-ETHYLHEXYL)PHTHALATE	7/12	91	J	140	J	78 - 190	123.00	93.75	13SS060002
CHRYSENE	7/12	7	J	1100	J	3.8 - 4	174.14	102.40	13SS090002
DIBENZO(A,H)ANTHRACENE	1/12	200	J	200	J	3.8 - 4.9	200.00	18.55	13SS090002
FLUORANTHENE	9/12	6	J	1800	J	3.8 - 4	217.44	163.58	13SS090002
FLUORENE	1/12	50	J	50	J	3.8 - 4.9	50.00	6.05	13SS090002
INDENO(1,2,3-CD)PYRENE	6/12	4	J	650	J	3.8 - 4.9	118.33	60.19	13SS090002
NAPHTHALENE	1/12	5	J	5	J	3.8 - 4.9	5.00	2.32	13SS100002
PHENANTHRENE	7/12	4	J	1000	J	3.8 - 4.2	151.14	89.00	13SS090002
PYRENE	9/12	6	J	2400	J	3.8 - 4	284.67	213.99	13SS090002
PCBs (ug/kg)	/					-			
AROCLOR-1248	40/51	24		160000		8.8 - 20	16446.95	12900.93	13SS100002
Energetics (mg/kg)	/					-			
1,3,5-TRINITROBENZENE	1/25	3		3		0.25 - 0.25	3.00	0.24	13SS480002
1,3-DINITROBENZENE	1/25	0.71	J	0.71	J	0.25 - 0.25	0.71	0.15	13SS480002
2,4,6-TRINITROTOLUENE	6/25	0.34	J	250		0.25 - 0.25	42.46	10.28	13SS480002
2,4-DINITROTOLUENE	1/25	0.87	J	0.87	J	0.25 - 0.25	0.87	0.15	13SS480002
2-AMINO-4,6-DINITROTOLUENE	1/25	100	J	100	J	0.25 - 0.25	100.00	4.12	13SS480002
4-AMINO-2,6-DINITROTOLUENE	5/25	0.25	J	130	J	0.25 - 0.25	26.48	5.40	13SS480002
HMX	9/25	0.25	J	350		0.25 - 0.25	48.79	17.64	13SS480002
RDX	6/24	0.33	J	1800		0.25 - 0.25	428.00	107.09	13SS480002
Miscellaneous Parameters	/					-			
CATION EXCHANGE CAPACITY (meq/100)	2/2	14		15		-	14.50	14.50	13SS080002
PH	2/2	5.1		7.4		-	6.25	6.25	13SS070002
Field PCB Results (mg/kg)									
TOTAL PCBS AS AROCLOR-1254	13/20	0.01	J	13.85	J	0.5 - 0.5	1.70	1.19	13SS960002

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SB001	13SB002	13SB003	13SB004	13SB005	13SB006	13SB007	13SB008	13SB009/015	13SB009/015	13SB010
NSAMPLE	13SS010002	13SS020002	13SS030002	13SS040002	13SS050002	13SS060002	13SS070002	13SS080002	13SS090002	13SS150002	13SS100002
SAMPLE NUMBER	13SS010002	13SS020002	13SS030002	13SS040002	13SS050002	13SS060002	13SS070002	13SS080002	13SS090002	13SS150002	13SS100002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3/30/2003	3/26/2003	4/10/2003	3/26/2003
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD	2240	1910	2810	3310	2910	4140			1570 J		2270 J
1,2,3,4,6,7,8,9-OCDF	0.2 U	0.2 U	0.5 U	2 U	1.6 U	4.6 J			1.7 J		1.3 U
1,2,3,4,6,7,8-HPCDD	9.8	7.9	18	28.4	34.3	45.4			13.6		18.8
1,2,3,4,6,7,8-HPCDF	0.1 U	0.09 U	0.2 U	0.87 U	0.68 U	2.1 J			2.3 J		3.1 J
1,2,3,4,7,8,9-HPCDF	0.1 U	0.1 U	0.3 U	0.7 U	0.7 U	0.7 U			0.3 U		0.3 U
1,2,3,4,7,8-HXCDD	0.2 U	0.1 U	0.3 U	0.6 U	0.7 U	0.6 J			0.2 U		0.2 U
1,2,3,4,7,8-HXCDF	0.1 U	0.07 U	0.2 U	1 U	1.2 U	1.8 J			0.46 U		0.41 U
1,2,3,6,7,8-HXCDD	0.1 U	0.1 U	0.3 U	0.54 U	0.86 U	1 U			0.2 U		0.2 U
1,2,3,6,7,8-HXCDF	0.09 U	0.07 U	0.2 U	0.3 U	0.4 U	0.39 U			0.3 U		0.1 U
1,2,3,7,8,9-HXCDD	0.2 U	0.1 U	0.3 U	0.6 U	2 U	1.5 J			0.72 J		0.79 J
1,2,3,7,8,9-HXCDF	0.1 U	0.09 U	0.2 U	0.4 U	0.5 U	0.4 U			0.2 U		0.2 U
1,2,3,7,8-PECDD	0.2 U	0.1 U	0.5 U	0.5 U	0.8 U	0.6 U			0.34 U		0.3 U
1,2,3,7,8-PECDF	0.1 U	0.09 U	0.3 U	0.35 U	0.4 U	0.3 U			0.2 U		0.2 U
2,3,4,6,7,8-HXCDF	0.1 U	0.07 U	0.2 U	0.3 U	0.4 U	0.7 J			0.21 U		0.21 J
2,3,4,7,8-PECDF	0.1 U	0.1 U	0.4 U	5 J	3.7 J	8			0.53 U		1.2 J
2,3,7,8-TCDD	0.2 U	0.1 U	0.4 U	0.4 U	0.6 U	1.2 U			0.52 J		0.4 U
2,3,7,8-TCDF	0.64 J	0.46 J	0.3 U	2	5	5.8			0.35 J		0.56 J
TEQ BIRD	0.8738	0.6589	0.299	7.3594	9.0253	14.71086			1.13577		2.1368
TEQ BIRD HALFND	1.16481	0.83736	1.180525	7.98255	9.99908	15.67386			1.64677		2.539865
TEQ MAMMAL	0.386	0.316	0.461	3.315	2.984	5.92946			0.94317		1.202
TEQ MAMMAL HALFND	0.65901	0.47421	1.121025	3.9687	4.00398	6.92996			1.33067		1.614065
TOTAL HPCDD	19.8	16.3	36.9	66	78.5	112			28		36.2
TOTAL HPCDF	0.1 U	0.1 U	0.3 U	1.9 U	1.7 J	4.8 J			3.7		5.3
TOTAL HXCDD	1.3 J	1.2 J	1.1 U	5.2 J	15.7 J	15.1 J			3.1		3.8
TOTAL HXCDF	0.1 U	0.07 U	0.2 U	3.9 J	2.5 J	9.8 J			3.1 J		4.1 J
TOTAL PECDD	0.2 U	0.1 U	0.5 U	0.5 U	0.8 U	2.8 U			0.34 U		0.3 U
TOTAL PECDF	0.1 U	0.94 J	0.3 U	48 J	23.1 J	79 J			7.6 J		11.8 J
TOTAL TCDD	0.2 U	0.1 U	0.4 U	1.8 U	0.6 U	2.1 J			0.52		0.71 U
TOTAL TCDF	7 J	15.7 J	1.8	238 J	177 J	328 J			39.9 J		59.4 J

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SB001	13SB002	13SB003	13SB004	13SB005	13SB006	13SB007	13SB008	13SB009/015	13SB009/015	13SB010
NSAMPLE	13SS010002	13SS020002	13SS030002	13SS040002	13SS050002	13SS060002	13SS070002	13SS080002	13SS090002	13SS150002	13SS100002
SAMPLE NUMBER	13SS010002	13SS020002	13SS030002	13SS040002	13SS050002	13SS060002	13SS070002	13SS080002	13SS090002	13SS150002	13SS100002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3/30/2003	3/26/2003	4/10/2003	3/26/2003
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE						2 J				1.4 U	
TRICHLOROFLUOROMETHANE						2 J				3 J	
Semivolatile Organics (ug/kg)											
ACENAPHTHENE	3.9 U	4 U	3.8 U	4.2 U	4.9 U	4.3 U			52 J		4.1 U
ANTHRACENE	3.9 U	4 U	3.8 U	4.2 U	4.9 U	5 J			210 J		4.1 U
BENZO(A)ANTHRACENE	3.9 U	4 U	3.8 U	20	4.9 U	32			1100 J		7 J
BENZO(A)PYRENE	3.9 U	4 U	3.8 U	27	4.9 U	42			1000 J		7 J
BENZO(B)FLUORANTHENE	3.9 U	4 U	3.8 U	37	7 J	58			1100 J		14
BENZO(G,H,I)PERYLENE	3.9 U	4 U	3.8 U	18	4.9 U	29			750 J		8 J
BENZO(K)FLUORANTHENE	3.9 U	4 U	3.8 U	18	5 J	26			640 J		8 J
BIS(2-ETHYLHEXYL)PHTHALATE	130 J	91 J	78 U	120 J	99 U	140 J			140 J		110 J
CHRYSENE	3.9 U	4 U	3.8 U	28	7 J	50			1100 J		13
DIBENZO(A,H)ANTHRACENE	3.9 U	4 U	3.8 U	4.2 U	4.9 U	4.3 U			200 J		4.1 U
FLUORANTHENE	6 J	4 U	3.8 U	34	10	75			1800 J		10
FLUORENE	3.9 U	4 U	3.8 U	4.2 U	4.9 U	4.3 U			50 J		4.1 U
INDENO(1,2,3-CD)PYRENE	3.9 U	4 U	3.8 U	16	4.9 U	26			650 J		7 J
NAPHTHALENE	3.9 U	4 U	3.8 U	4.2 U	4.9 U	4.3 U			4.4 U		5 J
PHENANTHRENE	4 J	4 U	3.8 U	15	5 J	23			1000 J		5 J
PYRENE	7 J	4 U	3.8 U	45	10	65			2400 J		10
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
PCBs (ug/kg)											
AROCLOR-1248	220	210	20 U	46000 J	5100	1300			5400 J		160000
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)							14	15			
PH (S.U.)							7.4	5.1			

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	02	02	02	02	02	02	02
LOCATION	13SB011	13SB012	13SB013	13SB014	13SB016	13SB017	13SB018	13SB019	13SB020	13SB021	13SB022
NSAMPLE	13SS110002	13SS120002	13SS130002	13SS140001	13SS160002	13SS170002	13SS180002	13SS190002	13SS200002	13SS210002	13SS220002
SAMPLE NUMBER	13SS110002	13SS120002	13SS130002	13SS140001	13SS160002	13SS170002	13SS180002	13SS190002	13SS200002	13SS210002	13SS220002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 1	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	3/26/2003	3/26/2003	3/26/2003	4/10/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD	828 J	813 J	2390 J	2340							
1,2,3,4,6,7,8,9-OCDF	0.55 J	0.2 UJ	0.3 UJ	9.5 J							
1,2,3,4,6,7,8-HPCDD	6.2	8.1	19.1	22.7							
1,2,3,4,6,7,8-HPCDF	0.18 U	0.1 U	0.57 J	4 U							
1,2,3,4,7,8,9-HPCDF	0.1 U	0.1 U	0.2 U	1.3 J							
1,2,3,4,7,8-HXCDD	0.1 U	0.1 U	0.63 J	0.42 J							
1,2,3,4,7,8-HXCDF	0.33 U	0.08 U	0.51 U	6.4							
1,2,3,6,7,8-HXCDD	0.1 U	0.1 U	0.69 J	0.84 J							
1,2,3,6,7,8-HXCDF	0.07 U	0.08 U	0.41 U	1.6 J							
1,2,3,7,8,9-HXCDD	0.1 U	0.49 U	1.6 J	1.5 J							
1,2,3,7,8,9-HXCDF	0.09 U	0.1 U	0.31 J	0.33 J							
1,2,3,7,8-PECDD	0.2 U	0.2 U	0.71 J	0.2 U							
1,2,3,7,8-PECDF	0.09 U	0.1 U	0.36 J	2.5 J							
2,3,4,6,7,8-HXCDF	0.07 U	0.07 U	0.42 J	1.8 J							
2,3,4,7,8-PECDF	1 J	0.1 U	0.47 J	21.8							
2,3,7,8-TCDD	0.1 U	0.2 U	0.2 U	0.1 U							
2,3,7,8-TCDF	1.2	0.1 U	0.53 J	21							
TEQ BIRD	2.289055	0.08942	2.28123	44.51305							
TEQ BIRD HALFND	2.480955	0.43942	2.42823	44.68305							
TEQ MAMMAL	0.764855	0.16232	1.81673	14.88895							
TEQ MAMMAL HALFND	0.961505	0.44682	1.96373	15.05895							
TOTAL HPCDD	11.8	14.5	36.5	56							
TOTAL HPCDF	0.38 J	0.1 U	0.57	10.1 J							
TOTAL HXCDD	0.77 J	1.1 J	5	8.4 J							
TOTAL HXCDF	0.33	0.08 U	1.6	19.4 J							
TOTAL PECDD	0.2 U	0.2 U	0.71	2.1 U							
TOTAL PECDF	4.6 J	0.1 U	0.83	135 J							
TOTAL TCDD	0.33 U	0.2 U	0.2 U	2.2 U							
TOTAL TCDF	36.1 J	0.1 U	7.8 J	540 J							

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	02	02	02	02	02	02	02
LOCATION	13SB011	13SB012	13SB013	13SB014	13SB016	13SB017	13SB018	13SB019	13SB020	13SB021	13SB022
NSAMPLE	13SS110002	13SS120002	13SS130002	13SS140001	13SS160002	13SS170002	13SS180002	13SS190002	13SS200002	13SS210002	13SS220002
SAMPLE NUMBER	13SS110002	13SS120002	13SS130002	13SS140001	13SS160002	13SS170002	13SS180002	13SS190002	13SS200002	13SS210002	13SS220002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 1	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	3/26/2003	3/26/2003	3/26/2003	4/10/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE	3.9 U	4 U	4 U	4.2 U							
ANTHRACENE	3.9 U	4 U	4 U	4.2 U							
BENZO(A)ANTHRACENE	5 J	4 J	4 U	8 J							
BENZO(A)PYRENE	6 J	4 U	4 U	10							
BENZO(B)FLUORANTHENE	9	4 U	4 U	14 J							
BENZO(G,H,I)PERYLENE	6 J	4 U	4 U	9							
BENZO(K)FLUORANTHENE	5 J	4 U	4 U	10							
BIS(2-ETHYLHEXYL)PHTHALATE	80 U	130 J	81 U	190 BU							
CHRYSENE	10	4 U	4 U	11							
DIBENZO(A,H)ANTHRACENE	3.9 U	4 U	4 U	4.2 U							
FLUORANTHENE	6 J	7 J	4 U	9							
FLUORENE	3.9 U	4 U	4 U	4.2 U							
INDENO(1,2,3-CD)PYRENE	4 J	4 U	4 U	7 J							
NAPHTHALENE	3.9 U	4 U	4 U	4.2 U							
PHENANTHRENE	3.9 U	6 J	4 U	4.2 U							
PYRENE	6 J	7 J	4 U	12							
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
PCBs (ug/kg)											
AROCLOR-1248	67000 J	330 J	39000 J	150000	50 J	17 U	17 U	6400 J	36000 J	8800 J	2600
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	02	03	03	03	03	03	03	03	03
LOCATION	13SB023	13SB024	13SB025	13SB026	13SB027	13SB029	13SB030	13SB032	13SB033	13SB034	13SB035
NSAMPLE	13SS230002	13SS240002	13SS250002	13SS260002	13SS270002	13SS290002	13SS300002	13SS320002	13SS330002	13SS340002	13SS350002
SAMPLE NUMBER	13SS230002	13SS240002	13SS250002	13SS260002	13SS270002	13SS290002	13SS300002	13SS320002	13SS330002	13SS340002	13SS350002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	12/8/2003	12/8/2003	12/8/2003	8/10/2004	8/10/2004	8/10/2004	8/11/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	02	03	03	03	03	03	03	03	03
LOCATION	13SB023	13SB024	13SB025	13SB026	13SB027	13SB029	13SB030	13SB032	13SB033	13SB034	13SB035
NSAMPLE	13SS230002	13SS240002	13SS250002	13SS260002	13SS270002	13SS290002	13SS300002	13SS320002	13SS330002	13SS340002	13SS350002
SAMPLE NUMBER	13SS230002	13SS240002	13SS250002	13SS260002	13SS270002	13SS290002	13SS300002	13SS320002	13SS330002	13SS340002	13SS350002
SOIL CLASSIFICATION	3	3	3	3	3	3	3	3	3	3	3
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	12/8/2003	12/8/2003	12/8/2003	8/10/2004	8/10/2004	8/10/2004	8/11/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
PCBs (ug/kg)											
AROCLOR-1248	630	160 J	17 U	42	2800	5800	9.2 U	140	9.2 U	8.8 U	110
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB036	13SB037	13SB038	13SB039	13SB040	13SB048	13SB049	13SB050	13SB051	13SB052	13SB053
NSAMPLE	13SS360002	13SS370002	13SS380002	13SS390002	13SS400002	13SS480002	13SS490002	13SS500002	13SS510002	13SS520002	13SS530002
SAMPLE NUMBER	13SS360002	13SS370002	13SS380002	13SS390002	13SS400002	13SS480002	13SS490002	13SS500002	13SS510002	13SS520002	13SS530002
SOIL CLASSIFICATION	3	3	3	3	3						
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/15/2006	2/15/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB036	13SB037	13SB038	13SB039	13SB040	13SB048	13SB049	13SB050	13SB051	13SB052	13SB053
NSAMPLE	13SS360002	13SS370002	13SS380002	13SS390002	13SS400002	13SS480002	13SS490002	13SS500002	13SS510002	13SS520002	13SS530002
SAMPLE NUMBER	13SS360002	13SS370002	13SS380002	13SS390002	13SS400002	13SS480002	13SS490002	13SS500002	13SS510002	13SS520002	13SS530002
SOIL CLASSIFICATION	3	3	3	3	3						
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/15/2006	2/15/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE						3	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE						0.71 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE						250	0.25 U	0.25 U	0.79	0.25 U	0.25 U
2,4-DINITROTOLUENE						0.87 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE						100 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE						130 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX						350	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX						1800	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
PCBs (ug/kg)											
AROCLOR-1248	10 U	51000	520	1500	9.9 U						
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB054	13SB055	13SB056	13SB057	13SB058	13SB059	13SB060	13SB061	13SB062	13SB063	13SB064
NSAMPLE	13SS540002	13SS550002	13SS560002	13SS570002	13SS580002	13SS590002	13SS600002	13SS610002	13SS620002	13SS630002	13SS640002
SAMPLE NUMBER	13SS540002	13SS550002	13SS560002	13SS570002	13SS580002	13SS590002	13SS600002	13SS610002	13SS620002	13SS630002	13SS640002
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/15/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB054	13SB055	13SB056	13SB057	13SB058	13SB059	13SB060	13SB061	13SB062	13SB063	13SB064
NSAMPLE	13SS540002	13SS550002	13SS560002	13SS570002	13SS580002	13SS590002	13SS600002	13SS610002	13SS620002	13SS630002	13SS640002
SAMPLE NUMBER	13SS540002	13SS550002	13SS560002	13SS570002	13SS580002	13SS590002	13SS600002	13SS610002	13SS620002	13SS630002	13SS640002
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/15/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	2.7	0.34 J	0.25 U	0.44 J	0.25 U	0.25 U	0.47 J	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	1.3	0.34 J	0.25 U	0.25 J	0.25 U	0.25 U	0.51	0.25 U	0.25 U	0.25 U	0.25 U
HMX	16	0.26 J	0.25 U	0.25 J	0.9	0.25 U	70	0.25 U	0.25 U	0.47 J	0.25 U
RDX	4.9	0.25 U	0.25 U	0.25 U	0.25 U	0.33 J	760	0.25 U	0.25 U	0.25 U	0.25 U
PCBs (ug/kg)											
AROCLOR-1248											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	PCB	PCB	PCB
LOCATION	13SB065	13SB066	13SB067	13SB068	13SB069	13SB070	13SB071	13SB072	13SB073	13SB074	13SB075
NSAMPLE	13SS650002	13SS660002	13SS670002	13SS680002	13SS690002	13SS700002	13SS710002	13SS720002	13SS730002	13SS740002	13SS750001
SAMPLE NUMBER	13SS650002	13SS660002	13SS670002	13SS680002	13SS690002	13SS700002	13SS710002	13SS720002	13SS730002	13SS740002	13SS750001
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 1
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/21/2006	6/6/2006	6/6/2006	6/6/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	PCB	PCB	PCB
LOCATION	13SB065	13SB066	13SB067	13SB068	13SB069	13SB070	13SB071	13SB072	13SB073	13SB074	13SB075
NSAMPLE	13SS650002	13SS660002	13SS670002	13SS680002	13SS690002	13SS700002	13SS710002	13SS720002	13SS730002	13SS740002	13SS750001
SAMPLE NUMBER	13SS650002	13SS660002	13SS670002	13SS680002	13SS690002	13SS700002	13SS710002	13SS720002	13SS730002	13SS740002	13SS750001
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 1
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/21/2006	6/6/2006	6/6/2006	6/6/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U			
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.55	0.68	0.25 U	0.25 U			
RDX	0.25 U	0.25 U	0.25 U	0.25 U	1.9	0.95 R	0.88 J	0.25 U			
PCBs (ug/kg)											
AROCLOR-1248									2000 J	870	25000
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB076	13SB077	13SB078	13SB079	13SB080	13SB081	13SB082	13SB083	13SB084	13SB087	13SB088
NSAMPLE	13SS760001	13SS770002	13SS780002	13SS790002	13SS800002	13SS810002	13SS820002	13SS830002	13SS840002	13SS870002	13SS880001
SAMPLE NUMBER	13SS760001	13SS770002	13SS780002	13SS790002	13SS800002	13SS810002	13SS820002	13SS830002	13SS840002	13SB870002	13SB880001
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 1	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 1
SAMPLE DATE	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	8/25/2006	8/24/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB076	13SB077	13SB078	13SB079	13SB080	13SB081	13SB082	13SB083	13SB084	13SB087	13SB088
NSAMPLE	13SS760001	13SS770002	13SS780002	13SS790002	13SS800002	13SS810002	13SS820002	13SS830002	13SS840002	13SS870002	13SS880001
SAMPLE NUMBER	13SS760001	13SS770002	13SS780002	13SS790002	13SS800002	13SS810002	13SS820002	13SS830002	13SS840002	13SB870002	13SB880001
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 1	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 1
SAMPLE DATE	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	8/25/2006	8/24/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
PCBs (ug/kg)											
AROCLOR-1248	20000 J	940	2500	1200 J	10.6 U	41 J	10.4 U	31	280		
TOTAL PCBS AS AROCLOR-1254										0.5 U	0.5 U
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB089	13SB090	13SB091	13SB093	13SB094	13SB095	13SB095	13SB096	13SB097	13SB098	13SB099
NSAMPLE	13SS890001	13SS900002	13SS910001	13SS930002	13SS940002	13SS950001	13SS950102	13SS960002	13SS970002	13SS980002	13SS990002
SAMPLE NUMBER	13SB890002	13SB900002	13SB910001	13SB930002	13SB940002	13SB950001	13SB950102	13SB960002	13SB970002	13SB980002	13SB990002
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 1	0 - 2	0 - 2	0 - 1	1 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006	8/23/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8,9-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,6,7,8-HXCDD											
1,2,3,6,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8,9-HXCDF											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDD											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB089	13SB090	13SB091	13SB093	13SB094	13SB095	13SB095	13SB096	13SB097	13SB098	13SB099
NSAMPLE	13SS890001	13SS900002	13SS910001	13SS930002	13SS940002	13SS950001	13SS950102	13SS960002	13SS970002	13SS980002	13SS990002
SAMPLE NUMBER	13SB890002	13SB900002	13SB910001	13SB930002	13SB940002	13SB950001	13SB950102	13SB960002	13SB970002	13SB980002	13SB990002
SOIL CLASSIFICATION											
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 1	0 - 2	0 - 2	0 - 1	1 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006	8/23/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)											
TRANS-1,2-DICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
PCBs (ug/kg)											
AROCLOR-1248		24	900 J			14000 J	64000 J				
TOTAL PCBS AS AROCLOR-1254	0.08 J	0.5 U	0.35 J	0.11 J	0.08 J	4.81	10.4 J	13.85 J	0.03 J	0.05 J	0.5 U
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/100)											
PH (S.U.)											

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB100	13SB101	13SB102	13SB103	13SB104	13SB105	13SB106	13SB107
NSAMPLE	13SS1000002	13SS1010002	13SS1020002	13SS1030002	13SS1040002	13SS1050002	13SS1060002	13SS1070002
SAMPLE NUMBER	13SB1000002	13SB1010002	13SB1020002	13SB1030002	13SB1040002	13SB1050002	13SB1060002	13SB1070002
SOIL CLASSIFICATION								
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/23/2006	8/23/2006	8/25/2006	8/25/2006	8/26/2006	8/26/2006	8/27/2006	8/27/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Dioxins (ng/kg)								
1,2,3,4,6,7,8,9-OCDD								
1,2,3,4,6,7,8,9-OCDF								
1,2,3,4,6,7,8-HPCDD								
1,2,3,4,6,7,8-HPCDF								
1,2,3,4,7,8,9-HPCDF								
1,2,3,4,7,8-HXCDD								
1,2,3,4,7,8-HXCDF								
1,2,3,6,7,8-HXCDD								
1,2,3,6,7,8-HXCDF								
1,2,3,7,8,9-HXCDD								
1,2,3,7,8,9-HXCDF								
1,2,3,7,8-PECDD								
1,2,3,7,8-PECDF								
2,3,4,6,7,8-HXCDF								
2,3,4,7,8-PECDF								
2,3,7,8-TCDD								
2,3,7,8-TCDF								
TEQ BIRD								
TEQ BIRD HALFND								
TEQ MAMMAL								
TEQ MAMMAL HALFND								
TOTAL HPCDD								
TOTAL HPCDF								
TOTAL HXCDD								
TOTAL HXCDF								
TOTAL PECDD								
TOTAL PECDF								
TOTAL TCDD								
TOTAL TCDF								

TABLE 3-6

SUMMARY OF CHEMICALS DETECTED IN SURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB100	13SB101	13SB102	13SB103	13SB104	13SB105	13SB106	13SB107
NSAMPLE	13SS1000002	13SS1010002	13SS1020002	13SS1030002	13SS1040002	13SS1050002	13SS1060002	13SS1070002
SAMPLE NUMBER	13SB1000002	13SB1010002	13SB1020002	13SB1030002	13SB1040002	13SB1050002	13SB1060002	13SB1070002
SOIL CLASSIFICATION								
SUBMATRIX	SS	SS	SS	SS	SS	SS	SS	SS
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2
SAMPLE DATE	8/23/2006	8/23/2006	8/25/2006	8/25/2006	8/26/2006	8/26/2006	8/27/2006	8/27/2006
VALIDATED	Y	Y	Y	Y	Y	Y	Y	Y
COLLECTION METHOD	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Volatile Organics (ug/kg)								
TRANS-1,2-DICHLOROETHENE								
TRICHLOROFLUOROMETHANE								
Semivolatile Organics (ug/kg)								
ACENAPHTHENE								
ANTHRACENE								
BENZO(A)ANTHRACENE								
BENZO(A)PYRENE								
BENZO(B)FLUORANTHENE								
BENZO(G,H,I)PERYLENE								
BENZO(K)FLUORANTHENE								
BIS(2-ETHYLHEXYL)PHTHALATE								
CHRYSENE								
DIBENZO(A,H)ANTHRACENE								
FLUORANTHENE								
FLUORENE								
INDENO(1,2,3-CD)PYRENE								
NAPHTHALENE								
PHENANTHRENE								
PYRENE								
Energetics (mg/kg)								
1,3,5-TRINITROBENZENE								
1,3-DINITROBENZENE								
2,4,6-TRINITROTOLUENE								
2,4-DINITROTOLUENE								
2-AMINO-4,6-DINITROTOLUENE								
4-AMINO-2,6-DINITROTOLUENE								
HMX								
RDX								
PCBs (ug/kg)								
AROCLOR-1248			1600 J	280 J		12000 J		
TOTAL PCBS AS AROCLOR-1254	0.5 U	0.5 U	0.13 J	0.2 J	0.5 U	2.24	0.01 J	0.1 J
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/100)								
PH (S.U.)								

TABLE 3-7

DESCRIPTIVE STATISTICS FOR
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3, ES/DI AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration		Maximum Concentration		Range of Non-Detects	Mean Concentration	Average of Positive Detects	Sample of Maximum Concentration
Dioxins (ng/kg)									
1,2,3,4,6,7,8,9-OCDD	11/11	330		4430		-	2355.73	2355.73	13SB010204
1,2,3,4,6,7,8,9-OCDF	1/11	2.9	J	2.9	J	0.1 - 3.4	0.55	2.90	13SB100204
1,2,3,4,6,7,8-HPCDD	11/11	5		26.2		-	14.40	14.40	13SB010204
1,2,3,4,6,7,8-HPCDF	2/11	0.69		1.1	J	0.08 - 1.3	0.28	0.90	13SB100204
1,2,3,4,7,8-HXCDD	1/11	0.44	J	0.44	J	0.09 - 1.5	0.18	0.44	13SB130204
1,2,3,4,7,8-HXCDF	3/11	0.73		2.7	J	0.07 - 0.2	0.51	1.71	13SB040204
1,2,3,7,8,9-HXCDD	5/11	0.53	J	1.1	J	0.1 - 1.5	0.53	0.79	13SB110204
1,2,3,7,8-PECDD	1/11	0.21	J	0.21	J	0.1 - 1.1	0.15	0.21	13SB120204
1,2,3,7,8-PECDF	2/11	0.3	J	0.31		0.08 - 0.7	0.16	0.31	13SB090204
2,3,4,6,7,8-HXCDF	2/11	0.09	J	0.59	J	0.07 - 0.8	0.14	0.34	13SB100204
2,3,4,7,8-PECDF	3/11	0.31	J	15.4		0.1 - 0.66	2.13	7.50	13SB040204
2,3,7,8-TCDF	2/11	2.9		5.2		0.09 - 0.5	0.82	4.05	13SB100204
TEQ BIRD	11/11	0.038		18.7027		-	3.15	3.15	13SB040204
TEQ BIRD HALFND	11/11	0.49046		19.89637		-	3.61	3.61	13SB040204
TEQ MAMMAL	11/11	0.083		8.462		-	1.59	1.59	13SB040204
TEQ MAMMAL HALFND	11/11	0.410035		9.73867		-	1.96	1.96	13SB040204
TOTAL HPCDD	11/11	8.7		52.1		-	29.10	29.10	13SB050204
TOTAL HPCDF	2/11	1.5	J	2	J	0.1 - 1.4	0.44	1.75	13SB100204
TOTAL HXCDD	9/11	0.65	J	4.2	J	0.2 - 1.4	1.89	2.22	13SB050204
TOTAL HXCDF	4/11	0.43		5.4	J	0.07 - 0.13	1.03	2.73	13SB100204
TOTAL PECDD	1/11	0.21		0.21		0.1 - 1.4	0.20	0.21	13SB120204
TOTAL PECDF	5/11	0.3		71.8	J	0.09 - 0.49	10.98	24.02	13SB040204
TOTAL TCDD	2/11	0.15		3	J	0.1 - 5.2	0.58	1.58	13SB100204
TOTAL TCDF	5/11	1.7		292	J	0.09 - 1.3	49.41	108.42	13SB040204
Volatile Organics (ug/kg)									
2-BUTANONE	1/2	18		18		1 - 1	9.25	18.00	13SB150204
4-METHYL-2-PENTANONE	1/2	3	J	3	J	1 - 1	1.75	3.00	13SB150204
ACETONE	1/2	89	BJ	89	BJ	1 - 1	44.75	89.00	13SB150204
DICHLORODIFLUOROMETHANE	1/2	7	J	7	J	1 - 1	3.75	7.00	13SB150204
TRICHLOROFLUOROMETHANE	2/2	2	J	3	J	-	2.50	2.50	13SB150204
Semivolatile Organics (ug/kg)									
3&4-METHYLPHENOL	1/11	560		560		76 - 87	87.27	560.00	13SB090204
BIS(2-ETHYLHEXYL)PHTHALATE	6/11	90	J	130	J	76 - 83	78.73	111.67	13SB050204
CHRYSENE	1/11	4	J	4	J	3.7 - 4.3	2.15	4.00	13SB020204
FLUORANTHENE	1/11	7	J	7	J	3.7 - 4.3	2.43	7.00	13SB020204
PHENANTHRENE	1/11	6	J	6	J	3.7 - 4.3	2.34	6.00	13SB020204

TABLE 3-7

DESCRIPTIVE STATISTICS FOR
SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 3, ES/DI AND PCB DELINEATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration		Maximum Concentration		Range of Non-Detects	Mean Concentration	Average of Positive Detects	Sample of Maximum Concentration
PHENOL	1/11	110	J	110	J	76 - 87	46.36	110.00	13SB090204
PYRENE	1/11	13		13		3.7 - 4.3	2.97	13.00	13SB020204
PCBs (ug/kg)									
AROCLOR-1248	27/58	13	J	210000		9 - 20	6190.66	13291.56	13SB100204
Herbicides (ug/kg)									
PENTACHLOROPHENOL	2/11	0.67	J	0.85	J	0.51 - 0.58	0.36	0.76	13SB010204
Energetics (mg/kg)									
1,3,5-TRINITROBENZENE	3/42	0.25	J	3.7		0.25 - 0.25	0.22	1.47	13SB490204
2,4,6-TRINITROTOLUENE	5/42	1.2		22	J	0.25 - 0.25	1.30	10.00	13SB720305
2,4-DIAMINO-6-NITROTOLUENE	2/25	0.29	J	0.36	J	0.25 - 0.25	0.14	0.33	13SB490608
2,6-DIAMINO-4-NITROTOLUENE	1/25	0.39	J	0.39	J	0.25 - 0.25	0.14	0.39	13SB480204
2-AMINO-4,6-DINITROTOLUENE	3/42	1.3	J	2.2	J	0.25 - 0.25	0.24	1.80	13SB480204
3,5-DINITROANILINE	1/25	0.27	J	0.27	J	0.25 - 0.25	0.13	0.27	13SB590204
4-AMINO-2,6-DINITROTOLUENE	4/42	0.28	J	5.2		0.25 - 0.25	0.30	2.00	13SB480204
HMX	9/41	0.26	J	2.1		0.25 - 0.25	0.35	1.16	13SB510607
HMX	9/41	0.26	J	2.1		0.25 - 0.25	0.35	1.16	13SB490204
HMX	9/41	0.26	J	2.1		0.25 - 0.25	0.35	1.16	13SB480204
RDX	13/42	0.26	J	4		0.25 - 0.25	0.40	1.01	13SB490204
Miscellaneous Parameters									
CATION EXCHANGE CAPACITY (meq/100)	2/2	13		14		-	13.50	13.50	13SB070810
PH	2/2	5.3		5.8		-	5.55	5.55	13SB080608
TOTAL ORGANIC CARBON (mg/kg)	1/2	1100	J	1100	J	1000 - 1000	800.00	1100.00	13SB070810
Field PCB Results (mg/kg)									
TOTAL PCBS AS AROCLOR-1254	4/18	0.03	J	10.4	J	0.5 - 0.5	0.78	2.66	13SB950102

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01
LOCATION	13SB001	13SB002	13SB003	13SB004	13SB005	13SB006	13SB007	13SB008	13SB009/015	13SB009/015
NSAMPLE	13SB010204	13SB020204	13SB030204	13SB040204	13SB050204	13SB060204	13SB070810	13SB080608	13SB090204	13SB150204
SAMPLE NUMBER	13SB010204	13SB020204	13SB030204	13SB040204	13SB050204	13SB060204	13SB070810	13SB080608	13SB090204	13SB150204
SOIL CLASSIFICATION	8	8	8	8	8	9	8	8	9	8
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	8 - 10	6 - 8	2 - 4	2 - 4
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3/30/2003	3/26/2003	4/11/2003
Dioxins (ng/kg)										
1,2,3,4,6,7,8,9-OCDD	4430	1900	3030	1250	3250	330			923 J	
1,2,3,4,6,7,8,9-OCDF	0.2 U	0.2 U	0.3 U	3.4 U	0.6 U	0.7 U			0.4 UJ	
1,2,3,4,6,7,8-HPCDD	26.2	8.5	11.8	7.7	23.2	5			8.1	
1,2,3,4,6,7,8-HPCDF	0.1 U	0.09 U	0.2 U	1.3 U	0.2 U	0.2 U			0.69	
1,2,3,4,7,8-HXCDD	0.2 U	0.1 U	0.2 U	1.5 U	0.2 U	0.2 U			0.2 U	
1,2,3,4,7,8-HXCDF	0.1 U	0.07 U	0.1 U	2.7 J	0.1 U	0.1 U			0.73	
1,2,3,7,8,9-HXCDD	0.67 J	0.69 J	0.2 U	1.5 U	1.2 U	0.3 U			0.5 U	
1,2,3,7,8-PECDD	0.2 U	0.1 U	0.3 U	1.1 U	0.2 U	0.2 U			0.2 U	
1,2,3,7,8-PECDF	0.2 U	0.09 U	0.2 U	0.7 U	0.2 U	0.1 U			0.31	
2,3,4,6,7,8-HXCDF	0.1 U	0.07 U	0.1 U	0.8 U	0.1 U	0.1 U			0.2 U	
2,3,4,7,8-PECDF	0.2 U	0.1 U	0.2 U	15.4	0.2 U	0.2 U			0.66 U	
2,3,7,8-TCDF	0.2 U	0.1 U	0.2 U	2.9	0.1 U	0.24 U			0.5 U	
TEQ BIRD	0.5362	0.2675	0.3148	18.7027	0.3482	0.038			0.21134	
TEQ BIRD HALFND	0.97371	0.49046	0.867815	19.89637	0.79623	0.511535			0.99819	
TEQ MAMMAL	0.772	0.344	0.421	8.462	0.557	0.083			0.26874	
TEQ MAMMAL HALFND	1.07851	0.50171	0.843015	9.73867	0.91903	0.410035			0.67824	
TOTAL HPCDD	44.2	16.4	25.1	17.4	52.1	8.7			17	
TOTAL HPCDF	0.2 U	0.1 U	0.2 U	1.4 U	0.2 U	0.2 U			1.5 J	
TOTAL HXCDD	1.1 J	1.5 J	0.2 U	1.4 U	4.2 J	1.1			2.5 J	
TOTAL HXCDF	0.1 U	0.07 U	0.1 U	2.7	0.1 U	0.1 U			2.4 J	
TOTAL PECDD	0.2 U	0.1 U	1.4 U	1.1 U	0.2 U	0.2 U			0.2 U	
TOTAL PECDF	0.2 U	0.1 U	0.2 U	71.8 J	0.2 U	0.49 U			6.1 J	
TOTAL TCDD	0.2 U	0.1 U	0.3 U	5.2 U	0.2 U	0.2 U			0.1 U	
TOTAL TCDF	0.2 U	0.1 U	0.94 U	292 J	1.7	1.3 U			24.6 J	
Volatile Organics (ug/kg)										
2-BUTANONE						1 U				18
4-METHYL-2-PENTANONE						1 U				3 J
ACETONE						1 UJ				89 BJ
DICHLORODIFLUOROMETHANE						1 U				7 J
TRICHLOROFLUOROMETHANE						2 J				3 J
Semivolatile Organics (ug/kg)										
3&4-METHYLPHENOL	81 U	78 U	79 U	81 U	80 U	87 U			560	
BIS(2-ETHYLHEXYL)PHTHALATE	110 J	110 J	79 U	120 J	130 J	90 J			76 U	
CHRYSENE	4 U	4 J	3.9 U	4 U	3.9 U	4.3 U			3.7 U	
FLUORANTHENE	4 U	7 J	3.9 U	4 U	3.9 U	4.3 U			3.7 U	
PHENANTHRENE	4 U	6 J	3.9 U	4 U	3.9 U	4.3 U			3.7 U	

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01
LOCATION	13SB001	13SB002	13SB003	13SB004	13SB005	13SB006	13SB007	13SB008	13SB009/015	13SB009/015
NSAMPLE	13SB010204	13SB020204	13SB030204	13SB040204	13SB050204	13SB060204	13SB070810	13SB080608	13SB090204	13SB150204
SAMPLE NUMBER	13SB010204	13SB020204	13SB030204	13SB040204	13SB050204	13SB060204	13SB070810	13SB080608	13SB090204	13SB150204
SOIL CLASSIFICATION	8	8	8	8	8	9	8	8	9	8
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	8 - 10	6 - 8	2 - 4	2 - 4
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3/30/2003	3/26/2003	4/11/2003
PHENOL	81 U	78 U	79 U	81 U	80 U	87 U			110 J	
PYRENE	4 U	13	3.9 U	4 U	3.9 U	4.3 U			3.7 U	
PCBs (ug/kg)										
AROCLOR-1248	20 U	20 U	20 U	35000 J	20 U	370 J			190 J	
Herbicides (ug/kg)										
PENTACHLOROPHENOL	0.85 J	0.52 U	0.53 U	0.54 U	0.54 U	0.58 U			0.51 U	
Energetics (mg/kg)										
1,3,5-TRINITROBENZENE										
2,4,6-TRINITROTOLUENE										
2,4-DIAMINO-6-NITROTOLUENE										
2,6-DIAMINO-4-NITROTOLUENE										
2-AMINO-4,6-DINITROTOLUENE										
3,5-DINITROANILINE										
4-AMINO-2,6-DINITROTOLUENE										
HMX										
RDX										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1254										
Miscellaneous Parameters										
CATION EXCHANGE CAPACITY (meq/100)							14	13		
PH							5.3	5.8		
TOTAL ORGANIC CARBON (mg/kg)							1100 J	1000 U		

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	02	02	02	02	02	02	02
LOCATION	13SB010	13SB011	13SB012	13SB013	13SB016	13SB017	13SB018	13SB019	13SB021	13SB022	13SB023
NSAMPLE	13SB100204	13SB110204	13SB120204	13SB130204	13SB160204	13SB170204	13SB180204	13SB190203	13SB210204	13SB220204	13SB230204
SAMPLE NUMBER	13SB100204	13SB110204	13SB120204	13SB130204	13SB160204	13SB170204	13SB180204	13SB190203	13SB210204	13SB220204	13SB230204
SOIL CLASSIFICATION	8	9	8	8	8	8	8	8	8	9	9
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 3	2 - 4	2 - 4	2 - 4
SAMPLE DATE	3/26/2003	3/26/2003	3/26/2003	3/26/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD	1410 J	3460 J	2720 J	3210 J							
1,2,3,4,6,7,8,9-OCDF	2.9 J	0.1 UJ	0.2 UJ	0.3 UJ							
1,2,3,4,6,7,8-HPCDD	10.6	25	15.3	17							
1,2,3,4,6,7,8-HPCDF	1.1 J	0.08 U	0.1 U	0.2 U							
1,2,3,4,7,8-HXCDD	0.2 U	0.09 U	0.1 U	0.44 J							
1,2,3,4,7,8-HXCDF	1.7 J	0.2 U	0.13 U	0.1 U							
1,2,3,7,8,9-HXCDD	0.53 J	1.1 J	0.1 U	0.96							
1,2,3,7,8-PECDD	0.3 U	0.1 U	0.21 J	0.1 U							
1,2,3,7,8-PECDF	0.66 U	0.08 U	0.3 J	0.08 U							
2,3,4,6,7,8-HXCDF	0.59 J	0.09 J	0.07 U	0.1 U							
2,3,4,7,8-PECDF	6.8	0.31 J	0.1 U	0.1 U							
2,3,7,8-TCDF	5.2	0.2 U	0.09 U	0.1 U							
TEQ BIRD	12.44489	0.80001	0.52732	0.45603							
TEQ BIRD HALFND	12.76789	1.02916	0.69932	0.68368							
TEQ MAMMAL	4.46029	0.87001	0.65002	0.63103							
TEQ MAMMAL HALFND	4.78079	1.02291	0.76352	0.80153							
TOTAL HPCDD	21.4	47.3	26.4	44.1							
TOTAL HPCDF	2 J	0.1 U	0.1 U	0.2 U							
TOTAL HXCDD	1.5 J	4 J	0.65 J	3.4 J							
TOTAL HXCDF	5.4 J	0.43	0.13 U	0.1 U							
TOTAL PECDD	0.3 U	0.1 U	0.21	0.1 U							
TOTAL PECDF	40.1 J	1.8	0.3	0.09 U							
TOTAL TCDD	3 J	0.15	0.1 U	0.1 U							
TOTAL TCDF	211 J	12.8 J	0.09 U	0.1 U							
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL	77 U	78 U	76 U	83 U							
BIS(2-ETHYLHEXYL)PHTHALATE	110 J	78 U	76 U	83 U							
CHRYSENE	3.8 U	3.9 U	3.8 U	4.1 U							
FLUORANTHENE	3.8 U	3.9 U	3.8 U	4.1 U							
PHENANTHRENE	3.8 U	3.9 U	3.8 U	4.1 U							

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**01**	**01**	**01**	**01**	**02**	**02**	**02**	**02**	**02**	**02**	**02**
LOCATION	**13SB010**	**13SB011**	**13SB012**	**13SB013**	**13SB016**	**13SB017**	**13SB018**	**13SB019**	**13SB021**	**13SB022**	**13SB023**
NSAMPLE	**13SB100204**	**13SB110204**	**13SB120204**	**13SB130204**	**13SB160204**	**13SB170204**	**13SB180204**	**13SB190203**	**13SB210204**	**13SB220204**	**13SB230204**
SAMPLE NUMBER	**13SB100204**	**13SB110204**	**13SB120204**	**13SB130204**	**13SB160204**	**13SB170204**	**13SB180204**	**13SB190203**	**13SB210204**	**13SB220204**	**13SB230204**
SOIL CLASSIFICATION	**8**	**9**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**9**	**9**
SUBMATRIX	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**	**SB**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
DEPTH RANGE	**2 - 4**	**2 - 4**	**2 - 4**	**2 - 4**	**2 - 4**	**2 - 4**	**2 - 4**	**2 - 3**	**2 - 4**	**2 - 4**	**2 - 4**
SAMPLE DATE	**3/26/2003**	**3/26/2003**	**3/26/2003**	**3/26/2003**	**12/8/2003**	**12/8/2003**	**12/8/2003**	**12/8/2003**	**12/8/2003**	**12/8/2003**	**12/8/2003**
PHENOL	77 U	78 U	76 U	83 U							
PYRENE	3.8 U	3.9 U	3.8 U	4.1 U							
PCBs (ug/kg)											
AROCLOR-1248	210000	59 J	590 J	220 J	17 U	17 U	17 U	28000 J	100 J	130 J	21 J
Herbicides (ug/kg)											
PENTACHLOROPHENOL	0.52 U	0.53 U	0.67 J	0.55 U							
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DIAMINO-6-NITROTOLUENE											
2,6-DIAMINO-4-NITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
3,5-DINITROANILINE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	03	03	03	03	03	03	03	03	03
LOCATION	13SB024	13SB025	13SB026	13SB027	13SB028	13SB028	13SB029	13SB030	13SB031	13SB031	13SB032
NSAMPLE	13SB240203	13SB250204	13SB260204	13SB270204	13SB280204	13SB280406	13SB290204	13SB300204	13SB310406	13SB310608	13SB320204
SAMPLE NUMBER	13SB240203	13SB250204	13SB260204	13SB270204	13SB280204	13SB280406	13SB290204	13SB300204	13SB310406	13SB310608	13SB320204
SOIL CLASSIFICATION	9	9	9	8	9	9	9	9	9	9	9
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 3	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	2 - 4	2 - 4	4 - 6	6 - 8	2 - 4
SAMPLE DATE	12/8/2003	12/8/2003	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/11/2004	8/10/2004	8/10/2004	8/10/2004
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	03	03	03	03	03	03	03	03	03
LOCATION	13SB024	13SB025	13SB026	13SB027	13SB028	13SB028	13SB029	13SB030	13SB031	13SB031	13SB032
NSAMPLE	13SB240203	13SB250204	13SB260204	13SB270204	13SB280204	13SB280406	13SB290204	13SB300204	13SB310406	13SB310608	13SB320204
SAMPLE NUMBER	13SB240203	13SB250204	13SB260204	13SB270204	13SB280204	13SB280406	13SB290204	13SB300204	13SB310406	13SB310608	13SB320204
SOIL CLASSIFICATION	9	9	9	8	9	9	9	9	9	9	9
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 3	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	2 - 4	2 - 4	4 - 6	6 - 8	2 - 4
SAMPLE DATE	12/8/2003	12/8/2003	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/11/2004	8/10/2004	8/10/2004	8/10/2004
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248	24 J	17 U	9.9 U	840	9.4 U	9.5 U	280	9 U	9.2 U	13 J	220
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DIAMINO-6-NITROTOLUENE											
2,6-DIAMINO-4-NITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
3,5-DINITROANILINE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	13SB033	13SB034	13SB035	13SB036	13SB037	13SB038	13SB039	13SB040	13SB041	13SB041	13SB042
NSAMPLE	13SB330204	13SB340204	13SB350204	13SB360204	13SB370204	13SB380204	13SB390204	13SB400204	13SB410406	13SB410608	13SB420406
SAMPLE NUMBER	13SB330204	13SB340204	13SB350204	13SB360204	13SB370204	13SB380204	13SB390204	13SB400204	13SB410406	13SB410608	13SB420406
SOIL CLASSIFICATION	9	8	9	9	9	8	9	9	9	9	9
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	6 - 8	4 - 6
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03	03	03
LOCATION	13SB033	13SB034	13SB035	13SB036	13SB037	13SB038	13SB039	13SB040	13SB041	13SB041	13SB042
NSAMPLE	13SB330204	13SB340204	13SB350204	13SB360204	13SB370204	13SB380204	13SB390204	13SB400204	13SB410406	13SB410608	13SB420406
SAMPLE NUMBER	13SB330204	13SB340204	13SB350204	13SB360204	13SB370204	13SB380204	13SB390204	13SB400204	13SB410406	13SB410608	13SB420406
SOIL CLASSIFICATION	9	8	9	9	9	8	9	9	9	9	9
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	6 - 8	4 - 6
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248	9.2 U	9.8 U	26	9.4 U	300	9.8 U	9.3 U	9.2 U	9.5 U	9.4 U	60
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DIAMINO-6-NITROTOLUENE											
2,6-DIAMINO-4-NITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
3,5-DINITROANILINE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB042	13SB043	13SB044	13SB045	13SB046	13SB047	13SB048	13SB049	13SB049	13SB050	13SB050
NSAMPLE	13SB420608	13SB430406	13SB440406	13SB450406	13SB460406	13SB470406	13SB480204	13SB490204	13SB490608	13SB500305	13SB500709
SAMPLE NUMBER	13SB420608	13SB430406	13SB440406	13SB450406	13SB460406	13SB470406	13SB480204	13SB490204	13SB490608	13SB500305	13SB500709
SOIL CLASSIFICATION	9	9	9	9	9	8					
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	6 - 8	4 - 6	4 - 6	4 - 6	4 - 6	4 - 6	2 - 4	2 - 4	6 - 8	3 - 5	7 - 9
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/11/2004	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/14/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB042	13SB043	13SB044	13SB045	13SB046	13SB047	13SB048	13SB049	13SB049	13SB050	13SB050
NSAMPLE	13SB420608	13SB430406	13SB440406	13SB450406	13SB460406	13SB470406	13SB480204	13SB490204	13SB490608	13SB500305	13SB500709
SAMPLE NUMBER	13SB420608	13SB430406	13SB440406	13SB450406	13SB460406	13SB470406	13SB480204	13SB490204	13SB490608	13SB500305	13SB500709
SOIL CLASSIFICATION	9	9	9	9	9	8					
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	6 - 8	4 - 6	4 - 6	4 - 6	4 - 6	4 - 6	2 - 4	2 - 4	6 - 8	3 - 5	7 - 9
SAMPLE DATE	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/10/2004	8/11/2004	2/14/2006	2/14/2006	2/14/2006	2/14/2006	2/14/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248	9.4 U	9.4 U	9.2 U	300	9.9 U	49					
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE							0.25 U	3.7	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE							0.25 U	14	1.2	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE							0.25 U		0.36 J		0.25 U
2,6-DIAMINO-4-NITROTOLUENE							0.39 J		0.25 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE							2.2 J	1.3 J	0.25 U	0.25 U	0.25 U
3,5-DINITROANILINE							0.25 U		0.25 U		0.25 U
4-AMINO-2,6-DINITROTOLUENE							5.2	1 J	0.25 U	0.25 U	0.25 U
HMX							2.1	2.1	0.78	0.25 U	0.25 U
RDX							0.33 J	4	1.1	0.68	0.33 J
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB051	13SB051	13SB052	13SB052	13SB053	13SB054	13SB054	13SB055	13SB055	13SB056	13SB057
NSAMPLE	13SB510406	13SB510607	13SB520406	13SB520608	13SB530204	13SB540305	13SB540507	13SB550406	13SB550608	13SB560305	13SB570406
SAMPLE NUMBER	13SB510406	13SB510607	13SB520406	13SB520608	13SB530204	13SB540305	13SB540507	13SB550406	13SB550608	13SB560305	13SB570406
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	4 - 6	6 - 7	4 - 6	6 - 8	2 - 4	3 - 5	5 - 7	4 - 6	6 - 8	3 - 5	4 - 6
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB051	13SB051	13SB052	13SB052	13SB053	13SB054	13SB054	13SB055	13SB055	13SB056	13SB057
NSAMPLE	13SB510406	13SB510607	13SB520406	13SB520608	13SB530204	13SB540305	13SB540507	13SB550406	13SB550608	13SB560305	13SB570406
SAMPLE NUMBER	13SB510406	13SB510607	13SB520406	13SB520608	13SB530204	13SB540305	13SB540507	13SB550406	13SB550608	13SB560305	13SB570406
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	4 - 6	6 - 7	4 - 6	6 - 8	2 - 4	3 - 5	5 - 7	4 - 6	6 - 8	3 - 5	4 - 6
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248											
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 J	0.46 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	3.5	9.3	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U		0.25 U	0.25 U		0.25 U		0.25 U	0.25 U	
2,6-DIAMINO-4-NITROTOLUENE		0.25 U		0.25 U	0.25 U		0.25 U		0.25 U	0.25 U	
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3,5-DINITROANILINE		0.25 U		0.25 U	0.25 U		0.25 U		0.25 U	0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.28 J
HMX	1.2	2.1	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.7
RDX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB057	13SB057	13SB058	13SB059	13SB060	13SB060	13SB060	13SB061	13SB062	13SB062	13SB063
NSAMPLE	13SB570911	13SB571112	13SB580203	13SB590204	13SB600406	13SB600810	13SB601012	13SB610204	13SB620305	13SB620506	13SB630507
SAMPLE NUMBER	13SB570911	13SB571112	13SB580203	13SB590204	13SB600406	13SB600810	13SB601012	13SB610204	13SB620305	13SB620506	13SB630507
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	9 - 11	11 - 12	2 - 3	2 - 4	4 - 6	8 - 10	10 - 12	2 - 4	3 - 5	5 - 6	5 - 7
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/14/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB057	13SB057	13SB058	13SB059	13SB060	13SB060	13SB060	13SB061	13SB062	13SB062	13SB063
NSAMPLE	13SB570911	13SB571112	13SB580203	13SB590204	13SB600406	13SB600810	13SB601012	13SB610204	13SB620305	13SB620506	13SB630507
SAMPLE NUMBER	13SB570911	13SB571112	13SB580203	13SB590204	13SB600406	13SB600810	13SB601012	13SB610204	13SB620305	13SB620506	13SB630507
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	9 - 11	11 - 12	2 - 3	2 - 4	4 - 6	8 - 10	10 - 12	2 - 4	3 - 5	5 - 6	5 - 7
SAMPLE DATE	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006	2/14/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248											
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U	0.25 U	0.29 J			0.25 U	0.25 U		0.25 U	
2,6-DIAMINO-4-NITROTOLUENE		0.25 U	0.25 U	0.25 U			0.25 U	0.25 U		0.25 U	
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	1.9 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3,5-DINITROANILINE		0.25 U	0.25 U	0.27 J			0.25 U	0.25 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	1.5	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U	0.81	0.42 J	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U	0.25 U	0.8	1.2	1.1	1.1	1.5	0.25 U	0.35 J	0.25 U	0.42 J
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB063	13SB064	13SB064	13SB065	13SB065	13SB066	13SB066	13SB067	13SB067	13SB068	13SB069
NSAMPLE	13SB630709	13SB640406	13SB640608	13SB650305	13SB650709	13SB660406	13SB660608	13SB670305	13SB670709	13SB680204	13SB690204
SAMPLE NUMBER	13SB630709	13SB640406	13SB640608	13SB650305	13SB650709	13SB660406	13SB660608	13SB670305	13SB670709	13SB680204	13SB690204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	7 - 9	4 - 6	6 - 8	3 - 5	7 - 9	4 - 6	6 - 8	3 - 5	7 - 9	2 - 4	2 - 4
SAMPLE DATE	2/14/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SB063	13SB064	13SB064	13SB065	13SB065	13SB066	13SB066	13SB067	13SB067	13SB068	13SB069
NSAMPLE	13SB630709	13SB640406	13SB640608	13SB650305	13SB650709	13SB660406	13SB660608	13SB670305	13SB670709	13SB680204	13SB690204
SAMPLE NUMBER	13SB630709	13SB640406	13SB640608	13SB650305	13SB650709	13SB660406	13SB660608	13SB670305	13SB670709	13SB680204	13SB690204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	7 - 9	4 - 6	6 - 8	3 - 5	7 - 9	4 - 6	6 - 8	3 - 5	7 - 9	2 - 4	2 - 4
SAMPLE DATE	2/14/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/15/2006	2/14/2006	2/14/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248											
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.25 U		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3,5-DINITROANILINE	0.25 U		0.25 U		0.25 U		0.25 U		0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB070	13SB071	13SB071	13SB072	13SB073	13SB077	13SB078	13SB079	13SB080	13SB081	13SB083
NSAMPLE	13SB700305	13SB710305	13SB710507	13SB720305	13SB730204	13SB770204	13SB780204	13SB790204	13SB800204	13SB810204	13SB830204
SAMPLE NUMBER	13SB700305	13SB710305	13SB710507	13SB720305	13SB730204	13SB770204	13SB780204	13SB790204	13SB800204	13SB810204	13SB830204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	3 - 5	3 - 5	5 - 7	3 - 5	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE DATE	2/14/2006	2/14/2006	2/14/2006	2/21/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB070	13SB071	13SB071	13SB072	13SB073	13SB077	13SB078	13SB079	13SB080	13SB081	13SB083
NSAMPLE	13SB700305	13SB710305	13SB710507	13SB720305	13SB730204	13SB770204	13SB780204	13SB790204	13SB800204	13SB810204	13SB830204
SAMPLE NUMBER	13SB700305	13SB710305	13SB710507	13SB720305	13SB730204	13SB770204	13SB780204	13SB790204	13SB800204	13SB810204	13SB830204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	3 - 5	3 - 5	5 - 7	3 - 5	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4
SAMPLE DATE	2/14/2006	2/14/2006	2/14/2006	2/21/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248					10.5 U	2700	110	10.9 U	10.4 U	10.5 U	11.1 U
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U							
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	22 J							
2,4-DIAMINO-6-NITROTOLUENE	0.25 U		0.25 U	0.25 U							
2,6-DIAMINO-4-NITROTOLUENE	0.25 U		0.25 U	0.25 U							
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U							
3,5-DINITROANILINE	0.25 U		0.25 U	0.25 U							
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U							
HMX	0.25 U	0.28 R	0.25 U	0.25 U							
RDX	0.25 U	0.25 U	0.25 U	0.25 U							
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB084	13SB085	13SB085	13SB086	13SB086	13SB087	13SB087	13SB090	13SB096	13SB097	13SB098
NSAMPLE	13SB840204	13SB850406	13SB850608	13SB860406	13SB860608	13SB870204	13SB870506	13SB900203	13SB960204	13SB970203	13SB980204
SAMPLE NUMBER	13SB840204	13SB850406	13SB850608	13SB860406	13SB860608	13SB870204	13SB870506	13SB900203	13SB960204	13SB970203	13SB980204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	4 - 6	6 - 8	4 - 6	6 - 8	2 - 4	5 - 6	2 - 3	2 - 4	2 - 3	2 - 4
SAMPLE DATE	6/6/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
Dioxins (ng/kg)											
1,2,3,4,6,7,8,9-OCDD											
1,2,3,4,6,7,8,9-OCDF											
1,2,3,4,6,7,8-HPCDD											
1,2,3,4,6,7,8-HPCDF											
1,2,3,4,7,8-HXCDD											
1,2,3,4,7,8-HXCDF											
1,2,3,7,8,9-HXCDD											
1,2,3,7,8-PECDD											
1,2,3,7,8-PECDF											
2,3,4,6,7,8-HXCDF											
2,3,4,7,8-PECDF											
2,3,7,8-TCDF											
TEQ BIRD											
TEQ BIRD HALFND											
TEQ MAMMAL											
TEQ MAMMAL HALFND											
TOTAL HPCDD											
TOTAL HPCDF											
TOTAL HXCDD											
TOTAL HXCDF											
TOTAL PECDD											
TOTAL PECDF											
TOTAL TCDD											
TOTAL TCDF											
Volatile Organics (ug/kg)											
2-BUTANONE											
4-METHYL-2-PENTANONE											
ACETONE											
DICHLORODIFLUOROMETHANE											
TRICHLOROFLUOROMETHANE											
Semivolatile Organics (ug/kg)											
3&4-METHYLPHENOL											
BIS(2-ETHYLHEXYL)PHTHALATE											
CHRYSENE											
FLUORANTHENE											
PHENANTHRENE											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB084	13SB085	13SB085	13SB086	13SB086	13SB087	13SB087	13SB090	13SB096	13SB097	13SB098
NSAMPLE	13SB840204	13SB850406	13SB850608	13SB860406	13SB860608	13SB870204	13SB870506	13SB900203	13SB960204	13SB970203	13SB980204
SAMPLE NUMBER	13SB840204	13SB850406	13SB850608	13SB860406	13SB860608	13SB870204	13SB870506	13SB900203	13SB960204	13SB970203	13SB980204
SOIL CLASSIFICATION											
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	4 - 6	6 - 8	4 - 6	6 - 8	2 - 4	5 - 6	2 - 3	2 - 4	2 - 3	2 - 4
SAMPLE DATE	6/6/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
PHENOL											
PYRENE											
PCBs (ug/kg)											
AROCLOR-1248	10.9 U								370 J		
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DIAMINO-6-NITROTOLUENE											
2,6-DIAMINO-4-NITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
3,5-DINITROANILINE											
4-AMINO-2,6-DINITROTOLUENE											
HMX											
RDX											
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.03 J	0.1 J	0.09 J	0.5 U
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (meq/100)											
PH											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB099	13SB100	13SB101	13SB104	13SB104	13SB105	13SB105
NSAMPLE	13SB990204	13SB1000204	13SB1010204	13SB1040204	13SB1040406	13SB1050204	13SB1050406
SAMPLE NUMBER	13SB990204	13SB1000204	13SB1010204	13SB1040204	13SB1040406	13SB1050204	13SB1050406
SOIL CLASSIFICATION							
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	2 - 4	4 - 6
SAMPLE DATE	8/23/2006	8/23/2006	8/23/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
Dioxins (ng/kg)							
1,2,3,4,6,7,8,9-OCDD							
1,2,3,4,6,7,8,9-OCDF							
1,2,3,4,6,7,8-HPCDD							
1,2,3,4,6,7,8-HPCDF							
1,2,3,4,7,8-HXCDD							
1,2,3,4,7,8-HXCDF							
1,2,3,7,8,9-HXCDD							
1,2,3,7,8-PECDD							
1,2,3,7,8-PECDF							
2,3,4,6,7,8-HXCDF							
2,3,4,7,8-PECDF							
2,3,7,8-TCDF							
TEQ BIRD							
TEQ BIRD HALFND							
TEQ MAMMAL							
TEQ MAMMAL HALFND							
TOTAL HPCDD							
TOTAL HPCDF							
TOTAL HXCDD							
TOTAL HXCDF							
TOTAL PECDD							
TOTAL PECDF							
TOTAL TCDD							
TOTAL TCDF							
Volatile Organics (ug/kg)							
2-BUTANONE							
4-METHYL-2-PENTANONE							
ACETONE							
DICHLORODIFLUOROMETHANE							
TRICHLOROFLUOROMETHANE							
Semivolatile Organics (ug/kg)							
3&4-METHYLPHENOL							
BIS(2-ETHYLHEXYL)PHTHALATE							
CHRYSENE							
FLUORANTHENE							
PHENANTHRENE							

TABLE 3-8

SUMMARY OF CHEMICALS DETECTED IN SUBSURFACE SOIL SAMPLES ROUNDS 1 THROUGH 4 AND PCB DELINEATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SB099	13SB100	13SB101	13SB104	13SB104	13SB105	13SB105
NSAMPLE	13SB990204	13SB1000204	13SB1010204	13SB1040204	13SB1040406	13SB1050204	13SB1050406
SAMPLE NUMBER	13SB990204	13SB1000204	13SB1010204	13SB1040204	13SB1040406	13SB1050204	13SB1050406
SOIL CLASSIFICATION							
SUBMATRIX	SB	SB	SB	SB	SB	SB	SB
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	2 - 4	2 - 4	2 - 4	4 - 6	2 - 4	4 - 6
SAMPLE DATE	8/23/2006	8/23/2006	8/23/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
PHENOL							
PYRENE							
PCBs (ug/kg)							
AROCLOR-1248							
Herbicides (ug/kg)							
PENTACHLOROPHENOL							
Energetics (mg/kg)							
1,3,5-TRINITROBENZENE							
2,4,6-TRINITROTOLUENE							
2,4-DIAMINO-6-NITROTOLUENE							
2,6-DIAMINO-4-NITROTOLUENE							
2-AMINO-4,6-DINITROTOLUENE							
3,5-DINITROANILINE							
4-AMINO-2,6-DINITROTOLUENE							
HMX							
RDX							
Field PCB Results (mg/kg)							
TOTAL PCBS AS AROCLOR-1254	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Miscellaneous Parameters							
CATION EXCHANGE CAPACITY (meq/100)							
PH							
TOTAL ORGANIC CARBON (mg/kg)							

TABLE 3-9

DESCRIPTIVE STATISTICS FOR
SUMP WATER SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
2,4,6-TRINITROTOLUENE	2/2	1.1 J	8.3	---	4.95	4.95	13SU00701
2-AMINO-4,6-DINITROTOLUENE	2/2	0.9 J	1.1 J	---	1.04	1.04	13SU00701
4-AMINO-2,6-DINITROTOLUENE	2/2	2	3.6	---	2.90	2.90	13SU00701
HMX	2/2	23	79	---	52	52	13SU00701
RDX	2/2	68	630	---	350	350	13SU00701

ES/DI - External Sump/Investigation
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA - Not analyzed
ND - Not detected
J - estimated value
µg/L - micrograms per liter
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.

TABLE 3-10

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Semivolatile Organics (ug/L)								
BENZO(A)ANTHRACENE	2/5	0.2 J	0.22	0.049 - 0.05	0.0989	0.210	13SW0601	NA
BENZO(A)PYRENE	2/5	0.26	0.27 J	0.049 - 0.05	0.121	0.265	13SW3201	NA
BENZO(B)FLUORANTHENE	2/5	0.38	0.4 J	0.049 - 0.05	0.171	0.390	13SW3201	NA
BENZO(G,H,I)PERYLENE	2/5	0.22 J	0.23	0.049 - 0.05	0.105	0.225	13SW0601	NA
BENZO(K)FLUORANTHENE	2/5	0.19 J	0.2	0.049 - 0.05	0.0929	0.195	13SW0601	NA
CHRYSENE	2/5	0.33 J	0.35	0.049 - 0.05	0.151	0.340	13SW0601	NA
FLUORANTHENE	2/5	0.77 J	0.96	0.049 - 0.05	0.361	0.865	13SW0601	NA
INDENO(1,2,3-CD)PYRENE	2/5	0.2	0.21 J	0.049 - 0.05	0.0969	0.205	13SW3201	NA
PHENANTHRENE	2/5	0.32 J	0.51	0.049 - 0.05	0.181	0.415	13SW0601	NA
PYRENE	2/5	0.58 J	0.65	0.049 - 0.05	0.261	0.615	13SW0601	NA
Energetics (ug/L)								
2,4,6-TRINITROTOLUENE	5/34	0.42 J	6.8	0.21 - 0.65	0.480	2.39	13SW1301	ND
2,6-DIAMINO-4-NITROTOLUENE	1/21	0.44 J	0.44 J	0.24 - 0.287	0.141	0.440	13SW1302	ND
2-AMINO-4,6-DINITROTOLUENE	11/33	0.26 J	8.3 J	0.24 - 0.65	0.606	1.49	13SW1302	ND
3-NITROTOLUENE	2/34	0.29 J	0.31 J	0.21 - 0.65	0.169	0.300	13SW1302	ND
4-AMINO-2,6-DINITROTOLUENE	14/34	0.46 J	21 J	0.24 - 0.65	1.39	3.15	13SW1302	ND
DNX	10/21	0.59 J	35	0.24 - 0.27	3.70	7.63	13SW1102	ND
HMX	21/34	0.67	730	0.24 - 0.65	41.3	66.8	13SW1102	ND
MNX	10/21	1.2	72	0.24 - 0.27	7.70	16.0	13SW1102	ND
RDX	25/34	0.29 J	5500	0.24 - 0.6	276	375	13SW1102	ND
TNX	7/21	0.48 J	4	0.24 - 0.27	0.644	1.68	13SW1102, 13SW1501	ND
Herbicides (ug/L)								
PENTACHLOROPHENOL	2/3	0.025 J	0.091	0.013	0.0408	0.0580	13SW0401	NA
Total Metals (ug/L)								
ALUMINUM	28/33	108 J	19100 J	41.9 - 106	2329	2739	13SW0701	486 J - 1770 J
ARSENIC	15/33	0.85 J	35.7 J	0.11 - 0.97	2.38	4.96	13SW1101	0.8 J
BARIUM	33/33	25.3 J	247 J	---	75.4	75.4	13SW0701	58.1 J - 58.2 J
CADMIUM	1/33	1.3 J	1.3 J	0.039 - 0.56	0.105	1.30	13SW0102	ND
CALCIUM	33/33	3040 J	133000 J	---	47368	47368	13SW0701	5060 J - 6550 J
CHROMIUM	17/33	1 J	20.5 J	0.19 - 1	3.34	6.19	13SW0701	0.82 J - 2.2 J
COBALT	18/33	0.47 J	9.4 J	0.07 - 0.72	1.79	3.15	13SW1101	ND
COPPER	30/33	0.89 J	27.1 J	0.38 - 0.89	5.65	6.18	13SW1101	1.3 J - 2.2 J
IRON	26/33	152 J	16200 J	34.7 - 162	2142	2706	13SW0701	415 J - 1600 J
LEAD	14/33	1.3 J	137 J	0.07 - 1.6	6.42	14.8	13SW0102	ND
LITHIUM	8/13	2.8 J	14.3 J	1.3 - 2.2	4.18	6.24	13SW0701	NA
MAGNESIUM	32/33	836 J	92200 J	14200	11421	11556	13SW1101	2830 J - 3600 J
MANGANESE	32/33	7.5 J	3190 J	9.4	244	251	13SW0802	60.1 J - 122 J
MERCURY	1/33	0.047 J	0.047 J	0.007 - 0.2	0.0168	0.0470	13SW1501	ND
NICKEL	32/33	0.67 J	22 J	2	4.50	4.61	13SW1501	2.3 J
POTASSIUM	33/33	621 J	690000 J	---	35130	35130	13SW1101	1800 J - 2920 J
SELENIUM	1/33	2 J	2 J	0.04 - 0.62	0.167	2.00	13SW1101	ND
SODIUM	33/33	2260 J	325000 J	---	30873	30873	13SW0701	1540 J
STRONTIUM	13/13	48 J	245 J	---	108	108	13SW0701	NA

TABLE 3-10

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
TITANIUM	30/31	1.3 J	356 J	0.73	38.2	39.5	13SW0701	10.1 J
VANADIUM	25/33	0.42 J	43.5 J	0.11 - 0.61	5.92	7.76	13SW1101	0.89 J - 2.9
ZINC	25/33	6.8 J	269 J	2.1 - 13.1	28.6	36.8	13SW0102	8.8 J
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED	18/33	52.7 J	822	7.6 - 52.8	109	191	13SW0901-F	254 J - 938 J
ARSENIC, FILTERED	8/33	0.64 J	35.3 J	0.09 - 0.73	1.65	6.33	13SW1101-F	ND
BARIUM, FILTERED	33/33	10.1 J	149 J	---	61.5	61.5	13SW0701-F	51.7 J - 54.1 J
CALCIUM, FILTERED	33/33	5660 J	121000 J	---	45608	45608	13SW0701-F	5120 J - 6680 J
CHROMIUM, FILTERED	1/33	2 J	2 J	0.13 - 1.5	0.289	2.00	13SW1101-F	1 J
COBALT, FILTERED	20/33	0.6 J	8.8 J	0.088 - 0.7	1.60	2.50	13SW1101-F	0.79 J
COPPER, FILTERED	28/33	0.57 J	26.4 J	0.3 - 1.2	2.95	3.41	13SW1101-F	1.5 J
IRON, FILTERED	15/33	35.7 J	1120 J	6.15 - 122	135	275	13SW0802-F	155 J - 645 J
LEAD, FILTERED	1/33	1.1 J	1.1 J	0.02 - 0.38	0.109	1.10	13SW0102-F	ND
LITHIUM, FILTERED	3/13	3.1 J	5.5 J	0.37 - 1.5	1.32	4.03	13SW1001-F	NA
MAGNESIUM, FILTERED	32/33	3440 J	92900 J	13700	11414	11557	13SW1101-F	2740 J - 3770 J
MANGANESE, FILTERED	30/33	2.9 J	3110 J	2.1 - 10.7	180	198	13SW0802-F	112 J
NICKEL, FILTERED	28/33	0.58 J	18.6 J	0.55 - 1.5	2.39	2.75	13SW1101-F	1.8 J
POTASSIUM, FILTERED	33/33	600 J	700000 J	---	35149	35149	13SW1101-F	1850 J - 2700 J
SELENIUM, FILTERED	1/33	2.2 J	2.2 J	0.04 - 0.59	0.163	2.20	13SW1101-F	ND
SODIUM, FILTERED	33/33	2920 J	311000 J	---	30880	30880	13SW0701-F	1660 J
STRONTIUM, FILTERED	13/13	45.5 J	219 J	---	102	102	13SW0701-F	NA
TITANIUM, FILTERED	26/31	0.1 J	19.5 J	0.34 - 1.1	3.55	4.15	13SW0901-F	5.3 J
VANADIUM, FILTERED	9/33	0.44 J	38.5 J	0.06 - 1.14	1.75	5.91	13SW1101-F	ND
ZINC, FILTERED	18/33	3.4 J	54.5 J	2.1 - 16	9.44	14.7	13SW0902-F	18.6 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	5/5	2.83	11.97	---	9.51	9.51	13SW1502	8.05
DISSOLVED OXYGEN - METER	32/32	2.19	12.32	---	7.87	7.87	13SW1301	7.97
OXIDATION REDUCTION POTENTIAL (MV)	37/37	-23.7	640	---	196	196	13SW0601	49 - 330.8
PH (S.U.)	37/37	6.13	8.48	---	7.39	7.39	13SW0901	6.37 - 7.99
SPECIFIC CONDUCTANCE (MS/CM)	37/37	0.138	829	---	22.9	22.9	13SW0102	0.059 - 0.073
TEMPERATURE (C)	37/37	6.52	16.45	---	12.1	12.1	13SW1101	8.84 - 13.75
TURBIDITY (NTU)	36/36	0	352	---	44.2	44.2	13SW0701	56.4 - 221
Miscellaneous Parameters (mg/L)								
AMMONIA-N	18/31	0.01	3.4	0.005 - 0.01	0.180	0.307	13SW1101	ND
NITRITE/NITRATE-N	23/34	0.14	200	0.02 - 0.13	7.65	11.3	13SW2401	4

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA - Not analyzed
ND - Not detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter

TABLE 3-11

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUND 1
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Semivolatile Organics (ug/L)								
BENZO(A)ANTHRACENE	1/3	0.22	0.22	0.05	0.0900	0.220	13SW0601	NA
BENZO(A)PYRENE	1/3	0.26	0.26	0.05	0.103	0.260	13SW0601	NA
BENZO(B)FLUORANTHENE	1/3	0.38	0.38	0.05	0.143	0.380	13SW0601	NA
BENZO(G,H,I)PERYLENE	1/3	0.23	0.23	0.05	0.0933	0.230	13SW0601	NA
BENZO(K)FLUORANTHENE	1/3	0.2	0.2	0.05	0.0833	0.200	13SW0601	NA
CHRYSENE	1/3	0.35	0.35	0.05	0.133	0.350	13SW0601	NA
FLUORANTHENE	1/3	0.96	0.96	0.05	0.337	0.960	13SW0601	NA
INDENO(1,2,3-CD)PYRENE	1/3	0.2	0.2	0.05	0.0833	0.200	13SW0601	NA
PHENANTHRENE	1/3	0.51	0.51	0.05	0.187	0.510	13SW0601	NA
PYRENE	1/3	0.65	0.65	0.05	0.233	0.650	13SW0601	NA
Energetics (ug/L)								
2,4,6-TRINITROTOLUENE	4/13	0.53 J	6.8	0.21 - 0.65	1.03	2.88	13SW1301	ND
2-AMINO-4,6-DINITROTOLUENE	3/12	0.53 J	1.6 J	0.265 - 0.65	0.411	0.990	13SW1301	ND
4-AMINO-2,6-DINITROTOLUENE	5/13	0.52 J	3.8 J	0.265 - 0.65	0.805	1.74	13SW1301	ND
HMX	8/13	1.2	93	0.265 - 0.65	12.2	19.7	13SW1101	ND
RDX	10/13	0.29 J	610	0.25 - 0.6	64.6	83.9	13SW1101	ND
Herbicides (ug/L)								
PENTACHLOROPHENOL	2/3	0.025 J	0.091	0.013	0.0408	0.0580	13SW0401	NA
Total Metals (ug/L)								
ALUMINUM	13/13	575 J	19100 J	---	4016	4016	13SW0701	486 J - 1770 J
ARSENIC	7/13	1.2 J	35.7 J	0.51 - 0.97	4.27	7.59	13SW1101	0.8 J
BARIUM	13/13	25.3 J	247 J	---	81.4	81.4	13SW0701	58.1 J - 58.2 J
CALCIUM	13/13	18900 J	133000 J	---	50862	50862	13SW0701	5060 J - 6550 J
CHROMIUM	11/13	1.2 J	20.5 J	0.98 - 1	4.69	5.45	13SW0701	0.82 J - 2.2 J
COBALT	9/13	1.2 J	9.4 J	0.16 - 0.72	2.31	3.21	13SW1101	ND
COPPER	13/13	1.9 J	27.1 J	---	7.45	7.45	13SW1101	1.3 J - 2.2 J
IRON	13/13	467 J	16200 J	---	3328	3328	13SW0701	415 J - 1600 J
LEAD	9/13	1.3 J	29.9 J	0.77 - 1.2	4.22	5.88	13SW0701	ND
LITHIUM	8/13	2.8 J	14.3 J	1.3 - 2.2	4.18	6.24	13SW0701	NA
MAGNESIUM	13/13	3600 J	92200 J	---	15611	15611	13SW1101	2830 J - 3600 J
MANGANESE	13/13	8.2 J	231 J	---	102	102	13SW1001	60.1 J - 122 J
NICKEL	13/13	0.89 J	20.4 J	---	5.65	5.65	13SW1101	2.3 J
POTASSIUM	13/13	855 J	690000 J	---	63766	63766	13SW1101	1800 J - 2920 J
SELENIUM	1/13	2 J	2 J	0.1 - 0.55	0.280	2.00	13SW1101	ND
SODIUM	13/13	2960 J	325000 J	---	49552	49552	13SW0701	1540 J
STRONTIUM	13/13	48 J	245 J	---	108	108	13SW0701	NA
TITANIUM	13/13	11.1 J	356 J	---	68.1	68.1	13SW0701	10.1 J
VANADIUM	13/13	1.3 J	43.5 J	---	10.7	10.7	13SW1101	0.89 J - 2.9
ZINC	13/13	7.8 J	79.3 J	---	28.1	28.1	13SW0701	8.8 J
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED	12/13	52.7 J	822	24.8	169	183	13SW0901-F	254 J - 938 J
ARSENIC, FILTERED	2/13	3.6 J	35.3 J	0.15 - 0.73	3.17	19.5	13SW1101-F	ND
BARIUM, FILTERED	13/13	10.1 J	149 J	---	60.8	60.8	13SW0701-F	51.7 J - 54.1 J

TABLE 3-11

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUND 1
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
CALCIUM, FILTERED	13/13	5660 J	121000 J	---	44974	44974	13SW0701-F	5120 J - 6680 J
CHROMIUM, FILTERED	1/13	2 J	2 J	0.21 - 0.89	0.367	2.00	13SW1101-F	1 J
COBALT, FILTERED	5/13	1.3 J	8.8 J	0.26 - 0.7	1.29	2.94	13SW1101-F	0.79 J
COPPER, FILTERED	11/13	1.9 J	26.4 J	1 - 1.2	4.43	5.14	13SW1101-F	1.5 J
IRON, FILTERED	11/13	35.7 J	750 J	14.9 - 26.9	178	209	13SW0901-F	155 J - 645 J
LITHIUM, FILTERED	3/13	3.1 J	5.5 J	0.37 - 1.5	1.32	4.03	13SW1001-F	NA
MAGNESIUM, FILTERED	13/13	3440 J	92900 J	---	15117	15117	13SW1101-F	2740 J - 3770 J
MANGANESE, FILTERED	13/13	2.9 J	160 J	---	51.2	51.2	13SW1001-F	112 J
NICKEL, FILTERED	10/13	1.1 J	18.6 J	0.59 - 0.85	3.21	4.07	13SW1101-F	1.8 J
POTASSIUM, FILTERED	13/13	735 J	700000 J	---	63920	63920	13SW1101-F	1850 J - 2700 J
SELENIUM, FILTERED	1/13	2.2 J	2.2 J	0.08 - 0.59	0.287	2.20	13SW1101-F	ND
SODIUM, FILTERED	13/13	2920 J	311000 J	---	46447	46447	13SW0701-F	1660 J
STRONTIUM, FILTERED	13/13	45.5 J	219 J	---	102	102	13SW0701-F	NA
TITANIUM, FILTERED	11/13	1.4 J	19.5 J	1.1	5.86	6.83	13SW0901-F	5.3 J
VANADIUM, FILTERED	3/13	1.6 J	38.5 J	0.23 - 0.73	3.51	14.5	13SW1101-F	ND
ZINC, FILTERED	10/13	3.4 J	30.6 J	3.8 - 5.7	10.1	12.4	13SW1101-F	18.6 J
Field Parameters								
DISSOLVED OXYGEN - METER	13/13	4.35	12.32	---	9.57	9.57	13SW1301	7.97
OXIDATION REDUCTION POTENTIAL (MV)	13/13	95	640	---	179	179	13SW0601	49 - 330.8
PH (S.U.)	13/13	6.13	8.48	---	7.55	7.55	13SW0901	6.37 - 7.99
SPECIFIC CONDUCTANCE (MS/CM)	13/13	0.138	2.743	---	0.600	0.600	13SW1101	0.059 - 0.073
TEMPERATURE (°C)	13/13	6.52	16.45	---	10.5	10.5	13SW1101	8.84 - 13.75
TURBIDITY (NTU)	12/12	11	352	---	92.7	92.7	13SW0701	56.4 - 221
Miscellaneous Parameters (mg/L)								
AMMONIA-N	10/13	0.01 J	3.4	0.01	0.362	0.469	13SW1101	ND
NITRITE/NITRATE-N	9/13	0.15 J	23	0.02	2.52	3.63	13SW1101	4

Field duplicate samples were excluded from these summaries because they are considered to be field QC samples.
NA - Not Analyzed
ND - Not Detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L -micrograms per liter
mg/L - milligrams per liter
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-12

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Semivolatile Organics (ug/L)								
BENZO(A)ANTHRACENE	1/2	0.2 J	0.2 J	0.049	0.112	0.200	13SW3201	NA
BENZO(A)PYRENE	1/2	0.27 J	0.27 J	0.049	0.147	0.270	13SW3201	NA
BENZO(B)FLUORANTHENE	1/2	0.4 J	0.4 J	0.049	0.212	0.400	13SW3201	NA
BENZO(G,H,I)PERYLENE	1/2	0.22 J	0.22 J	0.049	0.122	0.220	13SW3201	NA
BENZO(K)FLUORANTHENE	1/2	0.19 J	0.19 J	0.049	0.107	0.190	13SW3201	NA
CHRYSENE	1/2	0.33 J	0.33 J	0.049	0.177	0.330	13SW3201	NA
FLUORANTHENE	1/2	0.77 J	0.77 J	0.049	0.397	0.770	13SW3201	NA
INDENO(1,2,3-CD)PYRENE	1/2	0.21 J	0.21 J	0.049	0.117	0.210	13SW3201	NA
PHENANTHRENE	1/2	0.32 J	0.32 J	0.049	0.172	0.320	13SW3201	NA
PYRENE	1/2	0.58 J	0.58 J	0.049	0.302	0.580	13SW3201	NA
Energetics (ug/L)								
2,6-DIAMINO-4-NITROTOLUENE	1/18	0.44 J	0.44 J	0.24 - 0.287	0.144	0.440	13SW1302	ND
2-AMINO-4,6-DINITROTOLUENE	5/18	0.52 J	8.3 J	0.24 - 0.27	0.748	2.36	13SW1302	ND
3-NITROTOLUENE	2/18	0.29 J	0.31 J	0.24 - 0.287	0.146	0.300	13SW1302	ND
4-AMINO-2,6-DINITROTOLUENE	6/18	0.46 J	21 J	0.24 - 0.27	1.83	5.24	13SW1302	ND
DNX	8/18	0.59 J	35	0.24 - 0.27	4.15	9.18	13SW1102	ND
HMX	10/18	0.67	730	0.24 - 0.27	58.6	105	13SW1102	ND
MNX	7/18	1.2 J	72	0.24 - 0.27	7.59	19.3	13SW1102	ND
RDX	12/18	0.35 J	5500	0.24 - 0.27	411	616	13SW1102	ND
TNX	6/18	0.48 J	4	0.24 - 0.27	0.696	1.84	13SW1102, 13SW1501	ND
Total Metals (ug/L)								
ALUMINUM	13/18	108 J	7250 J	41.9 - 106	1160	1593	13SW1102	486 J - 1770 J
ARSENIC	7/18	0.85 J	8.4 J	0.11 - 0.48	1.17	2.81	13SW1102	0.8 J
BARIUM	18/18	47.3 J	101 J	---	66.8	66.8	13SW1601	58.1 J - 58.2 J
CALCIUM	18/18	3040 J	82600 J	---	45119	45119	13SW0902	5060 J - 6550 J
CHROMIUM	4/18	3.2 J	8.2 J	0.19 - 1	1.75	6.88	13SW1601	0.82 J - 2.2 J
COBALT	8/18	0.47 J	9 J	0.07 - 0.52	1.49	3.21	13SW1501	ND
COPPER	15/18	0.89 J	18 J	0.38 - 0.89	3.54	4.19	13SW1501	1.3 J - 2.2 J
IRON	11/18	152 J	6220 J	34.7 - 162	1277	2059	13SW1501	415 J - 1600 J
LEAD	4/18	1.8 J	9.7 J	0.07 - 1.6	1.10	4.25	13SW1501	ND
MAGNESIUM	17/18	836 J	15600 J	14200	8944	9053	13SW1901	2830 J - 3600 J
MANGANESE	18/18	7.5 J	3190 J	---	369	369	13SW0802	60.1 J - 122 J
MERCURY	1/18	0.047 J	0.047 J	0.007 - 0.02	0.0117	0.0470	13SW1501	ND
NICKEL	18/18	0.67 J	22 J	---	3.80	3.80	13SW1501	2.3 J
POTASSIUM	18/18	621 J	126000 J	---	18036	18036	13SW1102	1800 J - 2920 J
SODIUM	18/18	2260 J	88300 J	---	20102	20102	13SW0702	1540 J
TITANIUM	17/18	1.3 J	96.9 J	0.73	16.7	17.6	13SW1102	10.1 J
VANADIUM	10/18	0.42 J	16.6 J	0.11 - 0.61	2.69	4.71	13SW1102	0.89 J - 2.9
ZINC	11/18	6.8 J	68.9 J	2.1 - 13.1	17.1	25.8	13SW0902	8.8 J
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED	5/18	134 J	283 J	7.6 - 52.8	66.1	209	13SW1102-F	254 J - 938 J
ARSENIC, FILTERED	6/18	0.64 J	6.7 J	0.09 - 0.42	0.720	1.96	13SW1102-F	ND

TABLE 3-12

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
BARIUM, FILTERED	18/18	22 J	95.3 J	---	58.8	58.8	13SW0802-F	51.7 J - 54.1 J
CALCIUM, FILTERED	18/18	17500 J	81400 J	---	46283	46283	13SW0902-F	5120 J - 6680 J
COBALT, FILTERED	15/18	0.6 J	6.5 J	0.21 - 0.52	1.99	2.35	13SW1002-F	0.79 J
COPPER, FILTERED	15/18	0.57 J	8.3 J	0.3 - 0.81	1.95	2.29	13SW1102-F	1.5 J
IRON, FILTERED	4/18	137 J	1120 J	6.2 - 122	117	456	13SW0802-F	155 J - 645 J
MAGNESIUM, FILTERED	17/18	4860 J	15400 J	13700	9327	9473	13SW1901-F	2740 J - 3770 J
MANGANESE, FILTERED	16/18	4 J	3110 J	2.1 - 10.7	294	330	13SW0802-F	112 J
NICKEL, FILTERED	17/18	0.7 J	6.2	0.55	2.00	2.10	13SW1302-F	1.8 J
POTASSIUM, FILTERED	18/18	600 J	125000 J	---	18006	18006	13SW1102-F	1850 J - 2700 J
SODIUM, FILTERED	18/18	7110 J	106000 J	---	22335	22335	13SW0702-F	1660 J
TITANIUM, FILTERED	15/18	0.1 J	8.7 J	0.34 - 1	1.88	2.19	13SW1102-F	5.3 J
VANADIUM, FILTERED	6/18	0.44 J	6 J	0.06 - 0.39	0.604	1.61	13SW1102-F	ND
ZINC, FILTERED	7/18	6.6 J	54.5 J	2.1 - 16	8.76	17.2	13SW0902-F	18.6 J
Field Parameters								
DISSOLVED OXYGEN - METER	19/19	2.19	10.59	---	6.71	6.71	13SW1501	7.97
OXIDATION REDUCTION POTENTIAL (MV)	19/19	-23.7	341.3	---	228	228	13SW2601	49 - 330.8
PH (S.U.)	19/19	6.17	7.8	---	7.26	7.26	13SW0902	6.37 - 7.99
SPECIFIC CONDUCTANCE (MS/CM)	19/19	0.207	1.024	---	0.410	0.410	13SW1102	0.059 - 0.073
TEMPERATURE (°C)	19/19	8.93	15.2	---	12.4	12.4	13SW1102	8.84 - 13.75
TURBIDITY (NTU)	19/19	0	242	---	20.9	20.9	13SW1102	56.4 - 221
Miscellaneous Parameters (mg/L)								
AMMONIA-N	8/18	0.01	0.4 J	0.005 - 0.01	0.0479	0.104	13SW0802	ND
NITRITE/NITRATE-N	11/18	0.14	200	0.025 - 0.13	12.0	19.5	13SW2401	4

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
NA - Not Analyzed
ND - Not Detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-13

DESCRIPTIVE STATISTICS FOR
GULLY SURFACE WATER SAMPLES ROUND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Energetics (ug/L)								
2,4,6-TRINITROTOLUENE	1/3	0.42 J	0.42 J	0.24 - 0.25	0.222	0.420	13SW1402	ND
2-AMINO-4,6-DINITROTOLUENE	3/3	0.26 J	1 J	---	0.537	0.537	13SW1402	ND
4-AMINO-2,6-DINITROTOLUENE	3/3	0.62	2.5	---	1.32	1.32	13SW1402	ND
DNX	2/3	1	1.8 J	0.24	0.973	1.40	13SW1502	ND
HMX	3/3	15	160	---	64.3	64.3	13SW1502	ND
MNX	3/3	1.2	22	---	8.37	8.37	13SW1502	ND
RDX	3/3	43	1000	---	380	380	13SW1502	ND
TNX	1/3	0.74 J	0.74 J	0.24 - 0.248	0.328	0.740	13SW1502	ND
Total Metals (ug/L)								
ALUMINUM	2/2	680 J	3080 J	---	1880	1880	13SW0102	486 J - 1770 J
ARSENIC	1/2	1.6 J	1.6 J	0.45	0.913	1.60	13SW0102	0.8 J
BARIUM	2/2	42.5 J	184 J	---	113	113	13SW0102	58.1 J - 58.2 J
CADMIUM	1/2	1.3 J	1.3 J	0.039	0.660	1.30	13SW0102	ND
CALCIUM	2/2	33000 J	56800 J	---	44900	44900	13SW0102	5060 J - 6550 J
CHROMIUM	2/2	1 J	16.8 J	---	8.90	8.90	13SW0102	0.82 J - 2.2 J
COBALT	1/2	2.1	2.1	0.26	1.12	2.10	13SW0102	ND
COPPER	2/2	3 J	22.8	---	12.9	12.9	13SW0102	1.3 J - 2.2 J
IRON	2/2	767 J	3690	---	2229	2229	13SW0102	415 J - 1600 J
LEAD	1/2	137 J	137 J	0.6	68.7	137	13SW0102	ND
MAGNESIUM	2/2	5530 J	7430 J	---	6480	6480	13SW0102	2830 J - 3600 J
MANGANESE	1/2	63	63	9.4	33.9	63.0	13SW0102	60.1 J - 122 J
NICKEL	1/2	5.7	5.7	2	3.35	5.70	13SW0102	2.3 J
POTASSIUM	2/2	2130 J	3580 J	---	2855	2855	13SW0102	1800 J - 2920 J
SODIUM	2/2	3860 J	8920 J	---	6390	6390	13SW2202	1540 J
VANADIUM	2/2	1.3 J	6.3	---	3.80	3.80	13SW0102	0.89 J - 2.9
ZINC	1/2	269 J	269 J	6.3	136	269	13SW0102	8.8 J
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED	1/2	194 J	194 J	26.4	104	194	13SW0102-F	254 J - 938 J
BARIUM, FILTERED	2/2	39.8 J	142 J	---	90.9	90.9	13SW0102-F	51.7 J - 54.1 J
CALCIUM, FILTERED	2/2	33100 J	54200 J	---	43650	43650	13SW0102-F	5120 J - 6680 J
COPPER, FILTERED	2/2	2.2	2.5 J	---	2.35	2.35	13SW2202-F	1.5 J
LEAD, FILTERED	1/2	1.1 J	1.1 J	0.23	0.608	1.10	13SW0102-F	ND
MAGNESIUM, FILTERED	2/2	5410 J	6850	---	6130	6130	13SW0102-F	2740 J - 3770 J
MANGANESE, FILTERED	1/2	3.8 J	3.8 J	3.5	2.78	3.80	13SW0102-F	112 J
NICKEL, FILTERED	1/2	0.58 J	0.58 J	1.5	0.665	0.580	13SW0102-F	1.8 J
POTASSIUM, FILTERED	2/2	2080 J	2760 J	---	2420	2420	13SW0102-F	1850 J - 2700 J
SODIUM, FILTERED	2/2	4370 J	8840 J	---	6605	6605	13SW2202-F	1660 J
ZINC, FILTERED	1/2	21.2 J	21.2 J	3	11.4	21.2	13SW0102-F	18.6 J
Field Parameters								
DISSOLVED OXYGEN	5/5	2.83	11.97	---	9.51	9.51	13SW1502	8.05
OXIDATION REDUCTION POTENTIAL (MV)	5/5	71.5	271.2	---	120	120	13SW0102	49 - 330.8
PH (S.U.)	5/5	6.97	7.7	---	7.43	7.43	13SW2202	6.37 - 7.99
SPECIFIC CONDUCTANCE (MS/CM)	5/5	0.205	829	---	166	166	13SW0102	0.059 - 0.073
TEMPERATURE (C)	5/5	14.22	16.27	---	15.0	15.0	13SW0102	8.84 - 13.75
TURBIDITY (NTU)	5/5	9.4	23.8	---	16.0	16.0	13SW1502	56.4 - 221
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	3/3	1.3	7.4	---	4.03	4.03	13SW1402	4

Field duplicate samples were excluded from these summaries because they are considered to be field QC samples.
ND - Not Detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-14

DESCRIPTIVE STATISTICS FOR
MAINSTREAM SURFACE WATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Energetics (ug/L)								
HMX	4/5	1.4	3.2 J	0.264	2.01	2.48	13SW3001	ND
MNX	2/5	0.28 J	0.31 J	0.25 - 0.264	0.195	0.295	13SW3002	ND
RDX	4/5	1.3	9.9	0.264	5.23	6.50	13SW3002	ND
Total Metals (ug/L)								
BARIUM	2/2	54.1 J	57.8 J	---	56.0	56.0	13SW3002	53.7 J - 62.7 J
CALCIUM	2/2	50000 J	54800 J	---	52400	52400	13SW3001	55700 J - 65300 J
CHROMIUM	1/2	0.68 J	0.68 J	0.84	0.550	0.680	13SW3002	3.8 J
COPPER	2/2	1.3 J	1.4 J	---	1.35	1.35	13SW3001	1.1 J - 5.5
IRON	1/2	175 J	175 J	70.1	105	175	13SW3001	2460
MAGNESIUM	2/2	8780 J	9770 J	---	9275	9275	13SW3001	9090 J - 14500 J
MANGANESE	1/2	7.9 J	7.9 J	5.3	5.28	7.90	13SW3001	23
NICKEL	1/2	0.45 J	0.45 J	0.93	0.458	0.450	13SW3001	0.77 J - 6.9
POTASSIUM	2/2	4850 J	6690 J	---	5770	5770	13SW3002	2560 J - 3860 J
SODIUM	2/2	18400 J	25600 J	---	22000	22000	13SW3001	29900 J - 34300 J
TITANIUM	1/1	2.3 J	2.3 J	---	2.30	2.30	13SW3001	0.31 J
Dissolved Metals (ug/L)								
BARIUM, FILTERED	2/2	81.6 J	280 J	---	181	181	13SW3002-F	52.7 J - 56 J
CALCIUM, FILTERED	2/2	29000 J	52400 J	---	40700	40700	13SW3002-F	54900 J - 75800 J
CHROMIUM, FILTERED	1/2	0.6 J	0.6 J	0.3	0.375	0.600	13SW3002-F	ND
COBALT, FILTERED	1/2	2.8 J	2.8 J	0.088	1.42	2.80	13SW3001-F	0.16 J - 3.2 J
COPPER, FILTERED	2/2	1.2 J	1.5 J	---	1.35	1.35	13SW3001-F	1 J - 1.6 J
MAGNESIUM, FILTERED	2/2	8840 J	9090 J	---	8965	8965	13SW3001-F	9630 J - 15700
MANGANESE, FILTERED	1/2	23 J	23 J	3	12.3	23.0	13SW3001-F	4.9 J - 6.1 J
NICKEL, FILTERED	1/2	1.4	1.4	0.84	0.910	1.40	13SW3001-F	0.87 J - 1.8
POTASSIUM, FILTERED	2/2	6780 J	15100 J	---	10940	10940	13SW3001-F	2470 J - 3550 J
SODIUM, FILTERED	2/2	9830 J	18700 J	---	14265	14265	13SW3002-F	33800 J - 35700 J
TITANIUM, FILTERED	1/1	0.6 J	0.6 J	---	0.600	0.600	13SW3001-F	0.22 J
Field Parameters (mg/L)								
DISSOLVED OXYGEN	4/4	8.72	11.45	---	9.92	9.92	13SW3301	9.34
DISSOLVED OXYGEN - METER	1/1	9.63	9.63	---	9.63	9.63	13SW3001	9.4
OXIDATION REDUCTION POTENTIAL (MV)	5/5	39.3	222.1	---	124	124	13SW3001	130 - 226.2
PH (S.U.)	5/5	7.12	7.84	---	7.52	7.52	13SW3001	7.63 - 7.88
SPECIFIC CONDUCTANCE (MS/CM)	5/5	0.347	512	---	177	177	13SW3501	0.448 - 457
TEMPERATURE (°C)	5/5	10.79	14.5	---	13.4	13.4	13SW3501	12.5 - 14.25
TURBIDITY (NTU)	5/5	1.3	5.92	---	3.86	3.86	13SW3301	1.1 - 119
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	2/5	0.26	0.28	0.025	0.116	0.270	13SW3301	ND

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Mainstream SW samples were collected in Rounds 2 and 3.
ND - Not Detected.
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-15

DESCRIPTIVE STATISTICS FOR
MAINSTREAM SURFACE WATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Energetics (ug/L)								
HMX	1/1	3.2 J	3.2 J	---	3.20	3.20	13SW3001	ND
MNX	1/1	0.28 J	0.28 J	---	0.280	0.280	13SW3001	ND
RDX	1/1	6.2	6.2	---	6.20	6.20	13SW3001	ND
Total Metals (ug/L)								
BARIUM	1/1	54.1 J	54.1 J	---	54.1	54.1	13SW3001	53.7 J - 62.7 J
CALCIUM	1/1	54800 J	54800 J	---	54800	54800	13SW3001	55700 J - 65300 J
COPPER	1/1	1.4 J	1.4 J	---	1.40	1.40	13SW3001	1.1 J - 5.5
IRON	1/1	175 J	175 J	---	175	175	13SW3001	2460
MAGNESIUM	1/1	9770 J	9770 J	---	9770	9770	13SW3001	9090 J - 14500 J
MANGANESE	1/1	7.9 J	7.9 J	---	7.90	7.90	13SW3001	23
NICKEL	1/1	0.45 J	0.45 J	---	0.450	0.450	13SW3001	0.77 J - 6.9
POTASSIUM	1/1	4850 J	4850 J	---	4850	4850	13SW3001	2560 J - 3860 J
SODIUM	1/1	25600 J	25600 J	---	25600	25600	13SW3001	29900 J - 34300 J
TITANIUM	1/1	2.3 J	2.3 J	---	2.30	2.30	13SW3001	0.31 J
Dissolved Metals (ug/L)								
BARIUM, FILTERED	1/1	81.6 J	81.6 J	---	81.6	81.6	13SW3001-F	52.7 J - 56 J
CALCIUM, FILTERED	1/1	29000 J	29000 J	---	29000	29000	13SW3001-F	54900 J - 75800 J
COBALT, FILTERED	1/1	2.8 J	2.8 J	---	2.80	2.80	13SW3001-F	0.16 J - 3.2 J
COPPER, FILTERED	1/1	1.5 J	1.5 J	---	1.50	1.50	13SW3001-F	1 J - 1.6 J
MAGNESIUM, FILTERED	1/1	9090 J	9090 J	---	9090	9090	13SW3001-F	9630 J - 15700
MANGANESE, FILTERED	1/1	23 J	23 J	---	23.0	23.0	13SW3001-F	4.9 J - 6.1 J
NICKEL, FILTERED	1/1	1.4	1.4	---	1.40	1.40	13SW3001-F	0.87 J - 1.8
POTASSIUM, FILTERED	1/1	15100 J	15100 J	---	15100	15100	13SW3001-F	2470 J - 3550 J
SODIUM, FILTERED	1/1	9830 J	9830 J	---	9830	9830	13SW3001-F	33800 J - 35700 J
TITANIUM, FILTERED	1/1	0.6 J	0.6 J	---	0.600	0.600	13SW3001-F	0.22 J
Field Parameters								
DISSOLVED OXYGEN - METER	1/1	9.63	9.63	---	9.63	9.63	13SW3001	9.4
OXIDATION REDUCTION POTENTIAL (MV)	1/1	222.1	222.1	---	222	222	13SW3001	130 - 226.2
PH (S.U.)	1/1	7.84	7.84	---	7.84	7.84	13SW3001	7.63 - 7.88
SPECIFIC CONDUCTANCE (MS/CM)	1/1	0.395	0.395	---	0.395	0.395	13SW3001	0.448 - 457
TEMPERATURE (°C)	1/1	13.09	13.09	---	13.1	13.1	13SW3001	12.5 - 14.25
TURBIDITY (NTU)	1/1	2.6	2.6	---	2.60	2.60	13SW3001	1.1 - 119

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ND - Not detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-16

DESCRIPTIVE STATISTICS FOR
MAINSTREAM SURFACE WATER SAMPLES ROUND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Energetics (ug/L)								
HMX	3/4	1.4	2.9	0.264	1.71	2.23	13SW3002	ND
MNX	1/4	0.31 J	0.31 J	0.25 - 0.264	0.174	0.310	13SW3002	ND
RDX	3/4	1.3	9.9	0.264	4.98	6.60	13SW3002	ND
Total Metals (ug/L)								
BARIUM	1/1	57.8 J	57.8 J	---	57.8	57.8	13SW3002	53.7 J - 62.7 J
CALCIUM	1/1	50000 J	50000 J	---	50000	50000	13SW3002	55700 J - 65300 J
CHROMIUM	1/1	0.68 J	0.68 J	---	0.680	0.680	13SW3002	3.8 J
COPPER	1/1	1.3 J	1.3 J	---	1.30	1.30	13SW3002	1.1 J - 5.5
MAGNESIUM	1/1	8780 J	8780 J	---	8780	8780	13SW3002	9090 J - 14500 J
POTASSIUM	1/1	6690 J	6690 J	---	6690	6690	13SW3002	2560 J - 3860 J
SODIUM	1/1	18400 J	18400 J	---	18400	18400	13SW3002	29900 J - 34300 J
Dissolved Metals (ug/L)								
BARIUM, FILTERED	1/1	280 J	280 J	---	280	280	13SW3002-F	52.7 J - 56 J
CALCIUM, FILTERED	1/1	52400 J	52400 J	---	52400	52400	13SW3002-F	54900 J - 75800 J
CHROMIUM, FILTERED	1/1	0.6 J	0.6 J	---	0.600	0.600	13SW3002-F	ND
COPPER, FILTERED	1/1	1.2 J	1.2 J	---	1.20	1.20	13SW3002-F	1 J - 1.6 J
MAGNESIUM, FILTERED	1/1	8840 J	8840 J	---	8840	8840	13SW3002-F	9630 J - 15700
POTASSIUM, FILTERED	1/1	6780 J	6780 J	---	6780	6780	13SW3002-F	2470 J - 3550 J
SODIUM, FILTERED	1/1	18700 J	18700 J	---	18700	18700	13SW3002-F	33800 J - 35700 J
Field Parameters								
DISSOLVED OXYGEN	4/4	8.72	11.45	---	9.92	9.92	13SW3301	9.34
OXIDATION REDUCTION POTENTIAL (MV)	4/4	39.3	166.5	---	99.1	99.1	13SW3401	130 - 226.2
PH (S.U.)	4/4	7.12	7.74	---	7.44	7.44	13SW3301	7.63 - 7.88
SPECIFIC CONDUCTANCE (MS/CM)	4/4	0.347	512	---	221	221	13SW3501	0.448 - 457
TEMPERATURE (°C)	4/4	10.79	14.5	---	13.5	13.5	13SW3501	12.5 - 14.25
TURBIDITY (NTU)	4/4	1.3	5.92	---	4.18	4.18	13SW3301	1.1 - 119
Miscellaneous Parameters (mg/L)								
NITRITE/NITRATE-N	2/4	0.26	0.28	0.025	0.141	0.270	13SW3301	ND

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ND - Not detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-17

SUMMARY OF CHEMICALS DETECTED IN SUMP WATER SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	**ES/DI**	**ES/DI**
LOCATION	**13SU/SL007**	**13SU/SL009**
SAMPLE NUMBER	**13SU00701**	**13SU00901**
SAMPLE CODE	**NORMAL**	**ORIG**
SAMPLE DATE	**2/19/2006**	**2/19/2006**
Energetics (ug/L)		
2,4,6-TRINITROTOLUENE	8.3	1.6 J
2-AMINO-4,6-DINITROTOLUENE	1.1 J	0.98 J
4-AMINO-2,6-DINITROTOLUENE	3.6	2.2
HMX	79	25
RDX	630	69

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ES/DI - External Sump / Drainage Investigation
J - estimated value
µg/L - micrograms per liter

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE									0.05 U		0.05 U
BENZO(A)PYRENE									0.05 U		0.05 U
BENZO(B)FLUORANTHENE									0.05 U		0.05 U
BENZO(G,H,I)PERYLENE									0.05 U		0.05 U
BENZO(K)FLUORANTHENE									0.05 U		0.05 U
CHRYSENE									0.05 U		0.05 U
FLUORANTHENE									0.05 U		0.05 U
INDENO(1,2,3-CD)PYRENE									0.05 U		0.05 U
PHENANTHRENE									0.05 U		0.05 U
PYRENE									0.05 U		0.05 U
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE	2.3				0.53 J		0.265 U		0.5 U		0.475 U
2,6-DIAMINO-4-NITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE	0.53 J				0.435 U		0.265 U		0.5 U		0.475 U
3-NITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
4-AMINO-2,6-DINITROTOLUENE	1.4				0.52 J		0.265 U		0.5 U		0.475 U
DNX											
HMX	0.5 U				2.2		0.265 U		0.5 U		3.5
MNX											
RDX	1.5				14		0.25 U		0.47 U		5.3
TNX											
Herbicides (ug/L)											
PENTACHLOROPHENOL									0.091		0.013 U
Total Metals (ug/L)											
ALUMINUM	575 J		3080 J		4280 J		904 J		10600 J		3460 J
ARSENIC	0.51 U		1.6 J		1.5 J		0.67 U		3.4 J		1.3 J
BARIUM	112 J		184 J		71.8 J		57 J		94.5 J		56.3 J
CADMIUM	0.3 U		1.3 J		0.32 U		0.08 U		0.37 U		0.11 U
CALCIUM	47200 J		56800 J		39000 J		32800 J		30100 J		28900 J
CHROMIUM	1.2 J		16.8 J		4.6 J		1 U		15.6 J		3.5 J
COBALT	0.16 U		2.1		1.6 J		0.69 U		3.2 J		2.6 J
COPPER	5.2 J		22.8		6.1 J		3.3 J		12.2 J		3.4 J
IRON	467 J		3690		3180 J		700 J		8940 J		3060 J
LEAD	3.5 J		137 J		3.6 J		0.94 U		7.4 J		1.5 J
LITHIUM	1.3 U				4.4 J		2.2 U		9.1 J		5.9 J
MAGNESIUM	6820 J		7430 J		7180 J		7210 J		6190 J		7500 J
MANGANESE	8.2 J		63		104 J		71.7 J		66.8 J		114 J
MERCURY	0.02 U		0.04 U		0.02 U		0.02 U		0.02 U		0.02 U
NICKEL	0.89 J		5.7		3.6 J		3.9 J		7.6 J		5.4 J

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
POTASSIUM	855 J		3580 J		1630 J		2670 J		3760 J		1220 J
SELENIUM	0.21 U		0.36 U		0.29 U		0.15 U		0.28 U		0.24 U
SODIUM	2960 J		3860 J		18400 J		66800 J		16500 J		5420 J
STRONTIUM	105 J				103 J		83.7 J		74.2 J		94.7 J
TITANIUM	11.1 J				67.5 J		18.4 J		122 J		63.2 J
VANADIUM	1.3 J		6.3		7.5 J		1.8 J		18.8 J		6.6 J
ZINC	21.9 J		269 J		30.5 J		12.7 J		43.7 J		14.1 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		52.7 J		194 J		119		82.6		138	
ARSENIC, FILTERED		0.35 U		0.33 U		0.36 U		0.45 U		0.47 U	
BARIUM, FILTERED		107 J		142 J		47.9 J		50.8 J		40.9 J	
CALCIUM, FILTERED		46000 J		54200 J		38500 J		33100 J		28100 J	
CHROMIUM, FILTERED		0.4 U		0.67 U		0.57 U		0.4 U		0.48 U	
COBALT, FILTERED		0.26 U		0.088 U		0.59 U		0.55 U		0.61 U	
COPPER, FILTERED		3.2 J		2.2		2 J		2.5 J		3.8 J	
IRON, FILTERED		35.7 J		6.15 U		119 J		97 J		176 J	
LEAD, FILTERED		0.38 U		1.1 J		0.21 U		0.12 U		0.16 U	
LITHIUM, FILTERED		0.77 U				0.88 U		1.3 U		1.3 U	
MAGNESIUM, FILTERED		6590 J		6850		6690 J		7210 J		4970 J	
MANGANESE, FILTERED		2.9 J		3.8 J		14.4 J		28 J		5.3 J	
NICKEL, FILTERED		0.59 U		0.58 J		0.85 U		3.3 J		1.9 J	
POTASSIUM, FILTERED		769 J		2760 J		1100 J		2560 J		1460 J	
SELENIUM, FILTERED		0.28 U		0.26 U		0.32 U		0.15 U		0.15 U	
SODIUM, FILTERED		2950 J		4370 J		18000 J		70600 J		16300 J	
STRONTIUM, FILTERED		103 J				101 J		83.5 J		64.3 J	
TITANIUM, FILTERED		1.6 J				3.5 J		3.5 J		5.1 J	
VANADIUM, FILTERED		0.3 U		1.14 U		0.47 U		0.37 U		0.42 U	
ZINC, FILTERED		12.2 J		21.2 J		9.2 J		8.6 J		5.7 U	
Field Parameters											
DISSOLVED OXYGEN			2.83								
DISSOLVED OXYGEN - METER	11.7				9.28		9.12		10.41		10.8
OXIDATION REDUCTION POTENTIAL (MV)	95		271.200000		113		131		174		109
PH (S.U.)	7.49		6.97		7.24		7.39		7.75		7.58
SPECIFIC CONDUCTANCE (MS/CM)	0.262		829		0.28		0.496		0.181		0.203
TEMPERATURE (°C)	9.29		16.27		9.29		11		10.65		10.49
TURBIDITY (NTU)	11		9.4		59		16		298		36
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U				0.01 U		0.04 J		0.02 J		0.02 J
NITRITE/NITRATE-N	0.15 J				0.33 J		0.02 U		0.02 U		0.02 U

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE		0.22									
BENZO(A)PYRENE		0.26									
BENZO(B)FLUORANTHENE		0.38									
BENZO(G,H,I)PERYLENE		0.23									
BENZO(K)FLUORANTHENE		0.2									
CHRYSENE		0.35									
FLUORANTHENE		0.96									
INDENO(1,2,3-CD)PYRENE		0.2									
PHENANTHRENE		0.51									
PYRENE		0.65									
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2,6-DIAMINO-4-NITROTOLUENE						0.24 U				0.25 U	
2-AMINO-4,6-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
3-NITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
DNX						0.24 U				0.25 U	
HMX		2.8		0.265 U		0.67		1.2		1.2 J	
MNX						0.24 U				0.25 U	
RDX		3.6		0.29 J		0.35 J		2.8		1.4	
TNX						0.24 U				0.25 U	
Herbicides (ug/L)											
PENTACHLOROPHENOL		0.025 J									
Total Metals (ug/L)											
ALUMINUM		1740 J		19100 J		200 J		1650 J		53.4 U	
ARSENIC		0.97 U		5.8 J		0.32 U		1.2 J		1.5 J	
BARIUM		84.7 J		247 J		57.8 J		88.4 J		92 J	
CADMIUM		0.08 U		0.56 U		0.13 U		0.06 U		0.04 U	
CALCIUM		58800 J		133000 J		64400 J		59900 J		76400 J	
CHROMIUM		2 J		20.5 J		0.43 U		1.9 J		0.44 U	
COBALT		1.2 J		5.2 J		0.21 U		0.72 U		3.2 J	
COPPER		4.6 J		17.6 J		2.3 J		1.9 J		0.38 U	
IRON		1380 J		16200 J		198 J		1140 J		2750 J	
LEAD		1.9 J		29.9 J		1.6 U		1.2 U		0.09 U	
LITHIUM		2.8 J		14.3 J				1.6 U			
MAGNESIUM		10900 J		18100 J		4700 J		10500 J		14200 U	
MANGANESE		89.6 J		195 J		34.2 J		118 J		3190 J	
MERCURY		0.02 U		0.02 U		0.02 U		0.2 U		0.02 U	
NICKEL		2.4 J		12.3 J		0.67 J		2 J		1.2	

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
POTASSIUM		1330 J		4380 J		621 J		1430 J		2180 J	
SELENIUM		0.55 U		0.51 U		0.09 U		0.19 U		0.16 U	
SODIUM		55500 J		325000 J		88300 J		33100 J		19900 J	
STRONTIUM		149 J		245 J				143 J			
TITANIUM		33 J		356 J		4.7 J		24.2 J		1.3 J	
VANADIUM		3.1 J		38.1 J		0.61 U		3.2 J		0.27 U	
ZINC		9.8 J		79.3 J		10.8 J		7.8 J		17.7 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	108		57.1		56		52.8 U		24.8 U		7.6 U
ARSENIC, FILTERED	0.19 U		0.42 U		0.15 U		0.25 U		0.73 U		1 J
BARIUM, FILTERED	40 J		75.7 J		149 J		58.8 J		78.1 J		95.3 J
CALCIUM, FILTERED	28800 J		56900 J		121000 J		63400 J		5660 J		75300 J
CHROMIUM, FILTERED	0.21 U		0.38 U		0.39 U		0.22 U		0.33 U		0.26 U
COBALT, FILTERED	1.3 J		0.7 U		0.43 U		0.6 J		0.32 U		3.2 J
COPPER, FILTERED	3.5 J		2.3 J		2.2 J		1.4 J		1 U		0.3 U
IRON, FILTERED	120 J		43.4 J		26.9 U		41.6 U		14.9 U		1120 J
LEAD, FILTERED	0.28 U		0.14 U		0.18 U		0.13 U		0.2 U		0.27 U
LITHIUM, FILTERED	3.1 J		1.5 U		0.37 U				0.96 U		
MAGNESIUM, FILTERED	7210 J		11000 J		14400 J		5300 J		9870 J		13700 U
MANGANESE, FILTERED	64.9 J		63.3 J		20.4 J		28.7 J		84.4 J		3110 J
NICKEL, FILTERED	2.9 J		1.5 J		0.61 U		0.55 U		1.1 J		0.84 J
POTASSIUM, FILTERED	735 J		1080 J		1080 J		651 J		1100 J		2200 J
SELENIUM, FILTERED	0.21 U		0.59 U		0.17 U		0.09 U		0.36 U		0.14 U
SODIUM, FILTERED	5350 J		55800 J		311000 J		106000 J		3190 J		18800 J
STRONTIUM, FILTERED	88 J		142 J		219 J				140 J		
TITANIUM, FILTERED	3.2 J		1.4 J		1.1 U		1 U		1.1 U		0.59 J
VANADIUM, FILTERED	0.27 U		0.23 U		0.34 U		0.35 U		0.38 U		0.1 U
ZINC, FILTERED	19.8 J		5.3 U		3.8 U		17.4 J		3.4 J		16 U
Field Parameters											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER		9.62		8.13		5.19		6.91		6.03	
OXIDATION REDUCTION POTENTIAL (MV)		640		177		270		150.600000		-23.7	
PH (S.U.)		7.41		7.32		7.25		6.13		7.09	
SPECIFIC CONDUCTANCE (MS/CM)		0.543		1.394		0.55		0.462		0.46	
TEMPERATURE (°C)		10.44		9.8		13.27		15.18		14.71	
TURBIDITY (NTU)				352		9.12		31		19.3	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.01 U		0.03 J		0.01 U		0.07		0.4 J	
NITRITE/NITRATE-N		0.54 J		0.18 J		0.15		0.64		0.62 J	

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	02	02	01	01	02
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12	13SW/SD12	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-F	13SW1002	13SW1002-F	13SW1201	13SW1201-F	13SW1202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003	3/30/2003	10/22/2003
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
PHENANTHRENE											
PYRENE											
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE	0.65 U		0.25 U		0.55 U		0.27 U		1.9 J		0.24 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U				0.27 U				0.24 U
2-AMINO-4,6-DINITROTOLUENE	0.65 U		0.25 U		0.55 U		0.27 U		0.84 J		0.52 J
3-NITROTOLUENE	0.65 U		0.25 U		0.55 U		0.27 U		0.28 U		0.24 U
4-AMINO-2,6-DINITROTOLUENE	0.65 U		0.25 U		0.55 U		0.27 U		2 J		0.98 J
DNX			0.25 U				0.59 J				3.5 J
HMX	0.65 U		0.25 U		15 J		10		26		19
MNX			0.25 U				0.27 U				3.1
RDX	0.6 U		0.42 J		18		0.27 U		100		57
TNX			0.25 U				0.27 U				0.81
Herbicides (ug/L)											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	2700 J		139 J		2080 J		106 U		1330 J		1740 J
ARSENIC	0.91 U		0.33 U		0.8 U		0.35 U		4.2 J		2.2 J
BARIUM	38 J		61.1 J		44.1 J		49.6 J		80.7 J		68.5 J
CADMIUM	0.08 U		0.05 U		0.1 U		0.19 U		0.16 U		0.19 U
CALCIUM	18900 J		82600 J		23500 J		44600 J		55000 J		54700 J
CHROMIUM	2.5 J		0.59 U		1.9 J		0.42 U		1.8 J		3.2 J
COBALT	0.65 U		0.18 U		2.6 J		5.1 J		1.2 J		2.4 J
COPPER	3.6 J		3 J		2.2 J		1.3 J		7.2 J		4.2 J
IRON	2350 J		152 J		1740 J		406 J		1090 J		1920 J
LEAD	1.5 J		0.41 U		1.3 J		0.27 U		0.92 U		2 J
LITHIUM	1.8 U				6.6 J				2 U		
MAGNESIUM	3600 J		11400 J		6660 J		8220 J		18600 J		13000 J
MANGANESE	25 J		10.6 J		231 J		1900 J		69.9 J		292 J
MERCURY	0.02 U		0.02 U		0.02 U		0.02 U		0.02 U		0.02 U
NICKEL	2.1 J		1.1 J		4.5 J		4.7		4.5 J		5.7

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	02	02	01	01	02
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12	13SW/SD12	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-F	13SW1002	13SW1002-F	13SW1201	13SW1201-F	13SW1202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003	3/30/2003	10/22/2003
POTASSIUM	1130 J		1320 J		7750 J		730 J		97700 J		31800 J
SELENIUM	0.1 U		0.09 U		0.1 U		0.06 U		0.5 U		0.41 U
SODIUM	3020 J		9120 J		7780 J		9750 J		28300 J		16700 J
STRONTIUM	48 J				59 J				120 J		
TITANIUM	51 J		6.4 J		36.4 J		1.9 J		26.3 J		31.8
VANADIUM	4.9 J		0.57 U		3.6 J		0.3 U		5.2 J		5.1 J
ZINC	27 J		68.9 J		13.9 J		7.8 U		16.1 J		18.1 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		822		16.5 U		303		9.2 U		137	
ARSENIC, FILTERED		0.47 U		0.26 U		0.37 U		0.25 U		3.6 J	
BARIUM, FILTERED		28.4 J		62.3 J		33.7 J		46.2 J		74.6 J	
CALCIUM, FILTERED		18600 J		81400 J		24300 J		43000 J		51400 J	
CHROMIUM, FILTERED		0.89 U		0.2 U		0.55 U		0.31 U		0.67 U	
COBALT, FILTERED		0.65 U		0.63 J		1.6 J		6.5 J		1.3 J	
COPPER, FILTERED		2.1 J		1.9 J		1.2 U		0.73 J		6.6 J	
IRON, FILTERED		750 J		22.4 U		343 J		47.3 U		193 J	
LEAD, FILTERED		0.38 U		0.02 U		0.18 U		0.05 U		0.22 U	
LITHIUM, FILTERED		0.66 U				5.5 J				1.2 U	
MAGNESIUM, FILTERED		3440 J		11900 J		6610 J		7970 J		18000 J	
MANGANESE, FILTERED		9.2 J		5 J		160 J		1670 J		52.2 J	
NICKEL, FILTERED		1.1 J		0.7 J		3.3 J		4.1		3.8 J	
POTASSIUM, FILTERED		846 J		1370 J		7430 J		600 J		97700 J	
SELENIUM, FILTERED		0.08 U		0.15 U		0.13 U		0.08 U		0.44 U	
SODIUM, FILTERED		2920 J		9550 J		7840 J		9570 J		27500 J	
STRONTIUM, FILTERED		45.5 J				56.3 J				117 J	
TITANIUM, FILTERED		19.5 J		0.74 U		8 J		0.11 J		7.7 J	
VANADIUM, FILTERED		1.6 J		0.34 U		0.73 U		0.06 U		3.4 J	
ZINC, FILTERED		10.1 J		54.5 J		8.6 J		7.8 U		8.1 J	
Field Parameters											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER	9.81		8.55		9.95		3.65		11.98		9.5
OXIDATION REDUCTION POTENTIAL (MV)	120		324.400000		145		178.700000		162		233.600000
PH (S.U.)	8.48		7.8		7.74		6.17		7.92		7.51
SPECIFIC CONDUCTANCE (MS/CM)	0.138		0.436		0.199		0.27		0.64		0.427
TEMPERATURE (°C)	11		11.8		9.3		12.77		6.85		12.25
TURBIDITY (NTU)	45		5.13		150		1.98		17		6
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 J		0.01		0.08 J		0.03 J		0.88 J		0.005 UJ
NITRITE/NITRATE-N	0.02 U		0.18		0.46 J		0.025 U		5.8 J		0.13 U

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	01	01	02	02	02	02	03	02	02	03
LOCATION	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15
SAMPLE NUMBER	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-F	13SW1401	13SW1401-F	13SW1402	13SW1501	13SW1501-F	13SW1502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	ORIG	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
PHENANTHRENE											
PYRENE											
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE		6.8		0.24 U		0.24 U		0.42 J	0.24 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE				0.44 J		0.24 U		0.248 U	0.24 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE		1.6 J		8.3 J		1.3		1 J	0.24 U		0.26 J
3-NITROTOLUENE		0.6 U		0.31 J		0.24 U		0.248 U	0.24 U		0.25 U
4-AMINO-2,6-DINITROTOLUENE		3.8 J		21 J		2.9		2.5	0.24 U		0.62
DNX				4.2 J		2.7 J		1	23 J		1.8 J
HMX		14		33 J		20		18	210		160
MNX				5.2 J		3.8 J		1.9	47		22
RDX		84		180 J		77		97	1500		1000
TNX				1.1 J		0.62 J		0.248 U	4		0.74 J
Herbicides (ug/L)											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		714 J		167 J		202 J			3760 J		
ARSENIC		0.95 U		1.3 J		0.85 J			4 J		
BARIUM		58.8 J		94.3 J		78.6 J			91.3 J		
CADMIUM		0.11 U		0.12 U		0.04 U			0.3 U		
CALCIUM		38700 J		74800 J		36700 J			21900 J		
CHROMIUM		0.98 U		0.69 U		1 U			8.1 J		
COBALT		1.9 J		1.2 J		0.19 U			9 J		
COPPER		2.4 J		3.8 J		2.8 J			18 J		
IRON		673 J		337 J		147 U			6220 J		
LEAD		0.77 U		0.24 U		0.15 U			9.7 J		
LITHIUM		3.9 J									
MAGNESIUM		7480 J		12600 J		10100 J			9300 J		
MANGANESE		107 J		170 J		26.1 J			516 J		
MERCURY		0.02 U		0.02 U		0.02 U			0.047 J		
NICKEL		3.8 J		6.3		1.9			22 J		

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	01	01	02	02	02	02	03	02	02	03
LOCATION	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15
SAMPLE NUMBER	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-F	13SW1401	13SW1401-F	13SW1402	13SW1501	13SW1501-F	13SW1502
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	ORIG	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004
POTASSIUM		15100 J		42400 J		36000 J			30000 J		
SELENIUM		0.15 U		0.36 U		0.21 U			0.31 U		
SODIUM		8900 J		16700 J		10600 J			6640 J		
STRONTIUM		94.3 J									
TITANIUM		11.6 J		3.6 J		4.5 J			56.7 J		
VANADIUM		1.8 J		1.1 J		0.92 J			8.4 J		
ZINC		21.2 J		18.3 J		2.5 U			54.1 J		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	43.2 U		103		35.3 U		36.8 U			255 J	
ARSENIC, FILTERED	1.4 J		0.66 U		1.2 J		0.8 J			0.64 J	
BARIUM, FILTERED	51.7 J		53.7 J		94.5 J		75.9 J			40.5 J	
CALCIUM, FILTERED	54500 J		37900 J		73100 J		39800 J			20400 J	
CHROMIUM, FILTERED	0.72 U		0.27 U		0.63 U		0.5 U			0.59 U	
COBALT, FILTERED	2.9 J		1.7 J		1 J		0.21 U			0.97 J	
COPPER, FILTERED	2.5 J		1.9 J		3.5 J		2.7 J			3.8 J	
IRON, FILTERED	44.2 U		82.5 J		122 U		46 U			211 J	
LEAD, FILTERED	0.13 U		0.08 U		0.09 U		0.08 U			0.17 U	
LITHIUM, FILTERED			3.5 J								
MAGNESIUM, FILTERED	12900 J		7630 J		12300 J		10700 J			8560 J	
MANGANESE, FILTERED	119 J		88.3 J		141 J		10 J			4 J	
NICKEL, FILTERED	3.2		3.2 J		6.2		1.8			3.8 J	
POTASSIUM, FILTERED	31100 J		15100 J		42100 J		39900 J			28600 J	
SELENIUM, FILTERED	0.28 U		0.18 U		0.36 U		0.24 U			0.26 U	
SODIUM, FILTERED	16500 J		9160 J		16400 J		11400 J			7110 J	
STRONTIUM, FILTERED			91.8 J								
TITANIUM, FILTERED	1.5 J		3 J		0.55 J		1 J			6.5 J	
VANADIUM, FILTERED	1.2 J		0.67 U		0.75 J		0.6 J			0.69 J	
ZINC, FILTERED	4.1 U		13.1 J		15.4 U		2.3 U			14.1 J	
Field Parameters											
DISSOLVED OXYGEN								10.3			11.97
DISSOLVED OXYGEN - METER		12.32		2.19		5.93			10.59		
OXIDATION REDUCTION POTENTIAL (MV)		157		255.600000		224.700000		81.7	290.5		101.4
PH (S.U.)		8.07		7.42		7.33		7.45	7.43		7.41
SPECIFIC CONDUCTANCE (MS/CM)		0.26		0.531		0.365		0.702	0.251		0.361
TEMPERATURE (C)		6.52		13.33		12.14		14.69	8.93		14.22
TURBIDITY (NTU)		12.6		3		4.4		12.8	10.4		23.8
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.14 J		0.04 J		0.005 UJ			0.01		
NITRITE/NITRATE-N		1.6 J		3.6 J		0.54 J		7.4	0.14		3.4

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	02	02	02	02	02	02
LOCATION	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22
SAMPLE NUMBER	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
CHRYSENE											
FLUORANTHENE											
INDENO(1,2,3-CD)PYRENE											
PHENANTHRENE											
PYRENE											
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE	0.25 U		0.24 U	0.25 U		0.24 U		0.27 U		0.26 U	
2,6-DIAMINO-4-NITROTOLUENE	0.25 U		0.24 U	0.25 U		0.24 U		0.27 U		0.26 U	
2-AMINO-4,6-DINITROTOLUENE	0.8 J		0.35 J	0.25 U		0.24 U		0.27 U		0.26 U	
3-NITROTOLUENE	0.29 J		0.24 U	0.25 U		0.24 U		0.27 U		0.26 U	
4-AMINO-2,6-DINITROTOLUENE	1.6		0.83	0.25 U		0.24 U		0.27 U		0.26 U	
DNX	3.6 J		0.24 U	0.25 U		0.24 U		0.27 U		0.26 U	
HMX	21		15	0.25 U		0.24 U		0.27 U		0.26 U	
MNX	3		1.2	0.25 U		0.24 U		0.27 U		0.26 U	
RDX	50		43	0.25 U		0.24 U		0.46 J		1.6	
TNX	0.48 J		0.24 U	0.25 U		0.24 U		0.27 U		0.26 U	
Herbicides (ug/L)											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	5690 J			68.2 U		95.4 U		437 J		392 J	
ARSENIC	1.4 J			0.14 U		0.19 U		0.24 U		0.26 U	
BARIUM	101 J			57 J		50.1 J		55.6 J		77.7 J	
CADMIUM	0.06 U			0.04 U		0.04 U		0.04 U		0.04 U	
CALCIUM	29000 J			43800 J		72500 J		3040 J		62300 J	
CHROMIUM	8.2 J			0.39 U		0.58 U		0.95 U		0.45 U	
COBALT	1.1 J			0.07 U		0.39 U		0.33 U		0.47 J	
COPPER	3.1 J			0.56 U		0.89 J		1.3 J		1.3 J	
IRON	3600 J			47.8 U		74.8 U		455 J		116 U	
LEAD	1.8 J			0.07 U		0.13 U		0.35 U		0.31 U	
LITHIUM											
MAGNESIUM	7980 J			8940 J		15600 J		836 J		8520 J	
MANGANESE	61.4 J			19.5 J		26 J		41.4 J		136 J	
MERCURY	0.02 U			0.02 U		0.02 U		0.02 U		0.02 U	
NICKEL	5.2			0.86 J		1.5		1.2		1.6	

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	02	02	02	02	02	02
LOCATION	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22
SAMPLE NUMBER	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003
POTASSIUM	17500 J			1800 J		2960 J		1980 J		2190 J	
SELENIUM	0.13 U			0.12 U		0.09 U		0.08 U		0.13 U	
SODIUM	8500 J			28900 J		41500 J		2260 J		29200 J	
STRONTIUM											
TITANIUM	69.3			1.9 J		1.7 J		6.4		1.9 J	
VANADIUM	12 J			0.19 U		0.22 U		1.1 J		0.42 J	
ZINC	20.3 J			2.1 U		13.1 U		7.9 U		9.7 U	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		134 J			33.1 U		8.9 U		19.4 U		7.6 U
ARSENIC, FILTERED		0.26 U			0.09 U		0.11 U		0.13 U		0.2 U
BARIUM, FILTERED		70.1 J			58 J		50 J		55.2 J		57.8 J
CALCIUM, FILTERED		28900 J			43600 J		73800 J		30500 J		61300 J
CHROMIUM, FILTERED		0.63 U			0.36 U		0.41 U		0.32 U		0.3 U
COBALT, FILTERED		3.3 J			2.7 J		0.26 U		2.8 J		1.3 J
COPPER, FILTERED		1.5 J			0.57 J		0.46 U		0.73 J		0.95 J
IRON, FILTERED		114 U			13.8 U		7 U		11.6 U		9 U
LEAD, FILTERED		0.11 U			0.04 U		0.04 U		0.06 U		0.07 U
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		8100 J			8610 J		15400 J		8290 J		8250 J
MANGANESE, FILTERED		25.9 J			17.8 J		5.9 J		30.5 J		25.3 J
NICKEL, FILTERED		1.2			0.96 J		0.85 J		0.96 J		0.97 J
POTASSIUM, FILTERED		16200 J			1780 J		2920 J		2000 J		2100 J
SELENIUM, FILTERED		0.12 U			0.13 U		0.08 U		0.07 U		0.09 U
SODIUM, FILTERED		9450 J			28200 J		41300 J		22100 J		29400 J
STRONTIUM, FILTERED											
TITANIUM, FILTERED		3.7 J			1.2 J		0.76 J		0.27 J		0.2 J
VANADIUM, FILTERED		0.44 J			0.12 U		0.07 U		0.1 U		0.2 U
ZINC, FILTERED		8.9 U			2.4 U		2.2 U		9.5 U		4.4 U
Field Parameters											
DISSOLVED OXYGEN			11.63								
DISSOLVED OXYGEN - METER	8.48			7.19		6.03		4.39		3.71	
OXIDATION REDUCTION POTENTIAL (MV)	213.700000		71.5	175.600000		203.5		158.3		264.700000	
PH (S.U.)	7.17		7.61	7.12		7.25		7.75		7.02	
SPECIFIC CONDUCTANCE (MS/CM)	0.254		0.297	0.347		0.566		0.3		0.434	
TEMPERATURE (°C)	12.18		14.56	12.11		11.69		13.22		13.65	
TURBIDITY (NTU)	6.5		12.7	1.03		1.93		6.25		1.5	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.005 UJ			0.005 UJ		0.04 J		0.005 UJ		0.005 UJ	
NITRITE/NITRATE-N	0.66 J		1.3	0.025 U		0.13 U		0.11 U		0.025 U	

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	02	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29
SAMPLE NUMBER	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501	13SW2501-F	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	DRY
SAMPLE DATE	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004
Semivolatile Organics (ug/L)											
BENZO(A)ANTHRACENE					0.049 U						
BENZO(A)PYRENE					0.049 UJ						
BENZO(B)FLUORANTHENE					0.049 U						
BENZO(G,H,I)PERYLENE					0.049 U						
BENZO(K)FLUORANTHENE					0.049 U						
CHRYSENE					0.049 U						
FLUORANTHENE					0.049 U						
INDENO(1,2,3-CD)PYRENE					0.049 U						
PHENANTHRENE					0.049 U						
PYRENE					0.049 U						
Energetics (ug/L)											
2,4,6-TRINITROTOLUENE			0.26 U		0.25 U		0.25 U		0.26 U		
2,6-DIAMINO-4-NITROTOLUENE			0.26 U		0.25 U		0.25 U		0.26 U		
2-AMINO-4,6-DINITROTOLUENE			0.26 U		0.25 U		0.25 U		0.26 U		
3-NITROTOLUENE			0.26 U		0.25 U		0.25 U		0.26 U		
4-AMINO-2,6-DINITROTOLUENE			0.26 U		0.25 U		0.25 U		0.46 J		
DNX			0.26 U		0.25 U		0.25 U		0.86		
HMX			0.26 U		0.25 U		0.25 U		8.2		
MNX			0.26 U		0.25 U		0.25 U		1.2 J		
RDX			0.26 U		0.25 U		0.25 U		22		
TNX			0.26 U		0.25 U		0.25 U		0.26 U		
Herbicides (ug/L)											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	680 J		482 J		41.9 U		108 J		139 J		
ARSENIC	0.45 U		0.38 U		0.11 U		0.15 U		0.48 U		
BARIUM	42.5 J		47.3 J		50.7 J		62.5 J		54.6 J		
CADMIUM	0.039 U		0.04 U		0.04 U		0.04 U		0.04 U		
CALCIUM	33000 J		17200 J		28100 J		27900 J		26400 J		
CHROMIUM	1 J		0.62 U		0.19 U		0.6 U		0.6 U		
COBALT	0.26 U		0.52 U		0.07 U		0.11 U		0.18 U		
COPPER	3 J		3.4 J		0.89 U		1.3 J		2.2 J		
IRON	767 J		432 J		34.7 U		75.4 U		162 U		
LEAD	0.6 U		0.78 U		0.07 U		0.76 U		0.22 U		
LITHIUM											
MAGNESIUM	5530 J		4770 J		7540 J		6930 J		8260 J		
MANGANESE	9.4 U		111 J		7.5 J		14.2 J		28.1 J		
MERCURY	0.03 U		0.02 U		0.02 U		0.02 U		0.02 U		
NICKEL	2 U		1.8 J		0.76 J		2.5 J		1.3		

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	03	03	02	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29
SAMPLE NUMBER	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501	13SW2501-F	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	DRY
SAMPLE DATE	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004
POTASSIUM	2130 J		3310 J		1700 J		1750 J		20400 J		
SELENIUM	0.2 U		0.12 U		0.04 U		0.09 U		0.11 U		
SODIUM	8920 J		17200 J		13900 J		16200 J		9470 J		
STRONTIUM											
TITANIUM			6.7 J		0.73 U		2.2 J		2 J		
VANADIUM	1.3 J		0.88 J		0.11 U		0.27 U		0.55 J		
ZINC	6.3 U		9.4 J		6.8 J		12.3 J		2.7 U		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		26.4 U		217 J		9.9 U		156 J		11 U	
ARSENIC, FILTERED		0.23 U		0.18 U		0.11 U		0.17 U		0.42 U	
BARIUM, FILTERED		39.8 J		44.5 J		55.1 J		65.2 J		54.8 J	
CALCIUM, FILTERED		33100 J		17500 J		28200 J		28800 J		26300 J	
CHROMIUM, FILTERED		0.46 U		0.46 U		0.13 U		0.46 U		0.38 U	
COBALT, FILTERED		0.088 U		0.77 J		0.52 U		0.64 J		3.1 J	
COPPER, FILTERED		2.5 J		1.9 J		0.81 U		1.9 J		1.9 J	
IRON, FILTERED		43 U		137 J		6.2 U		75.9 U		15.8 U	
LEAD, FILTERED		0.23 U		0.09 U		0.02 U		0.19 U		0.09 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		5410 J		4860 J		7720 J		7130 J		8050 J	
MANGANESE, FILTERED		3.5 U		59.3 J		2.1 U		11.7 J		13.3 J	
NICKEL, FILTERED		1.5 U		1.4 J		0.89 J		2.4 J		1.4	
POTASSIUM, FILTERED		2080 J		3310 J		1760 J		1810 J		20700 J	
SELENIUM, FILTERED		0.23 U		0.04 U		0.04 U		0.1 U		0.11 U	
SODIUM, FILTERED		8840 J		18000 J		14600 J		16800 J		9250 J	
STRONTIUM, FILTERED											
TITANIUM, FILTERED				4.8 J		0.34 U		2.8 J		0.1 J	
VANADIUM, FILTERED		1.14 U		0.39 U		0.06 U		0.37 U		0.24 U	
ZINC, FILTERED		3 U		11.4 J		6.9 J		6.6 J		2.1 U	
Field Parameters											
DISSOLVED OXYGEN	10.84										
DISSOLVED OXYGEN - METER			8.29		8.64		6.7		8.2		
OXIDATION REDUCTION POTENTIAL (MV)	74.1		261.700000		288		341.3		257.1		
PH (S.U.)	7.7		7.65		7.63		6.87		7.58		
SPECIFIC CONDUCTANCE (MS/CM)	0.205		0.207		0.262		0.26		0.264		
TEMPERATURE (°C)	15.14		10.52		10.95		12.25		13.43		
TURBIDITY (NTU)	21.3		22.7		0		8.04		4		
Miscellaneous Parameters (mg/L)											
AMMONIA-N			0.04		0.01 U		0.01 U		0.005 UJ		
NITRITE/NITRATE-N			200		0.05 U		0.39		0.26 J		

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	01	01	02	02	02	02	03	03
LOCATION	13SW/SD32	13SW11	13SW11	13SW11	13SW11	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28
SAMPLE NUMBER	13SW3201	13SW1101	13SW1101-F	13SW1102	13SW1102-F	13SW2801	13SW2801-F	13SW2802	13SW2802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG
SAMPLE DATE	10/24/2003	5/8/2003	5/8/2003	11/18/2003	11/18/2003	10/27/2003	10/27/2003	10/26/2004	10/26/2004
Semivolatile Organics (ug/L)									
BENZO(A)ANTHRACENE	0.2 J								
BENZO(A)PYRENE	0.27 J								
BENZO(B)FLUORANTHENE	0.4 J								
BENZO(G,H,I)PERYLENE	0.22 J								
BENZO(K)FLUORANTHENE	0.19 J								
CHRYSENE	0.33 J								
FLUORANTHENE	0.77 J								
INDENO(1,2,3-CD)PYRENE	0.21 J								
PHENANTHRENE	0.32 J								
PYRENE	0.58 J								
Energetics (ug/L)									
2,4,6-TRINITROTOLUENE		0.21 U		0.287 U		0.24 U			
2,6-DIAMINO-4-NITROTOLUENE				0.287 U		0.24 U			
2-AMINO-4,6-DINITROTOLUENE		0.25 R		0.9 J		0.24 U			
3-NITROTOLUENE		0.21 U		0.287 U		0.24 U			
4-AMINO-2,6-DINITROTOLUENE		1 J		4.5 J		0.24 U			
DNX				35		0.24 U			
HMX		93		730		0.24 U			
MNX				72		0.24 U			
RDX		610		5500		0.24 U			
TNX				4		0.24 U			
Herbicides (ug/L)									
PENTACHLOROPHENOL									
Total Metals (ug/L)									
ALUMINUM		3080 J		7250 J		486 J		1770 J	
ARSENIC		35.7 J		8.4 J		0.35 U		0.8 J	
BARIUM		25.3 J		53.3 J		58.1 J		58.2 J	
CADMIUM		0.29 U		0.24 U		0.06 U		0.04 U	
CALCIUM		95400 J		45800 J		6550 J		5060 J	
CHROMIUM		4.5 J		8 J		0.82 J		2.2 J	
COBALT		9.4 J		3.2 J		0.26 U		0.67 U	
COPPER		27.1 J		13.9 J		1.3 J		2.2 J	
IRON		2340 J		6180 J		415 J		1600 J	
LEAD		2.3 J		3.5 J		0.45 U		1.1 U	
LITHIUM		2.9 J							
MAGNESIUM		92200 J		15200 J		3600 J		2830 J	
MANGANESE		126 J		64 J		122 J		60.1 J	
MERCURY		0.2 U		0.007 U		0.02 U		0.03 U	
NICKEL		20.4 J		8.1 J		2.3 J		4.3 U	

TABLE 3-18

SUMMARY OF CHEMICALS DETECTED IN
GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	01	01	02	02	02	02	03	03
LOCATION	13SW/SD32	13SW11	13SW11	13SW11	13SW11	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28
SAMPLE NUMBER	13SW3201	13SW1101	13SW1101-F	13SW1102	13SW1102-F	13SW2801	13SW2801-F	13SW2802	13SW2802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG
SAMPLE DATE	10/24/2003	5/8/2003	5/8/2003	11/18/2003	11/18/2003	10/27/2003	10/27/2003	10/26/2004	10/26/2004
POTASSIUM		690000 J		126000 J		1800 J		2920 J	
SELENIUM		2 J		0.62 U		0.06 U		0.094 U	
SODIUM		72500 J		17000 J		1540 J		1380 U	
STRONTIUM		82.4 J							
TITANIUM		64.6 J		96.9 J		10.1 J			
VANADIUM		43.5 J		16.6 J		0.89 J		2.9	
ZINC		67.9 J		47.4 J		8.8 J		8.2 U	
Dissolved Metals (ug/L)									
ALUMINUM, FILTERED			212 J		283 J		254 J		938 J
ARSENIC, FILTERED			35.3 J		6.7 J		0.16 U		0.44 U
BARIUM, FILTERED			10.1 J		22 J		54.1 J		51.7 J
CALCIUM, FILTERED			94400 J		43300 J		6680 J		5120 J
CHROMIUM, FILTERED			2 J		1.5 U		0.44 U		1 J
COBALT, FILTERED			8.8 J		4.9 J		0.79 J		0.3 U
COPPER, FILTERED			26.4 J		8.3 J		0.93 U		1.5 J
IRON, FILTERED			337 J		356 J		155 J		645 J
LEAD, FILTERED			0.26 U		0.32 U		0.16 U		0.48 U
LITHIUM, FILTERED			1.3 U						
MAGNESIUM, FILTERED			92900 J		15000 J		3770 J		2740 J
MANGANESE, FILTERED			72.5 J		10.7 U		112 J		39.4 U
NICKEL, FILTERED			18.6 J		4 J		1.8 J		3.1 U
POTASSIUM, FILTERED			700000 J		125000 J		1850 J		2700 J
SELENIUM, FILTERED			2.2 J		0.46 U		0.04 U		0.094 U
SODIUM, FILTERED			73200 J		17600 J		1660 J		1450 U
STRONTIUM, FILTERED			79.9 J						
TITANIUM, FILTERED			18.6 J		8.7 J		5.3 J		
VANADIUM, FILTERED			38.5 J		6 J		0.4 U		1.14 U
ZINC, FILTERED			30.6 J		9.3 J		18.6 J		5.1 U
Field Parameters									
DISSOLVED OXYGEN								8.05	
DISSOLVED OXYGEN - METER	9.15	4.35		4.99		7.97			
OXIDATION REDUCTION POTENTIAL (MV)	201.5	152.9		216		330.8		49	
PH (S.U.)	6.99	7.67		6.9		6.37		7.99	
SPECIFIC CONDUCTANCE (MS/CM)	0.578	2.743		1.024		0.073		0.059	
TEMPERATURE (°C)	10.33	16.45		15.2		8.84		13.75	
TURBIDITY (NTU)	44	85		242		221		56.4	
Miscellaneous Parameters (mg/L)									
AMMONIA-N		3.4		0.26 J		0.01 U			
NITRITE/NITRATE-N		23		8.5 J		4			

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.

J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-19

SUMMARY OF CHEMICALS DETECTED IN
MAINSTREAM SURFACE WATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	03	02	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
Energetics (ug/L)											
HMX	3.2 J		2.9		2.4	1.4	0.264 U	0.27 U			
MNX	0.28 J		0.31 J		0.258 U	0.25 U	0.264 U	0.27 U			
RDX	6.2		9.9		8.6	1.3	0.264 U	0.27 U			
Total Metals (ug/L)											
ALUMINUM	40.9 U		68.7 U					30.6 U		1910 J	
ARSENIC	0.3 U		0.31 U					0.23 U		1.7 J	
BARIUM	54.1 J		57.8 J					53.7 J		62.7 J	
CALCIUM	54800 J		50000 J					55700 J		65300 J	
CHROMIUM	0.84 U		0.68 J					0.85 U		3.8 J	
COBALT	0.07 U		0.16 U					0.34 U		1.3	
COPPER	1.4 J		1.3 J					1.1 J		5.5	
IRON	175 J		70.1 U					24.5 U		2460	
LEAD	0.12 U		0.11 U					0.09 U		1.3 J	
MAGNESIUM	9770 J		8780 J					9090 J		14500 J	
MANGANESE	7.9 J		5.3 U					2 U		23	
NICKEL	0.45 J		0.93 U					0.77 J		6.9	
POTASSIUM	4850 J		6690 J					2560 J		3860 J	
SODIUM	25600 J		18400 J					34300 J		29900 J	
TITANIUM	2.3 J							0.31 J			
VANADIUM	0.22 U		1.14 U					0.16 U		3.6	
ZINC	2.1 U		2.9 U					6.8 U		29.5 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		20.9 U		29.2 U					7.6 U		101 J
BARIUM, FILTERED		81.6 J		280 J					52.7 J		56 J
CALCIUM, FILTERED		29000 J		52400 J					54900 J		75800 J
CHROMIUM, FILTERED		0.3 U		0.6 J					0.73 U		0.49 U
COBALT, FILTERED		2.8 J		0.088 U					3.2 J		0.16 J
COPPER, FILTERED		1.5 J		1.2 J					1 J		1.6 J
IRON, FILTERED		29.1 U		6.3 U					5.7 U		101
MAGNESIUM, FILTERED		9090 J		8840 J					9630 J		15700
MANGANESE, FILTERED		23 J		3 U					6.1 J		4.9 J
NICKEL, FILTERED		1.4		0.84 U					0.87 J		1.8
POTASSIUM, FILTERED		15100 J		6780 J					2470 J		3550 J
SODIUM, FILTERED		9830 J		18700 J					33800 J		35700 J
TITANIUM, FILTERED		0.6 J							0.22 J		

TABLE 3-19

SUMMARY OF CHEMICALS DETECTED IN
MAINSTREAM SURFACE WATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	03	02	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
Field Parameters											
DISSOLVED OXYGEN			9.44		11.45	10.05	8.72			9.34	
DISSOLVED OXYGEN - METER	9.63							9.4			
OXIDATION REDUCTION POTENTIAL (MV)	222.100000		39.6		39.3	166.5	151	226.200000		130	
PH (S.U.)	7.84		7.52		7.74	7.12	7.39	7.88		7.63	
SPECIFIC CONDUCTANCE (MS/CM)	0.395		0.359		0.347	373	512	0.448		457	
TEMPERATURE (°C)	13.09		14.39		14.28	10.79	14.5	14.25		12.5	
TURBIDITY (NTU)	2.6		5.69		5.92	1.3	3.8	1.1		119	
Miscellaneous Parameters (mg/L)											
NITRITE/NITRATE-N	0.025 U		0.26		0.28	0.025 U	0.025 U	0.025 U			

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Mainstream surface water samples were only collected in Rounds 2 and 3.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-20

DESCRIPTIVE STATISTICS FOR
SEEP SAMPLES ROUND 2 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
1,3,5-TRINITROBENZENE	1/4	0.47	0.47	0.25 - 0.26	0.214	0.470	13SP0301
2-AMINO-4,6-DINITROTOLUENE	1/4	1.1 J	1.1 J	0.24 - 0.26	0.369	1.10	13SP0201
3-NITROTOLUENE	1/4	0.35 J	0.35 J	0.24 - 0.26	0.181	0.350	13SP0201
4-AMINO-2,6-DINITROTOLUENE	1/4	2.3	2.3	0.24 - 0.26	0.669	2.30	13SP0201
DNX	2/4	2.5	3 J	0.24 - 0.25	1.44	2.75	13SP0101
HMX	2/4	9 J	20	0.24 - 0.25	7.31	14.5	13SP0201
MNX	2/4	2.2	4	0.24 - 0.25	1.61	3.10	13SP0201
RDX	3/4	1.9 J	77	0.24	25.0	33.3	13SP0201
TNX	2/4	0.45 J	0.59	0.24 - 0.25	0.321	0.520	13SP0201
Total Metals (ug/L)							
ALUMINUM	4/4	142 J	2670 J	---	875	875	13SP0301
ARSENIC	3/4	0.69 J	1.3 J	0.21	0.774	0.997	13SP0301
BARIUM	4/4	64.4 J	114 J	---	92.2	92.2	13SP0401
CALCIUM	4/4	29200 J	89700 J	---	49025	49025	13SP0301
CHROMIUM	1/4	4 J	4 J	0.47 - 1.6	1.37	4.00	13SP0301
COBALT	2/4	0.97 J	5.8 J	0.11 - 0.23	1.74	3.39	13SP0401
COPPER	4/4	1.4 J	3.6 J	---	2.58	2.58	13SP0201
IRON	2/4	922 J	2070 J	91.4 - 143	777	1496	13SP0301
LEAD	2/4	1.4 J	1.9 J	0.2 - 0.31	0.889	1.65	13SP0401
MAGNESIUM	3/4	8910 J	11600 J	8750	8746	10203	13SP0301
MANGANESE	4/4	5.8 J	3910 J	---	995	995	13SP0401
NICKEL	4/4	1.2	8.7	---	3.73	3.73	13SP0401
POTASSIUM	4/4	2730 J	38200 J	---	14778	14778	13SP0201
SODIUM	4/4	9370 J	20000 J	---	13943	13943	13SP0401
TITANIUM	4/4	1.5 J	32.4	---	11.0	11.0	13SP0301
VANADIUM	3/4	0.98 J	5.4 J	0.35	2.01	2.63	13SP0301
Dissolved Metals (ug/L)							
ARSENIC, FILTERED	1/4	1.1 J	1.1 J	0.16 - 0.23	0.353	1.10	13SP0201-F
BARIUM, FILTERED	4/4	55.3 J	91.7 J	---	70.6	70.6	13SP0301-F
CALCIUM, FILTERED	4/4	38900 J	87900 J	---	55000	55000	13SP0301-F
COBALT, FILTERED	4/4	1.3 J	3.6 J	---	2.73	2.73	13SP0401-F
COPPER, FILTERED	4/4	0.69 J	3.2 J	---	1.37	1.37	13SP0201-F
MAGNESIUM, FILTERED	4/4	8370 J	12900 J	---	10535	10535	13SP0301-F
MANGANESE, FILTERED	3/4	7.8 J	1090 J	2.7	280	372	13SP0401-F
NICKEL, FILTERED	4/4	0.46 J	4.8	---	2.02	2.02	13SP0401-F
POTASSIUM, FILTERED	4/4	2150 J	38500 J	---	11918	11918	13SP0201-F
SODIUM, FILTERED	4/4	11400 J	25700 J	---	18750	18750	13SP0101-F
TITANIUM, FILTERED	4/4	0.11 J	0.94 J	---	0.553	0.553	13SP0201-F
VANADIUM, FILTERED	1/4	0.57 J	0.57 J	0.13 - 0.23	0.208	0.570	13SP0201-F

TABLE 3-20

DESCRIPTIVE STATISTICS FOR
SEEP SAMPLES ROUND 2 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
Field Parameters							
DISSOLVED OXYGEN - METER (µg/L)	4/4	3.6	9.79	---	6.17	6.17	13SP0201
OXIDATION REDUCTION POTENTIAL (MV)	4/4	202.6	283.7	---	231	231	13SP0401
PH (S.U.)	4/4	6.44	7.7	---	6.99	6.99	13SP0201
SPECIFIC CONDUCTANCE (MS/CM)	4/4	0.307	0.509	---	0.378	0.378	13SP0301
TEMPERATURE (°C)	4/4	11.81	14.54	---	13.1	13.1	13SP0301
TURBIDITY (NTU)	4/4	0.01	40	---	11.9	11.9	13SP0301
Miscellaneous Parameters (ug/L)							
AMMONIA-N	1/4	0.02 J	0.02 J	0.005	0.00688	0.0200	13SP0301
NITRITE/NITRATE-N	1/4	0.58 J	0.58 J	0.025 - 0.06	0.163	0.580	13SP0201

Seep samples were only collected in sampling Round 2.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-21

SUMMARY OF CHEMICALS DETECTED IN
SEEP SAMPLES ROUND 2 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

SAMPLING ROUND	02	02	02	02	02	02	02	02
LOCATION	13SP01	13SP01	13SP02	13SP02	13SP03	13SP03	13SP04	13SP04
SAMPLE NUMBER	13SP0101	13SP0101-F	13SP0201	13SP0201-F	13SP0301	13SP0301-F	13SP0401	13SP0401-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
Energetics (ug/L)								
1,3,5-TRINITROBENZENE	0.26 U		0.26 U		0.47		0.25 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U		1.1 J		0.24 U		0.25 U	
3-NITROTOLUENE	0.26 U		0.35 J		0.24 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U		2.3		0.24 U		0.25 U	
DNX	3 J		2.5		0.24 U		0.25 U	
HMX	9 J		20		0.24 U		0.25 U	
MNX	2.2		4		0.24 U		0.25 U	
RDX	21		77		0.24 U		1.9 J	
TNX	0.45 J		0.59		0.24 U		0.25 U	
Total Metals (ug/L)								
ALUMINUM	142 J		220 J		2670 J		468 J	
ARSENIC	0.21 U		1 J		1.3 J		0.69 J	
BARIUM	83.5 J		64.4 J		107 J		114 J	
CALCIUM	29200 J		39100 J		89700 J		38100 J	
CHROMIUM	0.47 U		1.6 U		4 J		0.86 U	
COBALT	0.11 U		0.23 U		0.97 J		5.8 J	
COPPER	1.4 J		3.6 J		2.4 J		2.9 J	
IRON	91.4 U		143 U		2070 J		922 J	
LEAD	0.2 U		0.31 U		1.4 J		1.9 J	
MAGNESIUM	8910 J		10100 J		11600 J		8750 U	
MANGANESE	5.8 J		15.6 J		49.1 J		3910 J	
NICKEL	1.2		1.9		3.1		8.7	
POTASSIUM	15300 J		38200 J		2880 J		2730 J	
SODIUM	9370 J		10400 J		16000 J		20000 J	
TITANIUM	1.5 J		2 J		32.4		8	
VANADIUM	0.35 U		0.98 J		5.4 J		1.5 J	
Dissolved Metals (ug/L)								
ARSENIC, FILTERED		0.23 U		1.1 J		0.16 U		0.23 U
BARIUM, FILTERED		55.3 J		62.7 J		91.7 J		72.6 J
CALCIUM, FILTERED		53700 J		39500 J		87900 J		38900 J
COBALT, FILTERED		1.3 J		3 J		3 J		3.6 J
COPPER, FILTERED		0.87 J		3.2 J		0.7 J		0.69 J
MAGNESIUM, FILTERED		9970 J		10900 J		12900 J		8370 J
MANGANESE, FILTERED		2.7 U		7.8 J		18.9 J		1090 J
NICKEL, FILTERED		0.46 J		1.8		1 J		4.8
POTASSIUM, FILTERED		4720 J		38500 J		2150 J		2300 J

TABLE 3-21

SUMMARY OF CHEMICALS DETECTED IN
SEEP SAMPLES ROUND 2 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 2

SAMPLING ROUND	**02**	**02**	**02**	**02**	**02**	**02**	**02**	**02**
LOCATION	**13SP01**	**13SP01**	**13SP02**	**13SP02**	**13SP03**	**13SP03**	**13SP04**	**13SP04**
SAMPLE NUMBER	**13SP0101**	**13SP0101-F**	**13SP0201**	**13SP0201-F**	**13SP0301**	**13SP0301-F**	**13SP0401**	**13SP0401-F**
SAMPLE CODE	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
SAMPLE DATE	**10/22/2003**	**10/22/2003**	**10/22/2003**	**10/22/2003**	**10/22/2003**	**10/22/2003**	**10/22/2003**	**10/22/2003**
SODIUM, FILTERED		25700 J		11400 J		18000 J		19900 J
TITANIUM, FILTERED		0.11 J		0.94 J		0.69 J		0.47 J
VANADIUM, FILTERED		0.16 U		0.57 J		0.23 U		0.13 U
Field Parameters								
DISSOLVED OXYGEN - METER (µg/L)	3.6		9.79		5.28		6.02	
OXIDATION REDUCTION POTENTIAL (MV)	202.600000		211		227.5		283.700000	
PH (S.U.)	6.8		7.7		7.03		6.44	
SPECIFIC CONDUCTANCE (MS/CM)	0.335		0.36		0.509		0.307	
TEMPERATURE (°C)	11.81		12.16		14.54		14.08	
TURBIDITY (NTU)	2.6		5		40		0.01	
Miscellaneous Parameters (ug/L)								
AMMONIA-N	0.005 UJ		0.005 UJ		0.02 J		0.005 UJ	
NITRITE/NITRATE-N	0.06 U		0.58 J		0.06 U		0.025 U	

Seep samples were only collected in sampling Round 2.
J - estimated value
µg/L - micrograms per liter
mg/L - milligrams per liter
MV - millivolts
ms/cm - milliSiemens per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit
S.U. - standard unit

TABLE 3-22

DESCRIPTIVE STATISTICS FOR
SUMP SEDIMENT SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
Energetics (mg/kg)							
2,4,6-TRINITROTOLUENE	9 - 9	0.53	560	--	77	77	13SL003010006
2,4-DINITROTOLUENE	2 - 9	0.45 J	0.74	0.25 - 0.25	0.23	0.60	13SL008010006
2-AMINO-4,6-DINITROTOLUENE	6 - 9	0.35 J	4.9 J	0.25 - 0.25	1.1	1.6	13SL003010006
4-AMINO-2,6-DINITROTOLUENE	6 - 9	0.35 J	31 J	0.25 - 0.25	4.4	6.5	13SL003010006
HMX	9 - 9	0.72 J	3400	--	407	407	13SL008010006
RDX	9 - 9	0.41 J	8600	--	1092	1092	13SL008010006
TETRYL	1 - 9	30	30	0.25 - 0.25	3.4	30	13SL003010006

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
ES/DI - External Sump/Drainage Investigation
J - estimated value
mg/kg - milligrams per kilogram

TABLE 3-23

DESCRIPTIVE STATISTICS FOR
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Semivolatile Organics (ug/kg)								
2-METHYLNAPHTHALENE	1/5	6 J	6 J	3.9 - 4.4	2.87	6.00	13SD2501	NA
ACENAPHTHENE	2/5	24	43 J	4.1 - 4.4	14.7	33.5	13SD0501	NA
ANTHRACENE	2/5	72	88	4.1 - 4.4	33.3	80.0	13SD0501	NA
BENZO(A)ANTHRACENE	5/5	10	330	---	132	132	13SD0501	NA
BENZO(A)PYRENE	5/5	12	390 J	---	160	160	13SD0601	NA
BENZO(B)FLUORANTHENE	5/5	18	460 J	---	190	190	13SD0601	NA
BENZO(G,H,I)PERYLENE	5/5	10	380 J	---	138	138	13SD0601	NA
BENZO(K)FLUORANTHENE	5/5	7 J	250 J	---	97.4	97.4	13SD0501	NA
CHRYSENE	5/5	15	430 J	---	177	177	13SD0601	NA
DI-N-BUTYL PHTHALATE	1/3	86 J	86 J	83 - 87	57.0	86.0	13SD0601	NA
DI-N-OCTYL PHTHALATE	1/3	100 J	100 J	83 - 87	61.7	100	13SD0601	NA
DIBENZO(A,H)ANTHRACENE	2/5	66 J	74 J	4.1 - 4.4	29.3	70.0	13SD0601	NA
FLUORANTHENE	5/5	29	860	---	363	363	13SD0501	NA
FLUORENE	2/5	33	42 J	4.1 - 4.4	16.3	37.5	13SD0501	NA
INDENO(1,2,3-CD)PYRENE	5/5	8 J	290 J	---	109	109	13SD0601	NA
NAPHTHALENE	2/5	6 J	6 J	4.1 - 4.4	3.68	6.00	13SD0501, 13SD0601	NA
PHENANTHRENE	5/5	17	620	---	252	252	13SD0601	NA
PYRENE	5/5	25	1300 J	---	482	482	13SD0601	NA
Energetics (mg/kg)								
HMX	2/28	0.8 J	1.9 J	0.25	0.213	1.35	13SD1101	ND
RDX	3/28	0.44 J	2.2	0.25	0.231	1.12	13SD1101	ND
Herbicides (ug/kg)								
PENTACHLOROPHENOL	1/3	2.1 J	2.1 J	0.56 - 0.58	0.890	2.10	13SD0601	NA
Inorganics (mg/kg)								
ALUMINUM	30/30	1480	18500	---	8944	8944	13SD2201	13400 J - 17100 J
ANTIMONY	10/30	0.8 J	2.3 J	0.13 - 0.55	0.575	1.40	13SD2401	0.98 J - 1.1 J
ARSENIC	29/30	3.7 J	58.2 J	0.53	15.0	15.5	13SD2401	22.2 J - 28.7 J
BARIUM	30/30	28.5 J	693 J	---	136	136	13SD0102	129 J - 199 J
BERYLLIUM	26/30	0.53 J	4.3 J	0.18 - 0.65	1.25	1.41	13SD2201	2 J - 2.1 J
CADMIUM	20/30	0.41 J	4.1 J	0.17 - 0.45	0.868	1.21	13SD1301	0.59 J - 0.63 J
CALCIUM	30/30	766 J	89700 J	---	14645	14645	13SD1301	799 J - 845 J
CHROMIUM	30/30	7.9 J	228 J	---	44.4	44.4	13SD2401	38.7 J - 55 J
COBALT	30/30	1.8 J	107 J	---	25.2	25.2	13SD1901	31.3 J - 40.7 J
COPPER	30/30	7 J	52.1 J	---	16.5	16.5	13SD0101	17.3 J - 27.8 J
IRON	30/30	1990 J	195000 J	---	48890	48890	13SD2401	93700 J - 112000 J
LEAD	30/30	4.2 J	521 J	---	59.0	59.0	13SD0102	35.7 J - 37.2 J
LITHIUM	23/23	2.1 J	38.8 J	---	9.46	9.46	13SD1901	NA
MAGNESIUM	30/30	292 J	7540 J	---	1915	1915	13SD0701	1470 J - 1580 J
MANGANESE	30/30	65.3 J	6130 J	---	1683	1683	13SD1201	2570 J - 3240 J
MERCURY	19/30	0.013 J	0.16 J	0.01 - 0.076	0.0304	0.0385	13SD0101	0.026 J
NICKEL	30/30	7.9 J	83.9 J	---	24.6	24.6	13SD2201	33.5 J - 36.6 J
POTASSIUM	30/30	252 J	2390 J	---	753	753	13SD1501	1340 J - 2000 J
SELENIUM	22/30	0.18 J	1.1 J	0.02 - 0.37	0.439	0.557	13SD2401	0.56 J - 0.61 J

TABLE 3-23

DESCRIPTIVE STATISTICS FOR
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
SODIUM	5/30	31.7 J	334 J	21.8 - 126	39.5	121	13SD0701	31.6 J - 183 J
STRONTIUM	23/23	4.1 J	77.1 J	---	20.3	20.3	13SD1101	NA
TIN	9/30	0.52 J	12 J	0.3 - 0.64	1.28	3.74	13SD1201	ND
TITANIUM	28/28	13.8 J	164 J	---	69.9	69.9	13SD2401	40.9 J
VANADIUM	30/30	11.8 J	144 J	---	34.9	34.9	13SD2401	46.2 J - 53.8 J
ZINC	25/30	7.9 J	541 J	33.4 - 386	107	108	13SD0101	72.8 J - 79.7 J
AVS/SEM Parameters (UMO/G)								
ACID VOLATILE SULFIDE, SEM	7/7	0.23 J	0.88 J	---	0.543	0.543	13SD0501	NA
CADMIUM, SEM	2/7	0.002	0.004	0.001 - 0.002	0.00131	0.00300	13SD0801	NA
COPPER, SEM	7/7	0.036 J	2.223 J	---	0.379	0.379	13SD0801	NA
LEAD, SEM	6/7	0.03 J	0.067 J	0.006	0.0394	0.0455	13SD0201	NA
MERCURY, SEM	5/7	0.00004 J	0.00054 J	0.00003 - 0.00004	0.000118	0.000158	13SD1401	NA
NICKEL, SEM	7/7	0.02	0.111	---	0.0469	0.0469	13SD0501	NA
SEM/AVS, SEM (S.U.)	7/7	0.09	3.74	---	1.39	1.39	13SD0801	NA
ZINC, SEM	3/7	0.407 J	0.538 J	0.031 - 0.426	0.268	0.483	13SD1101	NA
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/1)	7/7	9.9	18	---	13.7	13.7	13SD1101	NA
PH (S.U.)	7/7	5	7.9	---	7.09	7.09	13SD1101	NA
TOTAL ORGANIC CARBON (mg/kg)	7/7	2500 J	19000 J	---	9014	9014	13SD0501	NA

Field duplicate samples were excluded from these summaries because they are considered to be field QC samples.
NA - Not analyzed
ND - Not detected
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
AVS/SEM - Acid Volatile sulfur/Simultaneously extracted metal
UMO/G - micromoles per gram
MEQ - milliequivalent
S.U. - standard unit
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

TABLE 3-24

DESCRIPTIVE STATISTICS FOR
MAINSTREAM SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects
Inorganics (mg/kg)								
ALUMINUM	5/5	11500 J	13700 J	---	12320	12320	13SD3501	14400 J - 22100 J
ANTIMONY	5/5	1.9 J	4.7 J	---	2.58	2.58	13SD3001	1.8 J - 2.1 J
ARSENIC	5/5	23.9 J	56.9 J	---	40.6	40.6	13SD3001	25.6 J - 33.3 J
BARIUM	5/5	77.4 J	207 J	---	132	132	13SD3002	90.8 J - 137 J
BERYLLIUM	5/5	1.9 J	3.7 J	---	3.02	3.02	13SD3001	2 J - 2.3 J
CADMIUM	5/5	9.4 J	17.1 J	---	12.4	12.4	13SD3001	1.8 J - 4.3 J
CALCIUM	5/5	1290 J	12200 J	---	3634	3634	13SD3501	2010 J - 2500 J
CHROMIUM	5/5	51.7 J	192 J	---	123	123	13SD3001	49.1 J - 77.2 J
COBALT	5/5	19 J	29.9 J	---	24.6	24.6	13SD3501	20.4 J - 27.5 J
COPPER	5/5	16.4 J	18.4 J	---	17.5	17.5	13SD3002	18.4 J - 22 J
IRON	5/5	89600 J	299000 J	---	208720	208720	13SD3001	120000 J - 121000 J
LEAD	5/5	25.6 J	45.6 J	---	38.0	38.0	13SD3001	20.6 J - 25.2 J
MAGNESIUM	5/5	610 J	2110 J	---	948	948	13SD3501	1490 J - 1940 J
MANGANESE	5/5	1450 J	3960 J	---	2342	2342	13SD3002	1250 J - 1330 J
MERCURY	1/5	0.016 J	0.016 J	0.026 - 0.044	0.0175	0.0160	13SD3001	0.021 J
NICKEL	5/5	35.8 J	47.8 J	---	42.3	42.3	13SD3002	41.5 J - 54.1 J
POTASSIUM	5/5	452 J	1680 J	---	851	851	13SD3501	2080 J - 3190 J
SELENIUM	5/5	0.62 J	1.5 J	---	0.890	0.890	13SD3401	0.48 J - 0.85 J
SODIUM	3/5	91.1 J	298 J	28.4 - 77.4	117	178	13SD3301	92.3 J - 126 J
TITANIUM	1/1	65.6 J	65.6 J	---	65.6	65.6	13SD3001	26.4 J
VANADIUM	5/5	48.3 J	101 J	---	73.5	73.5	13SD3001	47.6 J - 61.6 J
ZINC	5/5	121 J	195 J	---	161	161	13SD3301	73.1 J - 98.3 J

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
Mainstream sediment samples were only collected in Rounds 2 and 3.
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
J - estimated value
mg/kg - milligrams per kilogram

TABLE 3-25

DESCRIPTIVE STATISTICS FOR
BOGGS CREEK SEDIMENT SAMPLES ADDITIONAL METALS DELINEATION ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
Inorganics (mg/kg)							
ALUMINUM	7/7	4020 J	10700 J	--	7171	7171	13SD3701
ANTIMONY	1/7	1.4 J	1.4 J	0.21 - 0.86	0.44	1.4	13SD3701
ARSENIC	7/7	5.9 J	11.7 J	--	8.5	8.5	13SD3801
BARIUM	7/7	30.6 J	77.5 J	--	54.4	54.4	13SD3801
BERYLLIUM	7/7	0.48 J	1	--	0.78	0.78	13SD3701
CADMIUM	7/7	0.12 J	5.1	--	1.4	1.4	13SD3801
CALCIUM	7/7	367 J	1980 J	--	1037	1037	13SD3801
CHROMIUM	7/7	15.3 J	29.5 J	--	22.7	22.7	13SD3901
COBALT	7/7	7.2 J	17.8 J	--	12.1	12.1	13SD3801
COPPER	7/7	4.7 J	13.3 J	--	8.5	8.5	13SD4001
IRON	7/7	16600 J	33600 J	--	24914	24914	13SD3801
LEAD	7/7	7.5 J	24.3 J	--	14.4	14.4	13SD4001
MAGNESIUM	7/7	336 J	913 J	--	656	656	13SD3701
MANGANESE	7/7	380	1090	--	619	619	13SD3801
NICKEL	7/7	10.5 J	21.6 J	--	15.9	15.9	13SD3701
POTASSIUM	7/7	456 J	1160 J	--	853	853	13SD4001
SELENIUM	7/7	0.15 J	0.35 J	--	0.26	0.26	13SD3701
SILVER	5/7	0.06 J	1.9	0.055 - 0.057	0.46	0.63	13SD3701
SODIUM	5/7	7.2 J	24.2 J	4.14 - 4.24	11.1	14.7	13SD3701
THALLIUM	4/7	0.12 J	0.17 J	0.07 - 0.1	0.10	0.15	13SD3701
VANADIUM	7/7	14.8 J	28.8 J	--	22.2	22.2	13SD3901
ZINC	7/7	23.6 J	175 J	--	57.1	57.1	13SD4001

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
ES/DI - External Sump/Drainage Investigation
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
J - estimated value
mg/kg - milligrams per kilogram

TABLE 3-26

DESCRIPTIVE STATISTICS FOR
TURKEY CREEK SEDIMENT SAMPLES ADDITIONAL METALS DELINEATION ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
Inorganics (mg/kg)							
ALUMINUM	3/3	5360 J	30500 J	--	13793	13793	13SD4301
ARSENIC	3/3	4.5 J	10.5 J	--	6.7	6.7	13SD4301
BARIUM	3/3	51.6 J	127 J	--	76.9	76.9	13SD4301
BERYLLIUM	3/3	0.43 J	1.4	--	0.77	0.77	13SD4301
CADMIUM	3/3	0.17 J	8.4	--	2.9	2.9	13SD4301
CALCIUM	3/3	703 J	1920 J	--	1153	1153	13SD4301
CHROMIUM	3/3	11.8 J	38.4 J	--	20.8	20.8	13SD4301
COBALT	3/3	7 J	11.8 J	--	10.0	10.0	13SD4301
COPPER	3/3	6.3 J	245 J	--	86.3	86.3	13SD4301
IRON	3/3	14100 J	36000 J	--	21933	21933	13SD4301
LEAD	3/3	9.4 J	35.6 J	--	18.5	18.5	13SD4301
MAGNESIUM	3/3	565 J	2660 J	--	1279	1279	13SD4301
MANGANESE	3/3	444	564	--	511	511	13SD4401
NICKEL	3/3	10.7 J	31.7 J	--	18.7	18.7	13SD4301
POTASSIUM	3/3	748 J	3740 J	--	1759	1759	13SD4301
SELENIUM	3/3	0.13 J	0.49 J	--	0.26	0.26	13SD4301
SILVER	1/3	0.78 J	0.78 J	0.052 - 0.053	0.28	0.78	13SD4301
SODIUM	1/3	61.9 J	61.9 J	3.97 - 4.1	22.0	61.9	13SD4301
THALLIUM	1/3	0.43 J	0.43 J	0.09 - 0.1	0.18	0.43	13SD4301
TIN	1/3	3 J	3 J	0.35 - 0.38	1.1	3.0	13SD4301
VANADIUM	3/3	14 J	46.8 J	--	25.1	25.1	13SD4301
ZINC	3/3	27.2 J	262 J	--	107	107	13SD4301

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
ES/DI - External Sump/Drainage Investigation
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
J - estimated value
mg/kg - milligrams per kilogram

TABLE 3-26A

DESCRIPTIVE STATISTICS FOR
PCB DELINEATION SEDIMENT SAMPLES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration		Maximum Concentration		Range of Non-Detects	Mean Concentration	Average of Positive Detects	Sample of Maximum Concentration
PCBs (ug/kg)									
AROCLOR-1248	17/20	23	J	36000		11 - 200	8125.21	9552.53	13SD500012
AROCLOR-1248	17/20	23	J	36000	J	11 - 200	8125.21	9552.53	13SD570006
AROCLOR-1260	1/20	1900		1900		11 - 30000	1130.00	1900.00	13SD480612
Petroleum Hydrocarbons (mg/kg)									
DIESEL RANGE ORGANICS	2/4	46		240		3.12 - 3.23	72.29	143.00	13SD510024
GASOLINE RANGE ORGANICS	2/4	12		17		3.12 - 3.23	8.04	14.50	13SD510024
OIL RANGE ORGANICS (C24-C40)	2/4	46		240		12.5 - 12.9	74.68	143.00	13SD510024
Field PCB Results (mg/kg)									
TOTAL PCBS AS AROCLOR-1254	9/24	0.02	J	3.95		0.5 - 0.5	0.84	1.83	13SD600012

TABLE 3-27

SUMMARY OF CHEMICALS DETECTED IN
SUMP SEDIMENT SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SU/SL001	13SU/SL002	13SU/SL003	13SU/SL004	13SU/SL005	13SU/SL006	13SU/SL007	13SU/SL008	13SU/SL009
SAMPLE NUMBER	13SL001010006	13SL002010006	13SL003010006	13SL004010006	13SL005010006	13SL006010006	13SL007010006	13SL008010006	13SL009010006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006
Energetics (mg/kg)									
2,4,6-TRINITROTOLUENE	0.53	0.7	560	21	66	4.5	0.81	38 J	3.7 J
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.45 J	0.25 U	0.25 U	0.25 U	0.25 U	0.74	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	4.9 J	0.42 J	0.93 J	0.35 J	0.25 U	1.3	1.6 J
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.35 J	31 J	0.88 J	0.25 U	0.43 J	0.25 U	5.1 J	1.4 J
HMX	0.72 J	1.3 J	230 J	23	3.7	1.8	3.9	3400	0.84 J
RDX	2.4	2.3	1200	5.8	10	3.1	0.41 J	8600	1.1 J
TETRYL	0.25 U	0.25 U	30	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

ES/DI - External Sump/Drainage Investigation
J - estimated value
mg/kg - milligrams per kilogram
U - less than laboratory method detection limit

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
Semivolatile Organics (ug/kg)											
2-METHYLNAPHTHALENE					4.1 U	4.3 U	3.9 U				
ACENAPHTHENE					4.1 U	43 J	24				
ANTHRACENE					4.1 U	88	72				
BENZO(A)ANTHRACENE					11	330	290 J				
BENZO(A)PYRENE					15	360 J	390 J				
BENZO(B)FLUORANTHENE					18	420 J	460 J				
BENZO(G,H,I)PERYLENE					10	270 J	380 J				
BENZO(K)FLUORANTHENE					10	250 J	210 J				
CHRYSENE					18	400	430 J				
DI-N-BUTYL PHTHALATE					83 U	87 U	86 J				
DI-N-OCTYL PHTHALATE					83 U	87 U	100 J				
DIBENZO(A,H)ANTHRACENE					4.1 U	66 J	74 J				
FLUORANTHENE					44	860	830				
FLUORENE					4.1 U	42 J	33				
INDENO(1,2,3-CD)PYRENE					8 J	220 J	290 J				
NAPHTHALENE					4.1 U	6 J	6 J				
PHENANTHRENE					27	570	620				
PYRENE					36	1000	1300 J				
Energetics (mg/kg)											
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U		0.25 U	0.44 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)											
PENTACHLOROPHENOL					0.56 U	0.58 U	2.1 J				
Inorganics (mg/kg)											
ALUMINUM	9280	9230 J	8580 J	10900	4250 J	7000 J	3920 J	4810	5550 J	6430	1480
ANTIMONY	1.8 J	2.2 J	0.38 U	0.27 U	0.51 U	0.19 U	0.8 J	0.27 U	0.34 U	0.45 U	0.16 U
ARSENIC	6.5 J	24.8 J	6.5 J	8.2 J	10.7 J	5.7 J	5.7 J	3.7 J	9.1 J	6.1 J	3.7 J
BARIUM	364 J	693 J	79.7 J	97.4 J	34.4 J	61.4 J	45.1 J	28.5 J	62.5 J	49.6 J	104 J
BERYLLIUM	0.52 U	0.65 U	0.79 J	0.67 J	1.3 J	0.63 J	0.37 U	0.18 U	0.71 J	0.74 J	0.88 J
CADMIUM	3.5 J	3.9 J	0.55 J	0.45 U	0.36 U	0.35 U	0.41 J	0.66 J	0.62 J	0.43 J	0.36 U
CALCIUM	38500 J	66000 J	2140 J	2020 J	1120 J	1490 J	71000 J	45700 J	14800 J	6720 J	977 J
CHROMIUM	156 J	165 J	12.1 J	15.2 J	18 J	9 J	11.6 J	9.2 J	14.8 J	12.4 J	7.9 J
COBALT	8.1 J	11.1 J	10.9 J	18.5 J	9.3 J	15.9 J	10 J	3.5 J	8.2 J	11.7 J	10.3 J
COPPER	52.1 J	25.9 J	13.9 J	11.7 J	13.7 J	10.6 J	12.7 J	16.6 J	19.2 J	11.9 J	7 J
IRON	21300 J	55500 J	16700 J	22200 J	46100 J	20800 J	17500 J	9900 J	26100 J	34800 J	1990 J
LEAD	471 J	521 J	18.6 J	21.4 J	15 J	11.7 J	23.9 J	31.4 J	17 J	17.6 J	11 J
LITHIUM	8.1 J		7.8 J	8.2 J	2.1 J	6.4 J	4.1 J	4.3 J	3.6 J	7.3 J	10.1 J

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
MAGNESIUM	3830 J	6640 J	969 J	1200 J	292 J	908 J	4810 J	7540 J	2120 J	2450 J	983 J
MANGANESE	204 J	249 J	641 J	1580 J	302 J	747 J	773 J	147 J	591 J	284 J	67.5 J
MERCURY	0.16 J	0.076 U	0.044 U	0.037 J	0.01 U	0.024 U	0.015 U	0.015 J	0.036 U	0.013 J	0.029 J
NICKEL	16.1 J	17.6 J	11.3 J	12.8 J	13.5 J	13.5 J	10.4 J	7.9 J	12 J	13.5 J	19.3 J
POTASSIUM	614 J	806 J	394 J	561 J	417 J	319 J	252 J	317 J	451 J	413 J	442 J
SELENIUM	0.56 J	0.37 U	0.51 J	0.55 J	0.11 U	0.27 U	0.16 U	0.18 J	0.33 U	0.21 J	0.3 J
SODIUM	41.9 U	79.6 U	75.9 U	126 U	25.2 U	29.7 U	81.3 J	334 J	71.4 U	22.6 U	25.8 U
STRONTIUM	39.9 J		7.3 J	6.5 J	4.5 J	5.5 J	70.2 J	52.5 J	18.1 J	8.5 J	5.5 J
TIN	11.4 J	4.7 J	0.64 U	0.57 U	0.31 U	0.49 U	0.4 U	0.52 J	0.61 U	2 J	0.45 U
TITANIUM	68.1 J		93.1 J	92.4 J	27.4 J	91.5 J	67.2 J	78.2 J	52 J	42.8 J	68.6 J
VANADIUM	23.3 J	28.8 J	21.5 J	28.2 J	24.8 J	17.4 J	13.9 J	11.8 J	18.7 J	20.5 J	15.5 J
ZINC	541 J	490 J	67.8 J	41.4 J	40 J	97.2 J	43.1 J	58.1 J	78 J	386 U	37.7 J
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM			0.49 J			0.88 J			0.62 J		
CADMIUM, SEM			0.002 U			0.001 U			0.004		
COPPER, SEM			0.131 J			0.07 J			2.223 J		
LEAD, SEM			0.067 J			0.03 J			0.061 J		
MERCURY, SEM			0.00007 J			0.00004 J			0.00004 UJ		
NICKEL, SEM			0.048			0.111			0.028		
SEM/AVS, SEM (S.U.)			1.54			0.7			3.74		
ZINC, SEM			0.503 J			0.407 J			0.426 U		
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)			15			9.9			12		
PH (S.U.)			7.2			5			7.4		
TOTAL ORGANIC CARBON (mg/kg)			15000 J			19000 J			4400 J		

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
Semivolatile Organics (ug/kg)											
2-METHYLNAPHTHALENE											
ACENAPHTHENE											
ANTHRACENE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIBENZO(A,H)ANTHRACENE											
FLUORANTHENE											
FLUORENE											
INDENO(1,2,3-CD)PYRENE											
NAPHTHALENE											
PHENANTHRENE											
PYRENE											
Energetics (mg/kg)											
HMX	1.9 J	0.8 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	2.2	0.25 U	0.25 U	0.25 U	0.71 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM	9260 J	6860	5010	4160 J	10300	9140	10200 J	7650	16200	7090 J	6600
ANTIMONY	0.52 U	0.55 U	0.47 U	0.13 U	0.26 U	0.25 U	0.24 U	0.35 U	0.23 U	0.23 U	0.29 U
ARSENIC	9.4 J	11.7 J	17.5 J	0.53 U	16.9 J	11.4 J	6.2 J	8.2 J	7.5 J	11 J	8 J
BARIUM	67.6 J	257 J	152 J	148 J	65.4 J	113 J	94.1 J	79.5 J	102 J	77.9 J	102 J
BERYLLIUM	0.63 J	1 J	0.96 J	0.53 J	1.4 J	1.4 J	0.7 J	0.93 J	1.6 J	0.95 J	0.77 J
CADMIUM	0.91 J	0.81 J	4.1 J	0.17 U	0.25 U	0.37 U	0.38 U	0.39 U	0.45 U	0.46 J	0.52 J
CALCIUM	33200 J	35400 J	89700 J	998 J	1650 J	767 J	6640 J	1050 J	2440 J	1360 J	1560 J
CHROMIUM	15.4 J	32.7 J	49.6 J	16.2 J	24.9 J	21.5 J	11.3 J	24.9 J	13.5 J	36.5 J	10.3 J
COBALT	6.8 J	20.6 J	20 J	1.8 J	15 J	18.9 J	11.8 J	17.9 J	107 J	18.2 J	16 J
COPPER	12.5 J	10.7 J	11.3 J	8.9 J	24.1 J	13.6 J	11.5 J	11.8 J	12.2 J	14.9 J	13.2 J
IRON	25900 J	46300 J	83600 J	18400 J	25900 J	26900 J	18300 J	24900 J	33100 J	36500 J	14900 J
LEAD	20 J	21.4 J	38.1 J	4.2 J	14.8 J	20.5 J	13.7 J	19.2 J	20.1 J	20.7 J	19.2 J
LITHIUM	7.2 J	6.5 J	4 J	4.3 J	28.4 J	17.5 J	7.7 J	6.1 J	38.8 J	9.7 J	5.3 J

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
MAGNESIUM	2080 J	1450 J	5620 J	757 J	1840 J	1410 J	1990 J	943 J	1050 J	717 J	825 J
MANGANESE	372 J	6130 J	1760 J	65.3 J	247 J	1790 J	724 J	1290 J	2960 J	819 J	1440 J
MERCURY	0.028 U	0.032 J	0.019 J	0.01 U	0.022 J	0.041 J	0.028 U	0.028 J	0.036 J	0.029 U	0.03 J
NICKEL	8.6 J	14.9 J	13.6 J	8.6 J	35.5 J	33 J	12.8 J	13 J	45.5 J	18.6 J	11.7 J
POTASSIUM	2260 J	1130 J	538 J	1660 J	2390 J	807 J	523 J	392 J	599 J	482 J	367 J
SELENIUM	0.29 U	0.3 J	0.22 J	0.02 U	0.34 J	0.51 J	0.27 U	0.43 J	0.54 J	0.45 J	0.38 J
SODIUM	113 J	47.1 U	39 U	38.8 U	53.5 U	26.2 U	30.7 U	43.8 U	63.6 U	48.3 U	62.5 U
STRONTIUM	77.1 J	28.2 J	64.2 J	10.3 J	10.1 J	6.3 J	11 J	4.1 J	7.4 J	6.4 J	5.2 J
TIN	0.53 U	12 J	0.46 U	0.75 J	0.66 J	0.5 U	0.52 U	0.46 U	0.46 U	0.4 U	0.42 U
TITANIUM	62.7 J	60.2 J	67.9 J	72 J	13.8 J	45.1 J	110 J	72.3 J	67 J	66.6 J	77.4 J
VANADIUM	23 J	39.1 J	44 J	16.2 J	17.6 J	21.7 J	21.9 J	26.1 J	21.5 J	26.2 J	19.7 J
ZINC	116 J	138 U	216 U	7.9 J	65.3 J	46.3 J	62 J	31.7 J	75.9 J	40.4 J	33.4 U
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM	0.25 J			0.66 J			0.67 J			0.23 J	
CADMIUM, SEM	0.002			0.0014 U			0.001 U			0.001 U	
COPPER, SEM	0.055 J			0.036 J			0.061 J			0.075 J	
LEAD, SEM	0.033 J			0.006 U			0.035 J			0.047 J	
MERCURY, SEM	0.00003 UJ			0.00054 J			0.00005 J			0.00009 J	
NICKEL, SEM	0.021			0.022			0.02			0.078	
SEM/AVS, SEM (S.U.)	2.6			0.09			0.17			0.87	
ZINC, SEM	0.538 J			0.031 U			0.285 U			0.113 U	
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)	18			13			16			12	
PH (S.U.)	7.9			7.1			7.8			7.2	
TOTAL ORGANIC CARBON (mg/kg)	2600 J			2500 J			17000 J			2600 J	

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	UPGRADIENT	UPGRADIENT
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	03
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD32	13SW/SD28	13SW/SD28
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD3201	13SD2801	13SD2802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/24/2003	10/22/2003	10/6/2004
Semivolatile Organics (ug/kg)											
2-METHYLNAPHTHALENE					6 J				4.4 U		
ACENAPHTHENE					4.3 U				4.4 U		
ANTHRACENE					4.3 U				4.4 U		
BENZO(A)ANTHRACENE					10				19		
BENZO(A)PYRENE					12				23		
BENZO(B)FLUORANTHENE					21				32		
BENZO(G,H,I)PERYLENE					12				19		
BENZO(K)FLUORANTHENE					7 J				10 J		
CHRYSENE					15				24		
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIBENZO(A,H)ANTHRACENE					4.3 U				4.4 U		
FLUORANTHENE					29				54		
FLUORENE					4.3 U				4.4 U		
INDENO(1,2,3-CD)PYRENE					9				16		
NAPHTHALENE					4.3 U				4.4 U		
PHENANTHRENE					17				24		
PYRENE					25				47		
Energetics (mg/kg)											
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		0.25 U	
RDX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		0.25 U	
Herbicides (ug/kg)											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM	18500	14400 J	11900	14100 J	13900 J	12500 J	8820 J	10300 J		13400 J	17100 J
ANTIMONY	1.2 J	0.9 J	0.48 U	2.3 J	1.6 J	1.3 J	0.97 J	0.89 J		1.1 J	0.98 J
ARSENIC	35.6 J	16.7 J	10.2 J	58.2 J	33.8 J	32.1 J	37.6 J	25.9 J		22.2 J	28.7 J
BARIUM	203 J	113 J	165 J	101 J	121 J	154 J	202 J	129 J		199 J	129 J
BERYLLIUM	4.3 J	1.4 J	0.95 J	2.9 J	3.6 J	3.3 J	1.8 J	1.9 J		2.1 J	2 J
CADMIUM	1.8 J	0.65 J	0.82 J	1.1 J	0.88 J	0.95 J	0.54 J	0.66 J		0.63 J	0.59 J
CALCIUM	2310 J	1630 J	3400 J	766 J	1170 J	2670 J	892 J	1280 J		799 J	845 J
CHROMIUM	140 J	35.4 J	12.7 J	228 J	57.6 J	86.9 J	46.7 J	37.7 J		38.7 J	55 J
COBALT	70.2 J	58.1 J	28.5 J	24.2 J	63.5 J	68.7 J	34.6 J	36.9 J		40.7 J	31.3 J
COPPER	32.4 J	12.1 J	17.8 J	21.6 J	19.7 J	18.3 J	17.6 J	14.4 J		27.8 J	17.3 J
IRON	171000 J	41900 J	19900 J	195000 J	121000 J	135000 J	81000 J	74300 J		112000 J	93700 J
LEAD	87.7 J	46.5 J	34.8 J	54.8 J	49.5 J	46.6 J	46.2 J	32.9 J		35.7 J	37.2 J
LITHIUM	10.9 J		9.2 J								

TABLE 3-28

SUMMARY OF CHEMICALS DETECTED IN
GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	UPGRADIENT	UPGRADIENT
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	03
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD32	13SW/SD28	13SW/SD28
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD3201	13SD2801	13SD2802
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.33
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/24/2003	10/22/2003	10/6/2004
MAGNESIUM	1110 J	1260 J	1290 J	457 J	823 J	735 J	513 J	825 J		1470 J	1580 J
MANGANESE	4580 J	2980 J	4220 J	2220 J	4000 J	3580 J	3040 J	2700 J		3240 J	2570 J
MERCURY	0.031 J	0.059 U	0.042 J	0.044 J	0.043 J	0.024 J	0.04 J	0.045 J		0.026 J	0.057 U
NICKEL	83.9 J	28.7 J	19.3 J	28.1 J	63.9 J	65.3 J	38.6 J	45.4 J		33.5 J	36.6 J
POTASSIUM	482 J	1130 J	629 J	622 J	1050 J	831 J	729 J	971 J		1340 J	2000 J
SELENIUM	0.69 J	0.71 J	0.45 J	1.1 J	0.98 J	0.91 J	0.96 J	0.98 J		0.56 J	0.61 J
SODIUM	58.2 U	43.5 U	26.3 U	28.1 U	31.9 U	43 J	21.8 U	31.7 J		31.6 J	183 J
STRONTIUM	8.6 J		8.5 J								
TIN	0.82 J	0.43 U	0.82 J	0.38 U	0.46 U	0.3 U	0.31 U	0.39 U		0.4 U	0.53 U
TITANIUM	112 J		62.3 J	164 J	76.8 J	62.9 J	40.9 J	42.6 J		40.9 J	
VANADIUM	115 J	45.6 J	24.6 J	144 J	59.7 J	70.8 J	43.3 J	43.4 J		46.2 J	53.8 J
ZINC	273 U	120 J	64.5 J	68.4 J	142 J	151 J	69.5 J	139 J		72.8 J	79.7 J
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SEM (S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
J - estimated value
U - less than laboratory method detection limit
AVS/SEM - Acid Volatile sulfur/Simultaneously extracted metal
UMO/G - micromoles per gram
MEQ - milliequivalent
S.U. - standard unit
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram

TABLE 3-29

SUMMARY OF CHEMICALS DETECTED IN
MAINSTREAM SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	UPGRADIENT	UPGRADIENT
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD3101	13SD3102
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004
Energetics (mg/kg)							
HMX	0.25 U					0.28 J	
Inorganics (mg/kg)							
ALUMINUM	11600 J	12100 J	12700 J	11500 J	13700 J	14400 J	22100 J
ANTIMONY	4.7 J	2 J	2.2 J	2.1 J	1.9 J	2.1 J	1.8 J
ARSENIC	56.9 J	43.4 J	36.7 J	42 J	23.9 J	25.6 J	33.3 J
BARIUM	125 J	207 J	83.8 J	77.4 J	169 J	90.8 J	137 J
BERYLLIUM	3.7 J	3.4 J	3 J	3.1 J	1.9 J	2 J	2.3 J
CADMIUM	17.1 J	9.4 J	14.6 J	10.3 J	10.4 J	4.3 J	1.8 J
CALCIUM	1290 J	1850 J	1510 J	1320 J	12200 J	2010 J	2500 J
CHROMIUM	192 J	124 J	95.7 J	150 J	51.7 J	49.1 J	77.2 J
COBALT	19 J	28.6 J	22.9 J	22.5 J	29.9 J	27.5 J	20.4 J
COPPER	16.4 J	18.4 J	17.1 J	18.3 J	17.1 J	18.4 J	22 J
IRON	299000 J	210000 J	243000 J	202000 J	89600 J	121000 J	120000 J
LEAD	45.6 J	39.1 J	38.9 J	40.6 J	25.6 J	20.6 J	25.2 J
MAGNESIUM	610 J	707 J	702 J	611 J	2110 J	1490 J	1940 J
MANGANESE	2140 J	3960 J	1550 J	1450 J	2610 J	1330 J	1250 J
MERCURY	0.016 J	0.034 U	0.044 U	0.026 U	0.039 U	0.021 J	0.052 U
NICKEL	42.2 J	47.8 J	35.8 J	44.5 J	41.2 J	54.1 J	41.5 J
POTASSIUM	452 J	664 J	763 J	695 J	1680 J	2080 J	3190 J
SELENIUM	0.62 J	0.96 J	0.63 J	1.5 J	0.74 J	0.48 J	0.85 J
SODIUM	28.4 U	144 J	298 J	91.1 J	77.4 U	92.3 J	126 J
TITANIUM	65.6 J					26.4 J	
VANADIUM	101 J	67.5 J	74.8 J	75.8 J	48.3 J	47.6 J	61.6 J
ZINC	186 J	152 J	195 J	152 J	121 J	98.3 J	73.1 J

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Mainstream sediment samples were only collected in sampling Rounds 2 and 3.
J - estimated value
U - less than method detection limit
mg/kg - milligrams per kilogram

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TABLE 3-30

SUMMARY OF CHEMICALS DETECTED IN
BOGGS CREEK SEDIMENT SAMPLES ROUND 5 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRADIENT	UPGRADIENT	DOWNGRADIENT	DOWNGRADIENT	DOWNGRADIENT	DOWNGRADIENT	DOWNGRADIENT
SAMPLING ROUND	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42
SAMPLE NUMBER	13SD3601	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201
SAMPLE CODE	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
Inorganics (mg/kg)							
ALUMINUM	4370 J	10700 J	7640 J	8320 J	9680 J	5470 J	4020 J
ANTIMONY	0.21 U	1.4 J	0.86 U	0.47 U	0.73 U	0.44 U	0.67 U
ARSENIC	6.8 J	8.8 J	11.7 J	9.8 J	8.9 J	5.9 J	7.9 J
BARIUM	30.6 J	64.8 J	77.5 J	51.9 J	71.3 J	45.4 J	39.2 J
BERYLLIUM	0.48 J	1	0.9	0.99	0.89	0.52 J	0.65
CADMIUM	0.12 J	0.31 J	5.1	0.61	1.8	0.83	1.1
CALCIUM	1120 J	1090 J	1980 J	942 J	1260 J	497 J	367 J
CHROMIUM	15.3 J	24.6 J	25.6 J	29.5 J	28.9 J	15.6 J	19.6 J
COBALT	7.8 J	17.3 J	17.8 J	10.5 J	13.7 J	7.2 J	10.4 J
COPPER	5.9 J	10.8 J	9.5 J	8.4 J	13.3 J	4.7 J	7.1 J
IRON	18700 J	25700 J	33600 J	31200 J	24100 J	16600 J	24500 J
LEAD	7.5 J	19.9 J	16.8 J	12.7 J	24.3 J	8.3 J	11.5 J
MAGNESIUM	386 J	913 J	861 J	706 J	908 J	479 J	336 J
MANGANESE	490	380	1090	456	728	470	721
NICKEL	10.5 J	21.6 J	20.4 J	17.4 J	17.7 J	11.1 J	12.9 J
POTASSIUM	548 J	1140 J	1090 J	895 J	1160 J	679 J	456 J
SELENIUM	0.19 J	0.35 J	0.31 J	0.31 J	0.33 J	0.15 J	0.17 J
SILVER	0.055 U	1.9	0.057 U	0.14 J	1	0.06 J	0.06 J
SODIUM	4.24 U	24.2 J	7.2 J	9.6 J	23.9 J	8.5 J	4.14 U
THALLIUM	0.1 U	0.17 J	0.13 J	0.12 J	0.16 J	0.08 U	0.07 U
VANADIUM	14.8 J	26.7 J	26.7 J	28.8 J	23.8 J	16.4 J	17.9 J
ZINC	23.6 J	45.9 J	53.3 J	35.4 J	175 J	28.2 J	38.4 J

ES/DI - External Sump/Drainage Investigation
J - estimated value
mg/kg - milligrams per kilogram
U - less than laboratory method detection limit

TABLE 3-31

SUMMARY OF CHEMICALS DETECTED IN
TURKEY CREEK SEDIMENT SAMPLES ROUND 5 ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNSTREAM	DOWNSTREAM	UPSTREAM
SAMPLING ROUND	05	05	05
LOCATION	13SW/SD43	13SW/SD44	13SW/SD45
SAMPLE NUMBER	13SD4301	13SD4401	13SD4501
SAMPLE CODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005
Inorganics (mg/kg)			
ALUMINUM	30500 J	5520 J	5360 J
ARSENIC	10.5 J	5 J	4.5 J
BARIUM	127 J	51.6 J	52.1 J
BERYLLIUM	1.4	0.49 J	0.43 J
CADMIUM	8.4	0.19 J	0.17 J
CALCIUM	1920 J	835 J	703 J
CHROMIUM	38.4 J	12.1 J	11.8 J
COBALT	11.8 J	11.3 J	7 J
COPPER	245 J	7.5 J	6.3 J
IRON	36000 J	15700 J	14100 J
LEAD	35.6 J	10.6 J	9.4 J
MAGNESIUM	2660 J	612 J	565 J
MANGANESE	524	564	444
NICKEL	31.7 J	13.7 J	10.7 J
POTASSIUM	3740 J	788 J	748 J
SELENIUM	0.49 J	0.16 J	0.13 J
SILVER	0.78 J	0.053 U	0.052 U
SODIUM	61.9 J	4.1 U	3.97 U
THALLIUM	0.43 J	0.09 U	0.1 U
TIN	3 J	0.38 U	0.35 U
VANADIUM	46.8 J	14.5 J	14 J
ZINC	262 J	32 J	27.2 J

J - estimated value
mg/kg - milligrams per kilogram
U - less than laboratory method detection limit

TABLE 3-31A

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT PCB DELINEATION SAMPLES
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52	13SD53	13SD53
SAMPLE NUMBER	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD522448	13SD530024	13SD532436
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	2 - 4	0 - 2	2 - 3
SAMPLE DATE	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
PCBs (ug/kg)											
AROCLOR-1248	11.4 U	1700	200 U	8000 J	36000	1200	800 J	17000 J	2400	17000 J	1300 J
AROCLOR-1260	11.4 U	120 U	1900	612 U	14.3 U	110 U	108 U	11.2 U	237 U	12 U	118 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS						240	46	3.12 U	3.23 U		
GASOLINE RANGE ORGANICS						17	12	3.12 U	3.23 U		
OIL RANGE ORGANICS (C24-C40)						240	46	12.5 U	12.9 U		
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254			3.28								

TABLE 3-31A

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT PCB DELINEATION SAMPLES
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60	13SD60	13SD61	13SD62	13SD62
SAMPLE NUMBER	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012	13SD601224	13SD610012	13SD620012	13SD621224
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	0 - 1	1 - 2
SAMPLE DATE	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006	8/23/2006	8/24/2006	8/24/2006	8/24/2006
PCBs (ug/kg)												
AROCLOR-1248	1100				36000 J	2700 J		12000 J			23 J	11 UJ
AROCLOR-1260	134 U				30000 U	800 U		1000 U			11 UJ	11 UJ
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS												
GASOLINE RANGE ORGANICS												
OIL RANGE ORGANICS (C24-C40)												
Field PCB Results (mg/kg)												
TOTAL PCBS AS AROCLOR-1254		0.5 U	0.5 U	0.5 U	3.47	0.64	0.5 U	3.95	0.5 U	0.5 U	0.5 U	0.02 J

TABLE 3-31A

SUMMARY OF CHEMICALS DETECTED IN SEDIMENT PCB DELINEATION SAMPLES
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/27/2006	8/28/2006	8/28/2006
PCBs (ug/kg)												
AROCLOR-1248	470 J			17000 J						7700 J		
AROCLOR-1260	190 U			3900 U						4000 U		
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS												
GASOLINE RANGE ORGANICS												
OIL RANGE ORGANICS (C24-C40)												
Field PCB Results (mg/kg)												
TOTAL PCBS AS AROCLOR-1254	0.5 U	0.5 U	0.5 U	3.45	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.15	0.31 J	0.18 J

TABLE 3-32

DESCRIPTIVE STATISTICS FOR
OVERBURDEN GROUNDWATER SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detects
Energetics (ug/L)							
2,4,6-TRINITROTOLUENE	3/12	4 J	250	0.25 - 1.7	21.93	87.07	13GWTW012
2,6-DINITROTOLUENE	1/12	6.8 J	6.8 J	0.245 - 1.7	0.75	6.80	13GWTW012
2-AMINO-4,6-DINITROTOLUENE	5/12	0.76 J	9 J	0.25 - 1.7	1.26	2.69	13GWTW012
4-AMINO-2,6-DINITROTOLUENE	8/12	0.59	22	0.27 - 0.298	3.17	4.68	13GWTW012
HMX	11/12	1.3 J	270	0.281 - 0.281	64.20	70.03	13GWTW012
RDX	12/12	1.4 J	1200	0 - 0	191.88	191.88	13GWTW004
Field Parameters							
DISSOLVED OXYGEN (mg/L)	6/6	0.215	2.479	--	3.33	3.33	13GWTW004
OXIDATION REDUCTION POTENTIAL (MV)	6/6	0.29	9.03	--	31.50	31.50	13GWTW004
PH (s.u.)	6/6	6.38	7.75 >	--	6.85	6.85	13GWTW004
SPECIFIC CONDUCTANCE (MS/CM)	6/6	3.85	10.73	--	1.11	1.11	13GWTW004
TEMPERATURE (°C)	6/6	6.9	1000	--	8.59	8.59	13GWTW011
TURBIDITY (NTU)	6/6	-100	195	--	358.32	358.32	13GWTW002

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
ES/DI - External Sump/Drainage Investigation
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
°C - degrees Celsius
S.U. - standard unit
NTU - nephelometric turbidity unit
ms/cm - milliSiemen per centimeter

TABLE 3-33

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Volatile Organics (ug/L)							
TRICHLOROETHENE	1/2	1 J	1 J	0.3	0.575	1.00	13GWT2001
Energetics (ug/L)							
1,3,5-TRINITROBENZENE	4/106	0.4 J	1.3 J	0.039 - 0.65	0.170	1.03	13GWT0903, 13GWT2102
1,3-DINITROBENZENE	8/106	0.3 J	2.4	0.039 - 0.65	0.221	1.26	13GWT0903
2,4,6-TRINITROTOLUENE	12/106	1.6	69 J	0.039 - 0.65	2.44	20.5	13GWT2102
2,4-DIAMINO-6-NITROTOLUENE	4/40	0.77 J	3.9	0.24 - 0.301	0.292	1.74	13GWT0903
2,4-DINITROTOLUENE	7/106	0.48 J	1.6	0.039 - 0.65	0.197	1.05	13GWT1103
2,6-DIAMINO-4-NITROTOLUENE	1/40	1.8 J	1.8 J	0.24 - 0.301	0.172	1.80	13GWT1102
2,6-DINITROTOLUENE	7/106	1 J	9.9	0.039 - 0.65	0.425	4.51	13GWT0903
2-AMINO-4,6-DINITROTOLUENE	14/106	0.28 J	15 J	0.039 - 0.65	0.777	5.00	13GWT0904
2-NITROTOLUENE	2/106	0.37 J	1	0.039 - 0.65	0.146	0.685	13GWT2403
3-NITROTOLUENE	1/106	0.58 J	0.58 J	0.039 - 0.65	0.140	0.580	13GWT1103
4-AMINO-2,6-DINITROTOLUENE	21/106	0.12 J	19	0.039 - 0.65	1.28	5.90	13GWT0904, 13GWT1101
4-NITROTOLUENE	1/106	0.5 J	0.5 J	0.039 - 0.65	0.139	0.500	13GWT2101
DNX	10/40	0.31 J	50 J	0.24 - 0.301	2.83	10.9	13GWT2102
HMX	85/106	0.29 J	640	0.24 - 0.6	35.7	44.5	13GWT2102
MNX	13/40	0.32 J	11	0.24 - 0.291	1.52	4.40	13GWT1702
RDX	87/106	0.27 J	7700	0.24 - 0.465	264	322	13GWT2102
TNX	6/40	0.31 J	2.4	0.24 - 0.301	0.299	1.26	13GWT3901
Total Metals (ug/L)							
ALUMINUM	58/71	123 J	139000 J	14.2 - 332	6737	8236	13GWT0502
ARSENIC	25/71	0.65 J	24.1 J	0.07 - 1.1	1.94	5.11	13GWT0502
BARIUM	71/71	10.4 J	727 J	---	73.9	73.9	13GWT0502
BERYLLIUM	22/71	2.1 J	12.8 J	0.03 - 2.1	1.82	5.21	13GWT4701
CADMIUM	2/71	2.7 J	2.7 J	0.04 - 1.9	0.267	2.70	13GWT2501, 13GWT2502
CALCIUM	70/71	1720 J	117000 J	2580	29538	29942	13GWT2501
CHROMIUM	26/71	0.76 J	145 J	0.02 - 2.2	7.26	19.2	13GWT0502
COBALT	66/71	1.5 J	249 J	0.48 - 14.8	51.2	54.9	13GWT4702
COPPER	41/71	0.83 J	89.5 J	0.19 - 6.9	6.97	11.6	13GWT2501
IRON	55/71	127 J	143000 J	25 - 440	13261	17093	13GWT2001
LEAD	27/71	1.1 J	54.3 J	0.04 - 2	5.36	13.5	13GWT2501
LITHIUM	26/26	2.3 J	340 J	---	79.9	79.9	13GWT2001
MAGNESIUM	71/71	2230 J	70300 J	---	21469	21469	13GWT2001
MANGANESE	62/71	33.6 J	11600 J	48.3 - 566	1396	1579	13GWT2001
MERCURY	14/71	0.007 J	0.39	0.007 - 0.2	0.0417	0.127	13GWT0102
NICKEL	71/71	2.9 J	477 J	---	108	108	13GWT2001
POTASSIUM	71/71	240 J	27500 J	---	3353	3353	13GWT0502
SELENIUM	2/71	1.8 J	4.1 J	0.04 - 1.4	0.202	2.95	13GWT2502
SODIUM	71/71	6030 J	160000 J	---	38645	38645	13GWT1901
STRONTIUM	26/26	14.5 J	396 J	---	105	105	13GWT0201
TITANIUM	46/66	2.5 J	659 J	0.13 - 2.2	42.3	60.4	13GWT0502
VANADIUM	23/71	0.63 J	135 J	0.05 - 1.4	6.96	21.2	13GWT0502
ZINC	66/71	2.7 J	1220 J	2.8 - 6.8	150	162	13GWT4702

TABLE 3-33

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	12/20	124 J	11800 J	18.3 - 164	894	1465	13GWT2001-F
ARSENIC, FILTERED	5/20	0.8 J	8.6 J	0.11 - 0.87	0.845	2.82	13GWT1502-F
BARIUM, FILTERED	20/20	14.3 J	93.6 J	---	36.5	36.5	13GWT3901-F
BERYLLIUM, FILTERED	4/20	2 J	5.6 J	0.03 - 1.5	0.932	3.83	13GWT2001-F
CALCIUM, FILTERED	20/20	2250 J	70900 J	---	26580	26580	13GWT2001-F
CHROMIUM, FILTERED	3/20	1.3 J	2.7 J	0.13 - 1.4	0.585	2.20	13GWT2001-F
COBALT, FILTERED	19/20	1.3 J	230 J	0.11	37.2	39.2	13GWT2001-F
COPPER, FILTERED	10/20	2.5 J	13.1 J	0.35 - 5.2	3.23	5.60	13GWT2503-F
IRON, FILTERED	13/20	93.8 J	142000 J	27.1 - 219	8476	13009	13GWT2001-F
LEAD, FILTERED	2/20	11.5 J	35.7 J	0.04 - 1.3	2.56	23.6	13GWT1502-F
LITHIUM, FILTERED	7/7	9.7 J	322 J	---	94.8	94.8	13GWT2001-F
MAGNESIUM, FILTERED	20/20	2190 J	67900 J	---	16559	16559	13GWT2001-F
MANGANESE, FILTERED	20/20	20.9 J	11500 J	---	1159	1159	13GWT2001-F
NICKEL, FILTERED	19/20	3.2 J	470 J	1.6	83.5	87.8	13GWT2001-F
POTASSIUM, FILTERED	19/20	366 J	7110 J	151	2784	2926	13GWT0601-F
SELENIUM, FILTERED	2/20	2 J	2.5 J	0.04 - 1.4	0.356	2.25	13GWT2502-F
SODIUM, FILTERED	20/20	7100 J	55000 J	---	31365	31365	13GWT0501-F
STRONTIUM, FILTERED	7/7	13.6 J	188 J	---	99.2	99.2	13GWT0501-F
TITANIUM, FILTERED	7/17	2.6 J	9.3 J	0.42 - 3.8	2.84	5.66	13GWT0601-F
VANADIUM, FILTERED	1/20	1.1 J	1.1 J	0.05 - 0.8	0.199	1.10	13GWT0601-F
ZINC, FILTERED	20/20	2.1 J	695	---	113	113	13GWT2001-F
Field Parameters							
ALKALINITY	4/22	0	90	10	12.0	43.8	13GWT2402
CARBON DIOXIDE	22/22	23	400	---	94.8	94.8	13GWT2003
DISSOLVED OXYGEN	62/62	0.02	27.18	---	4.67	4.67	13GWT1903
DISSOLVED OXYGEN - METER	68/68	0.11	34.37	---	3.67	3.67	13GWT1902
HYDROGEN SULFIDE (H2S)	22/22	0	0	---	---	---	---
IRON(+2)	22/22	0	3.3 >	---	1.07	1.07	Multiple Samples
MANGANESE(+2)	22/22	0	8.3	---	1.19	1.19	13GWT2003
NITRITE-N	22/22	0	0.031	---	0.00559	0.00559	13GWT2102
OXIDATION REDUCTION POTENTIAL (MV)	108/108	-473	752	---	253	253	13GWT2603
PH (S.U.)	108/108	3.01	7.32	---	5.02	5.02	13GWT2103
SPECIFIC CONDUCTANCE (MS/CM)	108/108	0.076	1634	---	15.6	15.6	13GWT4701
SULFIDE	22/22	0	0.14	---	0.0318	0.0318	13GWT1502
TEMPERATURE (°C)	108/108	8.83	21.8	---	15.8	15.8	13GWT2503
TURBIDITY (NTU)	108/108	0	1000 >	---	52.6	52.6	13GWT4201, 13GWT4202
Miscellaneous Parameters (mg/L)							
AMMONIA-N	47/66	0.01	3.4	0.005 - 0.01	0.297	0.415	13GWT0903
NITRITE/NITRATE-N	46/66	0.03	92	0.02 - 0.05	2.46	3.52	13GWT0901
TOTAL ORGANIC CARBON	2/3	1	1.1	0.5	0.783	1.05	13GWT1502

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-34

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 1
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Volatile Organics (ug/L)							
TRICHLOROETHENE	1/2	1 J	1 J	0.3	0.575	1.00	13GWT2001
Energetics (ug/L)							
1,3-DINITROBENZENE	3/26	0.3 J	1.4 J	0.08 - 0.65	0.259	0.843	13GWT0901
2,4,6-TRINITROTOLUENE	4/26	1.8	31	0.08 - 0.65	3.14	19.5	13GWT1101
2-AMINO-4,6-DINITROTOLUENE	3/26	3.7 J	8.6 J	0.08 - 0.65	0.857	6.10	13GWT0901
4-AMINO-2,6-DINITROTOLUENE	5/26	0.12 J	19	0.08 - 0.65	1.82	8.70	13GWT1101
4-NITROTOLUENE	1/26	0.5 J	0.5 J	0.08 - 0.65	0.191	0.500	13GWT2101
HMX	19/26	0.29 J	390	0.265 - 0.6	29.0	39.6	13GWT2101
RDX	19/26	0.4 J	2700	0.25 - 0.465	199	273	13GWT2101
Total Metals (ug/L)							
ALUMINUM	24/26	123 J	39000 J	47.3 - 57.1	5109	5533	13GWT2501
ARSENIC	13/26	0.65 J	15.4 J	0.07 - 0.66	2.01	3.87	13GWT2501
BARIUM	26/26	10.4 J	401 J	---	80.2	80.2	13GWT1901
BERYLLIUM	9/26	2.1 J	8.4 J	0.03 - 1.6	1.61	4.14	13GWT0701
CADMIUM	1/26	2.7 J	2.7 J	0.05 - 1.9	0.307	2.70	13GWT2501
CALCIUM	25/26	2800 J	117000 J	2580	31754	32973	13GWT2501
CHROMIUM	13/26	0.76 J	64.9 J	0.02 - 0.82	6.50	12.8	13GWT2501
COBALT	26/26	1.5 J	246 J	---	54.8	54.8	13GWT1001
COPPER	20/26	0.83 J	89.5 J	0.26 - 1.1	7.01	9.04	13GWT2501
IRON	23/26	127 J	143000 J	25 - 117	10386	11736	13GWT2001
LEAD	11/26	1.1 J	54.3 J	0.14 - 2	5.53	12.6	13GWT2501
LITHIUM	26/26	2.3 J	340 J	---	79.9	79.9	13GWT2001
MAGNESIUM	26/26	2230 J	70300 J	---	22155	22155	13GWT2001
MANGANESE	24/26	172 J	11600 J	56.3 - 57.6	1393	1507	13GWT2001
MERCURY	5/26	0.032 J	0.16 J	0.02 - 0.2	0.0526	0.0876	13GWT0101, 13GWT0701
NICKEL	26/26	2.9 J	477 J	---	111	111	13GWT2001
POTASSIUM	26/26	240 J	11000 J	---	3133	3133	13GWT2501
SELENIUM	1/26	1.8 J	1.8 J	0.05 - 1.1	0.209	1.80	13GWT2501
SODIUM	26/26	6030 J	160000 J	---	38917	38917	13GWT1901
STRONTIUM	26/26	14.5 J	396 J	---	105	105	13GWT0201
TITANIUM	24/26	2.5 J	285 J	1.9 - 2.1	34.3	37.0	13GWT2501
VANADIUM	10/26	0.63 J	75.3 J	0.05 - 0.72	6.45	16.6	13GWT2501
ZINC	26/26	3 J	661 J	---	129	129	13GWT2001
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	7/7	226 J	11800 J	---	2013	2013	13GWT2001-F
ARSENIC, FILTERED	3/7	0.8 J	1.7 J	0.36 - 0.51	0.681	1.30	13GWT2001-F
BARIUM, FILTERED	7/7	15.6 J	71.1 J	---	37.3	37.3	13GWT0301-F
BERYLLIUM, FILTERED	2/7	2 J	5.6 J	0.05 - 1.1	1.22	3.80	13GWT2001-F
CALCIUM, FILTERED	7/7	2980 J	70900 J	---	37783	37783	13GWT2001-F

TABLE 3-34

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 1
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect
CHROMIUM, FILTERED	3/7	1.3 J	2.7 J	0.2 - 0.81	1.09	2.20	13GWT2001-F
COBALT, FILTERED	7/7	1.3 J	230 J	---	54.7	54.7	13GWT2001-F
COPPER, FILTERED	6/7	2.8 J	10.6 J	0.63	4.49	5.18	13GWT2001-F
IRON, FILTERED	7/7	93.8 J	142000 J	---	20799	20799	13GWT2001-F
LEAD, FILTERED	1/7	11.5 J	11.5 J	0.21 - 0.91	1.82	11.5	13GWT2001-F
LITHIUM, FILTERED	7/7	9.7 J	322 J	---	94.8	94.8	13GWT2001-F
MAGNESIUM, FILTERED	7/7	2500 J	67900 J	---	24700	24700	13GWT2001-F
MANGANESE, FILTERED	7/7	133 J	11500 J	---	2179	2179	13GWT2001-F
NICKEL, FILTERED	7/7	3.2 J	470 J	---	120	120	13GWT2001-F
POTASSIUM, FILTERED	7/7	366 J	7110 J	---	4082	4082	13GWT0601-F
SELENIUM, FILTERED	1/7	2 J	2 J	0.19 - 0.33	0.403	2.00	13GWT2501-F
SODIUM, FILTERED	7/7	21800 J	55000 J	---	39300	39300	13GWT0501-F
STRONTIUM, FILTERED	7/7	13.6 J	188 J	---	99.2	99.2	13GWT0501-F
TITANIUM, FILTERED	6/7	2.6 J	9.3 J	2.8	5.34	6.00	13GWT0601-F
VANADIUM, FILTERED	1/7	1.1 J	1.1 J	0.05 - 0.8	0.338	1.10	13GWT0601-F
ZINC, FILTERED	7/7	3.6 J	695	---	166	166	13GWT2001-F
Field Parameters							
DISSOLVED OXYGEN - METER	28/28	0.11	4.5	---	2.01	2.01	13GWT0301
OXIDATION REDUCTION POTENTIAL (MV)	28/28	-30.4	364	---	201	201	13GWT1001
PH (S.U.)	28/28	3.01	6.63	---	4.91	4.91	13GWT0601
SPECIFIC CONDUCTANCE (MS/CM)	28/28	0.106	1.504	---	0.592	0.592	13GWT2001
TEMPERATURE (°C)	28/28	12	16.76	---	14.6	14.6	13GWT2401
TURBIDITY (NTU)	28/28	0	999 >	---	83.4	83.4	13GWT2501
Miscellaneous Parameters (mg/L)							
AMMONIA-N	21/26	0.01	3.3	0.01	0.328	0.405	13GWT0901
NITRITE/NITRATE-N	17/26	0.03	92	0.02	3.76	5.74	13GWT0901

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-35

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detects
Energetics (ug/L)							
1,3,5-TRINITROBENZENE	2/40	1.3	1.3 J	0.039 - 0.301	0.174	1.30	13GWT0903, 13GWT2102
1,3-DINITROBENZENE	2/40	1.8 J	2.4	0.039 - 0.301	0.214	2.10	13GWT0903
2,4,6-TRINITROTOLUENE	4/40	1.6	69 J	0.039 - 0.301	2.73	26.3	13GWT2102
2,4-DIAMINO-6-NITROTOLUENE	4/40	0.77 J	3.9	0.24 - 0.301	0.292	1.74	13GWT0903
2,4-DINITROTOLUENE	3/40	0.48 J	1.4 J	0.039 - 0.301	0.182	1.03	13GWT2102
2,6-DIAMINO-4-NITROTOLUENE	1/40	1.8 J	1.8 J	0.24 - 0.301	0.172	1.80	13GWT1102
2,6-DINITROTOLUENE	3/40	1.2 J	9.9	0.039 - 0.301	0.528	5.63	13GWT0903
2-AMINO-4,6-DINITROTOLUENE	5/40	0.28 J	13	0.039 - 0.301	0.632	4.24	13GWT0903
4-AMINO-2,6-DINITROTOLUENE	7/40	0.29 J	18	0.039 - 0.301	0.965	4.95	13GWT0903
DNX	10/40	0.31 J	50 J	0.24 - 0.301	2.83	10.9	13GWT2102
HMX	34/40	0.3 J	640	0.243 - 0.278	35.4	41.7	13GWT2102
MNX	13/40	0.32 J	11	0.24 - 0.291	1.52	4.40	13GWT1702
RDX	35/40	0.27 J	7700	0.258 - 0.278	313	358	13GWT2102
TNX	6/40	0.31 J	2.4	0.24 - 0.301	0.299	1.26	13GWT3901
Total Metals (ug/L)							
ALUMINUM	29/40	193 J	139000 J	14.2 - 332	7888	10859	13GWT0502
ARSENIC	10/40	1.6 J	24.1 J	0.07 - 1.1	1.95	7.12	13GWT0502
BARIUM	40/40	11.3 J	727 J	---	75.3	75.3	13GWT0502
BERYLLIUM	11/40	2.3 J	12.8 J	0.03 - 2.1	1.71	5.43	13GWT4701
CADMIUM	1/40	2.7 J	2.7 J	0.04 - 1.5	0.234	2.70	13GWT2502
CALCIUM	40/40	1720 J	113000 J	---	28078	28078	13GWT0202
CHROMIUM	12/40	1.7 J	145 J	0.17 - 1.4	8.41	27.3	13GWT0502
COBALT	35/40	2.2 J	210 J	0.48 - 14.8	41.3	46.9	13GWT1002
COPPER	19/40	1.3 J	82.8 J	0.19 - 1.6	6.29	12.8	13GWT2502
IRON	27/40	162 J	120000 J	38.2 - 440	12459	18410	13GWT2003
LEAD	12/40	3 J	51.3 J	0.04 - 2	5.15	16.4	13GWT2502
MAGNESIUM	40/40	2370 J	69800 J	---	20375	20375	13GWT0202
MANGANESE	33/40	33.6 J	9770 J	48.3 - 566	1255	1487	13GWT2003
MERCURY	9/40	0.007 J	0.39	0.007 - 0.02	0.0380	0.149	13GWT0102
NICKEL	40/40	2.9 J	400 J	---	91.0	91.0	13GWT4701
POTASSIUM	40/40	358 J	27500 J	---	3597	3597	13GWT0502
SELENIUM	1/40	4.1 J	4.1 J	0.04 - 1.3	0.196	4.10	13GWT2502
SODIUM	40/40	6800 J	129000 J	---	37716	37716	13GWT0202
TITANIUM	22/40	2.8 J	659 J	0.13 - 2.2	47.5	85.9	13GWT0502
VANADIUM	10/40	1.9 J	135 J	0.06 - 1.4	7.93	31.2	13GWT0502
ZINC	35/40	2.7 J	1070 J	2.8 - 6.8	128	146	13GWT4701
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	3/10	434 J	1990 J	18.3 - 164	348	1071	13GWT1502-F
ARSENIC, FILTERED	2/10	1.6 J	8.6 J	0.12 - 0.87	1.17	5.10	13GWT1502-F

TABLE 3-35

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Miniimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detects
BARIUM, FILTERED	10/10	14.3 J	93.6 J	---	37.3	37.3	13GWT3901-F
BERYLLIUM, FILTERED	2/10	2.5 J	5.2 J	0.03 - 1.5	0.904	3.85	13GWT1502-F
CALCIUM, FILTERED	10/10	2250 J	48000 J	---	21702	21702	13GWT3901-F
COBALT, FILTERED	9/10	1.9 J	82.8 J	0.11	26.3	29.2	13GWT1502-F
COPPER, FILTERED	3/10	2.5 J	6.2 J	0.35 - 1.8	1.56	3.93	13GWT0302-F
IRON, FILTERED	4/10	447 J	16000 J	27.1 - 219	2358	5799	13GWT1502-F
LEAD, FILTERED	1/10	35.7 J	35.7 J	0.04 - 1	3.72	35.7	13GWT1502-F
MAGNESIUM, FILTERED	10/10	2190 J	26000 J	---	12388	12388	13GWT0502-F
MANGANESE, FILTERED	10/10	20.9 J	2000 J	---	743	743	13GWT4201-F
NICKEL, FILTERED	9/10	3.6 J	180 J	1.6	60.4	67.0	13GWT1502-F
POTASSIUM, FILTERED	9/10	1440 J	4540 J	151	2345	2597	13GWT3901-F
SELENIUM, FILTERED	1/10	2.5 J	2.5 J	0.04 - 0.76	0.344	2.50	13GWT2502-F
SODIUM, FILTERED	10/10	7100 J	50500 J	---	26620	26620	13GWT0502-F
TITANIUM, FILTERED	1/10	3.6 J	3.6 J	0.42 - 3.8	1.08	3.60	13GWT2502-F
ZINC, FILTERED	10/10	2.1 J	222 J	---	79.2	79.2	13GWT1502-F
Field Parameters							
ALKALINITY	4/22	0	90	10	12.0	43.8	13GWT2402
CARBON DIOXIDE	22/22	23	400	---	94.8	94.8	13GWT2003
DISSOLVED OXYGEN	22/22	0.02	11	---	3.08	3.08	13GWT1302
DISSOLVED OXYGEN - METER	40/40	0.44	34.37	---	4.83	4.83	13GWT1902
HYDROGEN SULFIDE (H2S)	22/22	0	0	---	---	---	---
IRON(+2)	22/22	0	3.3 >	---	1.07	1.07	Multiple Samples
MANGANESE(+2)	22/22	0	8.3	---	1.19	1.19	13GWT2003
NITRITE-N	22/22	0	0.031	---	0.00559	0.00559	13GWT2102
OXIDATION REDUCTION POTENTIAL (MV)	40/40	-473	432	---	245	245	13GWT0502
PH (S.U.)	40/40	3.34	6.45	---	5.08	5.08	13GWT0602
SPECIFIC CONDUCTANCE (MS/CM)	40/40	0.076	1634	---	41.3	41.3	13GWT4701
SULFIDE	22/22	0	0.14	---	0.0318	0.0318	13GWT1502
TEMPERATURE (°C)	40/40	8.83	19.73	---	14.0	14.0	13GWT1002
TURBIDITY (NTU)	40/40	0	1000 >	---	47.4	47.4	13GWT4201
Miscellaneous Parameters (mg/L)							
AMMONIA-N	26/40	0.01	3.4	0.005 - 0.01	0.277	0.424	13GWT0903
NITRITE/NITRATE-N	29/40	0.05 J	54 J	0.025 - 0.05	1.61	2.22	13GWT0903
TOTAL ORGANIC CARBON	2/3	1	1.1	0.5	0.783	1.05	13GWT1502

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-36

DESCRIPTIVE STATISTICS FOR
UPPER AQUIFER GROUNDWATER SAMPLES ROUND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Energetics (ug/L)							
1,3,5-TRINITROBENZENE	2/40	0.4 J	1.1	0.24 - 0.29	0.161	0.750	13GWT0904
1,3-DINITROBENZENE	3/40	0.46 J	2.1	0.24 - 0.29	0.205	1.12	13GWT0904
2,4,6-TRINITROTOLUENE	4/40	2.2	26	0.24 - 0.29	1.70	15.8	13GWT2103
2,4-DINITROTOLUENE	4/40	0.61 J	1.6	0.24 - 0.29	0.224	1.07	13GWT1103
2,6-DINITROTOLUENE	4/40	1 J	8.8 J	0.24 - 0.29	0.485	3.68	13GWT0904
2-AMINO-4,6-DINITROTOLUENE	6/40	0.28 J	15 J	0.24 - 0.29	0.872	5.08	13GWT0904
2-NITROTOLUENE	2/40	0.37 J	1	0.24 - 0.29	0.157	0.685	13GWT2403
3-NITROTOLUENE	1/40	0.58 J	0.58 J	0.24 - 0.29	0.141	0.580	13GWT1103
4-AMINO-2,6-DINITROTOLUENE	9/40	0.26 J	19	0.24 - 0.29	1.25	5.09	13GWT0904
HMX	32/40	0.3 J	460	0.24 - 0.27	40.4	50.4	13GWT2103
RDX	33/40	0.3 J	4000	0.24 - 0.27	258	313	13GWT2103
Total Metals (ug/L)							
ALUMINUM	5/5	510 J	17400 J	---	5991	5991	13GWT4702
ARSENIC	2/5	2.1 J	4.1 J	0.55 - 0.8	1.44	3.10	13GWT4702
BARIUM	5/5	12.6 J	50.6 J	---	30.0	30.0	13GWT3302
BERYLLIUM	2/5	5.2 J	12.4 J	0.37 - 1.4	3.80	8.80	13GWT4702
CALCIUM	5/5	4300 J	49200 J	---	29700	29700	13GWT2004
CHROMIUM	1/5	6.1 J	6.1 J	1.6 - 2.2	1.96	6.10	13GWT3302
COBALT	5/5	7 J	249 J	---	111	111	13GWT4702
COPPER	2/5	18.2 J	35.2 J	4.1 - 6.9	12.2	26.7	13GWT4702
IRON	5/5	485 J	124000 J	---	34627	34627	13GWT2004
LEAD	4/5	2.9 J	14.8 J	1.5	6.25	7.63	13GWT4702
MAGNESIUM	5/5	3600 J	52200 J	---	26660	26660	13GWT2004
MANGANESE	5/5	125 J	8390 J	---	2535	2535	13GWT2004
NICKEL	5/5	21.8 J	463 J	---	227	227	13GWT4702
POTASSIUM	5/5	1340 J	4950 J	---	2540	2540	13GWT2004
SODIUM	5/5	11700 J	69900 J	---	44660	44660	13GWT4702
VANADIUM	3/5	1.1 J	6.2 J	0.16 - 0.27	1.78	2.90	13GWT3302
ZINC	5/5	49.6 J	1220 J	---	441	441	13GWT4702
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	2/3	124 J	154 J	66.5	104	139	13GWT2503-F
BARIUM, FILTERED	3/3	27.9 J	36.3 J	---	32.2	32.2	13GWT2503-F
CALCIUM, FILTERED	3/3	3290 J	26100 J	---	16697	16697	13GWT0503-F
COBALT, FILTERED	3/3	6.7 J	54.2 J	---	33.0	33.0	13GWT2503-F
COPPER, FILTERED	1/3	13.1 J	13.1 J	4 - 5.2	5.90	13.1	13GWT2503-F
IRON, FILTERED	2/3	130 J	201 J	55.3	120	166	13GWT3302-F
MAGNESIUM, FILTERED	3/3	3300 J	20000 J	---	11467	11467	13GWT0503-F
MANGANESE, FILTERED	3/3	105 J	287 J	---	168	168	13GWT3302-F
NICKEL, FILTERED	3/3	21.7 J	118 J	---	75.8	75.8	13GWT2503-F
POTASSIUM, FILTERED	3/3	562 J	1550 J	---	1217	1217	13GWT2503-F
SODIUM, FILTERED	3/3	12200 J	40500 J	---	28667	28667	13GWT0503-F
ZINC, FILTERED	3/3	19 J	168 J	---	104	104	13GWT0503-F
Field Parameters							
DISSOLVED OXYGEN	40/40	0.2	27.18	---	5.55	5.55	13GWT1903
OXIDATION REDUCTION POTENTIAL (MV)	40/40	2.8	752	---	297	297	13GWT2603
PH (S.U.)	40/40	3.26	7.32	---	5.05	5.05	13GWT2103
SPECIFIC CONDUCTANCE (MS/CM)	40/40	0.085	1.501	---	0.511	0.511	13GWT0203
TEMPERATURE (°C)	40/40	14.5	21.8	---	18.4	18.4	13GWT2503
TURBIDITY (NTU)	40/40	0.4	1000 >	---	36.1	36.1	13GWT4202

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV - threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-37

DESCRIPTIVE STATISTICS FOR
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
2-NITROTOLUENE	1/14	0.45 J	0.45 J	0.236 - 0.278	0.150	0.450	13GWT4102
3-NITROTOLUENE	1/14	0.34 J	0.34 J	0.236 - 0.278	0.141	0.340	13GWT4501
Total Metals (ug/L)							
ALUMINUM	7/7	135 J	29800 J	---	9514	9514	13GWT4101
ANTIMONY	4/7	2.9 J	6.7 J	0.05 - 0.81	2.82	4.75	13GWT3501
ARSENIC	5/7	2.1 J	24.5 J	0.5 - 1.4	11.2	15.5	13GWT3801
BARIUM	7/7	23.1 J	114 J	---	60.5	60.5	13GWT4101
CALCIUM	7/7	5790 J	67700 J	---	22113	22113	13GWT4601
CHROMIUM	5/7	5.6 J	38.7 J	0.43 - 0.67	14.9	20.7	13GWT4101
COBALT	4/7	2 J	11.2 J	0.36 - 1.6	3.31	5.43	13GWT4101
COPPER	4/7	1.6 J	10.9 J	0.25 - 1.4	3.49	5.85	13GWT4101
IRON	7/7	168 J	23700 J	---	6574	6574	13GWT4101
LEAD	3/7	5.8 J	12 J	0.37 - 2.5	3.96	8.33	13GWT4101
MAGNESIUM	7/7	1040 J	34100 J	---	8666	8666	13GWT4601
MANGANESE	6/7	58.1 J	495 J	300	154	154	13GWT4601
NICKEL	6/7	3.1 J	34 J	1.4	11.2	13.0	13GWT4101
POTASSIUM	7/7	3260 J	10100 J	---	5207	5207	13GWT3501
SELENIUM	2/7	4.1 J	5.1 J	0.13 - 2.2	1.72	4.60	13GWT4101
SODIUM	7/7	71400 J	166000 J	---	114371	114371	13GWT3501
TITANIUM	6/7	5.4 J	104 J	1.6	56.5	65.8	13GWT3501
VANADIUM	5/7	6.7 J	33.9 J	0.33 - 0.58	15.8	22.1	13GWT4101
ZINC	7/7	0.5 J	77.6 J	---	20.2	20.2	13GWT4101
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	1/5	285 J	285 J	95.6 - 130	100	285	13GWT3801-F
ANTIMONY, FILTERED	4/5	3 J	7.3 J	1	4.08	4.98	13GWT3501-F
ARSENIC, FILTERED	4/5	9.4 J	21.3 J	1.4	11.6	14.4	13GWT3801-F
BARIUM, FILTERED	5/5	9.6 J	43.8 J	---	26.2	26.2	13GWT4501-F
CALCIUM, FILTERED	5/5	3980 J	17300 J	---	12148	12148	13GWT4101-F
CHROMIUM, FILTERED	1/5	2.3 J	2.3 J	0.34 - 0.81	0.716	2.30	13GWT3501-F
COBALT, FILTERED	3/5	3 J	3.9 J	0.55 - 1.5	2.21	3.33	13GWT4101-F
MAGNESIUM, FILTERED	4/5	1800 J	3160 J	140	2194	2725	13GWT4501-F
MANGANESE, FILTERED	2/5	9 J	104 J	3.7 - 30.9	26.5	56.5	13GWT4501-F
NICKEL, FILTERED	2/5	2.6 J	3.1 J	0.48 - 1.4	1.40	2.85	13GWT2801-F
POTASSIUM, FILTERED	5/5	1880 J	5390 J	---	3370	3370	13GWT3501-F
SELENIUM, FILTERED	2/5	3.9 J	4.2 J	1.6 - 2.4	2.22	4.05	13GWT4101-F
SODIUM, FILTERED	5/5	65200 J	161000 J	---	104360	104360	13GWT3501-F
VANADIUM, FILTERED	3/5	2 J	7 J	0.68	2.50	3.93	13GWT3801-F
ZINC, FILTERED	4/5	2.8 J	17 J	1.7	5.63	6.83	13GWT4101-F
Field Parameters							
ALKALINITY	3/3	108	200	---	153	153	13GWT3501
DISSOLVED OXYGEN	10/10	0.05	7.97	---	2.16	2.16	13GWT4502
DISSOLVED OXYGEN - METER	7/7	0.55	5.28	---	2.37	2.37	13GWT3501
HYDROGEN SULFIDE (H2S)	3/3	0	0	---	---	---	---

TABLE 3-37

DESCRIPTIVE STATISTICS FOR
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect
IRON(+2)	3/3	0	0.02	---	0.0100	0.0100	13GWT3501
MANGANESE(+2)	3/3	0	0.1	---	0.0333	0.0333	13GWT3801
NITRITE-N	3/3	0	0.007	---	0.00233	0.00233	13GWT2801
OXIDATION REDUCTION POTENTIAL (MV)	13/13	-70	170	---	63.4	63.4	13GWT4101
PH (S.U.)	14/14	6.25	11.39	---	8.02	8.02	13GWT3801
SPECIFIC CONDUCTANCE (MS/CM)	14/14	0.332	1.217	---	0.708	0.708	13GWT2802
SULFIDE	3/3	0	0.01	---	0.00333	0.00333	13GWT3501
TEMPERATURE (°C)	14/14	11.37	25.29	---	16.0	16.0	13GWT4502
TURBIDITY (NTU)	14/14	2.81	1000 >	---	334	334	13GWT3501, 13GWT3502, 13GWT4101
Miscellaneous Parameters (mg/L)							
AMMONIA-N	7/7	0.12	0.56	---	0.349	0.349	13GWT3501
NITRITE/NITRATE-N	3/7	0.11	0.66 J	0.025 - 0.05	0.195	0.427	13GWT2801

Lower aquifer groundwater samples were only collected in Rounds 2 and 3.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-38

DESCRIPTIVE STATISTICS FOR
LOWER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
3-NITROTOLUENE	1/7	0.34 J	0.34 J	0.236 - 0.278	0.159	0.340	13GWT4501
Total Metals (ug/L)							
ALUMINUM	7/7	135 J	29800 J	---	9514	9514	13GWT4101
ANTIMONY	4/7	2.9 J	6.7 J	0.05 - 0.81	2.82	4.75	13GWT3501
ARSENIC	5/7	2.1 J	24.5 J	0.5 - 1.4	11.2	15.5	13GWT3801
BARIUM	7/7	23.1 J	114 J	---	60.5	60.5	13GWT4101
CALCIUM	7/7	5790 J	67700 J	---	22113	22113	13GWT4601
CHROMIUM	5/7	5.6 J	38.7 J	0.43 - 0.67	14.9	20.7	13GWT4101
COBALT	4/7	2 J	11.2 J	0.36 - 1.6	3.31	5.43	13GWT4101
COPPER	4/7	1.6 J	10.9 J	0.25 - 1.4	3.49	5.85	13GWT4101
IRON	7/7	168 J	23700 J	---	6574	6574	13GWT4101
LEAD	3/7	5.8 J	12 J	0.37 - 2.5	3.96	8.33	13GWT4101
MAGNESIUM	7/7	1040 J	34100 J	---	8666	8666	13GWT4601
MANGANESE	6/7	58.1 J	495 J	300	154	154	13GWT4601
NICKEL	6/7	3.1 J	34 J	1.4	11.2	13.0	13GWT4101
POTASSIUM	7/7	3260 J	10100 J	---	5207	5207	13GWT3501
SELENIUM	2/7	4.1 J	5.1 J	0.13 - 2.2	1.72	4.60	13GWT4101
SODIUM	7/7	71400 J	166000 J	---	114371	114371	13GWT3501
TITANIUM	6/7	5.4 J	104 J	1.6	56.5	65.8	13GWT3501
VANADIUM	5/7	6.7 J	33.9 J	0.33 - 0.58	15.8	22.1	13GWT4101
ZINC	7/7	0.5 J	77.6 J	---	20.2	20.2	13GWT4101
Dissolved Metals (ug/L)							
ALUMINUM, FILTERED	1/5	285 J	285 J	95.6 - 130	100	285	13GWT3801-F
ANTIMONY, FILTERED	4/5	3 J	7.3 J	1	4.08	4.98	13GWT3501-F
ARSENIC, FILTERED	4/5	9.4 J	21.3 J	1.4	11.6	14.4	13GWT3801-F
BARIUM, FILTERED	5/5	9.6 J	43.8 J	---	26.2	26.2	13GWT4501-F
CALCIUM, FILTERED	5/5	3980 J	17300 J	---	12148	12148	13GWT4101-F
CHROMIUM, FILTERED	1/5	2.3 J	2.3 J	0.34 - 0.81	0.716	2.30	13GWT3501-F
COBALT, FILTERED	3/5	3 J	3.9 J	0.55 - 1.5	2.21	3.33	13GWT4101-F
MAGNESIUM, FILTERED	4/5	1800 J	3160 J	140	2194	2725	13GWT4501-F
MANGANESE, FILTERED	2/5	9 J	104 J	3.7 - 30.9	26.5	56.5	13GWT4501-F
NICKEL, FILTERED	2/5	2.6 J	3.1 J	0.48 - 1.4	1.40	2.85	13GWT2801-F
POTASSIUM, FILTERED	5/5	1880 J	5390 J	---	3370	3370	13GWT3501-F
SELENIUM, FILTERED	2/5	3.9 J	4.2 J	1.6 - 2.4	2.22	4.05	13GWT4101-F
SODIUM, FILTERED	5/5	65200 J	161000 J	---	104360	104360	13GWT3501-F
VANADIUM, FILTERED	3/5	2 J	7 J	0.68	2.50	3.93	13GWT3801-F
ZINC, FILTERED	4/5	2.8 J	17 J	1.7	5.63	6.83	13GWT4101-F

TABLE 3-38

DESCRIPTIVE STATISTICS FOR
LOWER AQUIFER GROUNDWATER SAMPLES ROUND 2
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Field Parameters							
ALKALINITY	3/3	108	200	---	153	153	13GWT3501
DISSOLVED OXYGEN	3/3	0.5	5.5	---	3.17	3.17	13GWT3501
DISSOLVED OXYGEN - METER	7/7	0.55	5.28	---	2.37	2.37	13GWT3501
HYDROGEN SULFIDE (H2S)	3/3	0	0	---	---	---	---
IRON(+2)	3/3	0	0.02	---	0.0100	0.0100	13GWT3501
MANGANESE(+2)	3/3	0	0.1	---	0.0333	0.0333	13GWT3801
NITRITE-N	3/3	0	0.007	---	0.00233	0.00233	13GWT2801
OXIDATION REDUCTION POTENTIAL (MV)	7/7	-70	170	---	29.2	29.2	13GWT4101
PH (S.U.)	7/7	6.6	11.39	---	8.65	8.65	13GWT3801
SPECIFIC CONDUCTANCE (MS/CM)	7/7	0.332	1.021	---	0.568	0.568	13GWT4601
SULFIDE	3/3	0	0.01	---	0.00333	0.00333	13GWT3501
TEMPERATURE (°C)	7/7	11.37	14.01	---	13.1	13.1	13GWT4101
TURBIDITY (NTU)	7/7	4.6	1000 >	---	478	478	13GWT3501, 13GWT4101
Miscellaneous Parameters (mg/L)							
AMMONIA-N	7/7	0.12	0.56	---	0.349	0.349	13GWT3501
NITRITE/NITRATE-N	3/7	0.11	0.66 J	0.025 - 0.05	0.195	0.427	13GWT2801

1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-39

DESCRIPTIVE STATISTICS FOR
LOWER AQUIFER GROUNDWATER SAMPLES ROUND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects (1)	Sample of Maximum Detect
Energetics (ug/L)							
2-NITROTOLUENE	1/7	0.45 J	0.45 J	0.24 - 0.26	0.170	0.450	13GWT4102
Field Parameters							
DISSOLVED OXYGEN	7/7	0.05	7.97	---	1.72	1.72	13GWT4502
OXIDATION REDUCTION POTENTIAL (MV)	6/6	72.9	149	---	103	103	13GWT4102
PH (S.U.)	7/7	6.25	8.44	---	7.39	7.39	13GWT3802
SPECIFIC CONDUCTANCE (MS/CM)	7/7	0.665	1.217	---	0.849	0.849	13GWT2802
TEMPERATURE (°C)	7/7	14.1	25.29	---	19.0	19.0	13GWT4502
TURBIDITY (NTU)	7/7	2.81	1000 >	---	189	189	13GWT3502

1 - Mean concentrations incorporate TV/2 for non-detect values where TV - threshold value.
J - estimated value
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-40

DESCRIPTIVE STATISTICS FOR
VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detects
Energetics (ug/L)							
2-AMINO-4,6-DINITROTOLUENE	1/4	0.39 J	0.39 J	0.27 - 0.275	0.199	0.390	13GWT5101
4-AMINO-2,6-DINITROTOLUENE	1/4	0.62	0.62	0.27 - 0.275	0.257	0.620	13GWT4901
HMX	3/4	0.86	120	0.27	37.0	49.3	13GWT5101
RDX	3/4	0.54 J	250	0.27	70.7	94.2	13GWT5101
Total Metals (ug/L)							
ALUMINUM	2/4	93.9 J	1990 J	8.35 - 39.4	527	1042	13GWT5101
ARSENIC	2/4	1.2 J	2 J	0.21 - 0.43	0.880	1.60	13GWT5101
BARIUM	4/4	67 J	148 J	---	109	109	13GWT5001
CALCIUM	4/4	22700 J	148000 J	---	75625	75625	13GWT4801
CHROMIUM	1/4	4.6 J	4.6 J	0.81 - 0.98	1.48	4.60	13GWT5101
COBALT	3/4	1.1 J	29 J	0.97	8.20	10.8	13GWT5101
COPPER	1/4	1.4 J	1.4 J	0.46 - 3.4	0.910	1.40	13GWT5001
IRON	3/4	92.9 J	5620 J	26.9	1471	1957	13GWT5101
LEAD	1/4	2.8 J	2.8 J	0.069 - 0.14	0.736	2.80	13GWT5101
MAGNESIUM	4/4	9000 J	45700 J	---	19950	19950	13GWT5001
MANGANESE	4/4	146	3370 J	---	1007	1007	13GWT5101
NICKEL	4/4	2.2 J	22.4 J	---	9.38	9.38	13GWT5101
POTASSIUM	4/4	4220 J	20100 J	---	10358	10358	13GWT5101
SELENIUM	1/4	6 J	6 J	0.094 - 0.18	1.55	6.00	13GWT5001
SODIUM	4/4	7740 J	146000 J	---	48895	48895	13GWT5001
VANADIUM	1/4	4.9 J	4.9 J	1.14	1.65	4.90	13GWT5101
Dissolved Metals (ug/L)							
BARIUM, FILTERED	1/1	51.6 J	51.6 J	---	51.6	51.6	13GWT5101-F
CALCIUM, FILTERED	1/1	24700 J	24700 J	---	24700	24700	13GWT5101-F
COBALT, FILTERED	1/1	30.4 J	30.4 J	---	30.4	30.4	13GWT5101-F
MAGNESIUM, FILTERED	1/1	8400 J	8400 J	---	8400	8400	13GWT5101-F
MANGANESE, FILTERED	1/1	3890 J	3890 J	---	3890	3890	13GWT5101-F
NICKEL, FILTERED	1/1	18.8 J	18.8 J	---	18.8	18.8	13GWT5101-F
POTASSIUM, FILTERED	1/1	20800 J	20800 J	---	20800	20800	13GWT5101-F
SODIUM, FILTERED	1/1	7410 J	7410 J	---	7410	7410	13GWT5101-F
Field Parameters							
DISSOLVED OXYGEN	4/4	0.15	8.32	---	2.80	2.80	13GWT5101
OXIDATION REDUCTION POTENTIAL (MV)	4/4	104.4	299	---	190	190	13GWT5101
PH (S.U.)	4/4	5.94	7.18	---	6.61	6.61	13GWT5001
SPECIFIC CONDUCTANCE (MS/CM)	4/4	0.278	0.881	---	0.582	0.582	13GWT5001
TEMPERATURE (°C)	4/4	16.11	20.57	---	19.2	19.2	13GWT5101
TURBIDITY (NTU)	4/4	1.54	33	---	11.2	11.2	13GWT5101

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Valley aquifer samples were only collected in Round 3.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
MV - millivolts
°C - degrees Celsius
S.U. - standard unit
NTU - nephelometric turbidity unit
ms/cm - milliSiemen per centimeter

TABLE 3-41

SUMMARY OF CHEMICALS DETECTED IN
OVERBURDEN GROUNDWATER SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006
SAMPLE NUMBER	13GWTW001	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006
SAMPLE CODE	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006
Energetics (ug/L)						
2,4,6-TRINITROTOLUENE	0.266 U	0.275 UJ	4 J	0.25 U	1.7 U	0.301 UJ
2,6-DINITROTOLUENE	0.266 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.275 UJ	0.95 J	0.25 U	1.7 U	0.76 J
4-AMINO-2,6-DINITROTOLUENE	0.78	0.275 UJ	1.3 J	0.59	3.7	2.1 J
HMX	17	3.6 J	13 J	140	33	150 J
RDX	190	10 J	160	1200	100	120 J
Field Parameters						
DISSOLVED OXYGEN (MG/L)	0.91	4.94		9.03		
OXIDATION REDUCTION POTENTIAL (MV)	-68	141		195		
PH (S.U.)	6.87	6.46		7.75		
SPECIFIC CONDUCTANCE (MS/CM)	1.583	1.066		2.479		
TEMPERATURE (C)	9.80	9.53		3.85		
TURBIDITY (NTU)	39	1000 >		65		

TABLE 3-41

SUMMARY OF CHEMICALS DETECTED IN
OVERBURDEN GROUNDWATER SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13TW007	13TW008	13TW009	13TW010	13TW011	13TW012
SAMPLE NUMBER	13GWTW007	13GWTW008	13GWTW009	13GWTW010	13GWTW011	13GWTW012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/16/2006	2/16/2006	2/16/2006	2/16/2006	3/1/2006	2/28/2006
Energetics (ug/L)						
2,4,6-TRINITROTOLUENE	0.281 UJ	0.298 UJ	0.281 UJ	7.2	0.27 U	250
2,6-DINITROTOLUENE	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U	0.27 U	6.8 J
2-AMINO-4,6-DINITROTOLUENE	0.281 UJ	0.298 UJ	0.83 J	1.9 J	0.27 U	9 J
4-AMINO-2,6-DINITROTOLUENE	0.281 UJ	0.298 UJ	1.4 J	5.6	0.27 U	22
HMX	0.281 UJ	1.3 J	81 J	60	1.4 J	270
RDX	1.4 J	3.8 J	120 J	240	7.3	150
Field Parameters						
DISSOLVED OXYGEN (MG/L)		3.89		0.29	0.91	
OXIDATION REDUCTION POTENTIAL (MV)		-7		28	-100	
PH (S.U.)		6.38		6.75	6.87	
SPECIFIC CONDUCTANCE (MS/CM)		0.215		0.740	0.559	
TEMPERATURE (C)		9.66		7.96	10.73	
TURBIDITY (NTU)		1000 >		39	6.9	

1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
°C - degrees Celsius
ES/DI - External Sump/Drainage Investigation
Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
J - estimated value
mg/L = milligrams per liter
ms/cm - milliSiemen per centimeter
MV - millivolts
NTU - nephelometric turbidity unit
S.U. - standard unit
U - non-detect
UJ – Indicates that the chemical was not detected; however, the detection limit is considered to be estimated based on problems encountered during laboratory analysis.
> - Indicates that the true value is probably greater than the reported value.

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
Volatile Organics (ug/L)											
TRICHLOROETHENE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
1,3-DINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,4,6-TRINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,4-DIAMINO-6-NITROTOLUENE		0.263 U			0.278 U				0.255 U		
2,4-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,6-DIAMINO-4-NITROTOLUENE		0.263 U			0.278 U				0.255 U		
2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
3-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
4-AMINO-2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
4-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
DNX		0.263 U			0.278 U				0.255 U		
HMX	1	1	1.3	0.495 U	0.278 U	0.26 U	0.29 J		0.51 J		0.38 J
MNX		0.263 U			0.278 U				0.255 U		
RDX	0.44 U	0.35 J	0.3 J	0.465 U	0.278 U	0.26 U	0.25 U		0.3 J		0.33 J
TNX		0.263 U			0.278 U				0.255 U		
Total Metals (ug/L)											
ALUMINUM	598 J	699 J		659 J	244 J		3990 J		627 J		
ARSENIC	0.23 U	0.17 U		0.65 J	0.87 U		1 J		0.31 U		
BARIUM	55.4 J	46.8 J		27.5 J	18.1 J		74.5 J		62.1 J		
BERYLLIUM	1.2 U	1.2 U		0.63 U	0.3 U		1.2 U		1.8 U		
CADMIUM	0.18 U	0.06 U		0.38 U	0.34 U		0.82 U		0.37 U		
CALCIUM	9720 J	7190 J		94100 J	113000 J		34800 J		26100 J		
CHROMIUM	0.2 U	0.73 U		1.1 J	0.71 U		7.1 J		1.4 U		
COBALT	36 J	29.9 J		119 J	71 J		48.8 J		25 J		
COPPER	2.9 J	1.4 U		2.7 J	2 J		5.6 J		3.2 J		
IRON	135 J	61.7 U		10500 J	15200 J		1910 J		344 U		
LEAD	1.4 U	1.2 U		0.53 U	0.36 U		2 U		0.67 U		
LITHIUM	21.1 J			208 J			74 J				
MAGNESIUM	6790 J	5850 J		60200 J	69800 J		17000 J		15800 J		
MANGANESE	689 J	566 U		4580 J	5100 J		302 J		211 J		
MERCURY	0.16 J	0.39		0.02 U	0.007 U		0.02 U		0.02 U		
NICKEL	26.6 J	21.1 J		289 J	170 J		99.7 J		76.3 J		
POTASSIUM	494 J	403 J		6910 J	7090 J		2860 J		1040 J		
SELENIUM	0.17 U	0.05 U		0.91 U	0.27 U		0.32 U		0.04 U		
SODIUM	24300 J	26100 J		102000 J	129000 J		37400 J		40700 J		
STRONTIUM	53.3 J			396 J			97.8 J				
TITANIUM	4 J	0.21 U		5.8 J	2.2 U		32 J		8.5 J		
VANADIUM	0.08 U	0.06 U		0.68 J	0.39 U		5.8 J		0.76 U		
ZINC	29.7 J	29.9 J		140 J	96.7 J		161 J		97.7 J		

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED								226 J		790 J	
ARSENIC, FILTERED								0.5 U		0.5 U	
BARIUM, FILTERED								71.1 J		55.8 J	
BERYLLIUM, FILTERED								1.1 U		2.5 J	
CALCIUM, FILTERED								30900 J		27100 J	
CHROMIUM, FILTERED								0.48 U		0.24 U	
COBALT, FILTERED								55.7 J		43.4 J	
COPPER, FILTERED								4.5 J		6.2 J	
IRON, FILTERED								344 J		219 U	
LEAD, FILTERED								0.25 U		0.82 U	
LITHIUM, FILTERED								78.5 J			
MAGNESIUM, FILTERED								16800 J		16000 J	
MANGANESE, FILTERED								300 J		278 J	
NICKEL, FILTERED								107 J		107 J	
POTASSIUM, FILTERED								1890 J		1440 J	
SELENIUM, FILTERED								0.33 U		0.07 U	
SODIUM, FILTERED								35000 J		40600 J	
STRONTIUM, FILTERED								97.1 J			
TITANIUM, FILTERED								2.6 J		3.8 U	
VANADIUM, FILTERED								0.31 U		0.1 U	
ZINC, FILTERED								178		158 J	
Field Parameters											
ALKALINITY					10 U				10 U		
CARBON DIOXIDE					40				50		
DISSOLVED OXYGEN			4.2		4	2.19			6		3.66
DISSOLVED OXYGEN - METER	1.28	1.4		1.98	5.75		4.5		4.45		
HYDROGEN SULFIDE (H2S)					0				0		
IRON(+2)					2.05				0.03		
MANGANESE(+2)					5.4				0.1		
NITRITE-N					0.003				0.006		
OXIDATION REDUCTION POTENTIAL (MV)	220	385.4	461.2	191	157.9	616.2	152.7		345		107.4
PH (S.U.)	4.68	4.17	3.57	4.61	5.25	3.39	5.56		5.32		5.52
SPECIFIC CONDUCTANCE (MS/CM)	0.229	0.233	0.255	1.244	1.23	1.501	0.445		0.487		0.528
SULFIDE					0				0.06		
TEMPERATURE (°C)	12.59	17.04	18.75	15.28	10.43	19.59	13.14		18		19.98
TURBIDITY (NTU)	3.8	4.39	9.5	6.8	6.62	2.3	38		328 >		9.2
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U	0.005 UJ		0.13	0.24 J		0.12		0.07		
NITRITE/NITRATE-N	0.07	0.15 J		0.02 U	0.05 UJ		0.07		0.09		
TOTAL ORGANIC CARBON									0.5 U		

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
Volatile Organics (ug/L)											
TRICHLOROETHENE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
1,3-DINITROBENZENE	0.26 U	0.281 U	0.27 U	0.3 J		0.263 U		0.26 U		0.19 U	
2,4,6-TRINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,4-DIAMINO-6-NITROTOLUENE		0.281 U				0.263 U					
2,4-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,6-DIAMINO-4-NITROTOLUENE		0.281 U				0.263 U					
2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
3-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
4-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
DNX		0.281 U				0.31 J					
HMX	3.3	4.1	4.7	13		10		12		0.97	
MNX		0.281 U				0.263 U					
RDX	4.1	3.4	3.1	0.77 J		1.4		0.85		2	
TNX		0.281 U				0.263 U					
Total Metals (ug/L)											
ALUMINUM	8050 J	1530 J		21700 J		139000 J		510 J		12300 J	
ARSENIC	1.8 J	0.5 U		4.7 J		24.1 J		0.8 U		4 J	
BARIUM	154 J	91.8 J		126 J		727 J		31.9 J		178 J	
BERYLLIUM	3.5 J	1.2 U		1.2 U		5.9 J		1.4 U		0.58 U	
CADMIUM	1.9 U	0.52 U		0.39 U		0.69 U		0.6 U		0.56 U	
CALCIUM	34800 J	19000 J		40200 J		35300 J		30900 J		36700 J	
CHROMIUM	1.5 J	0.49 U		36.4 J		145 J		2 U		18.7 J	
COBALT	111 J	38.8 J		34.2 J		48.6 J		43.2 J		3.6 J	
COPPER	3.8 J	2.1 J		10.1 J		48.3 J		4.1 U		7.3 J	
IRON	5400 J	1530 J		9860 J		68900 J		485 J		12000 J	
LEAD	3.2 J	0.94 U		8.1 J		46.5 J		1.5 U		7.1 J	
LITHIUM	126 J			40 J						15.7 J	
MAGNESIUM	16700 J	8720 J		35700 J		35400 J		24200 J		17700 J	
MANGANESE	1330 J	441 U		172 J		209 J		135 J		505 J	
MERCURY	0.02 U	0.007 U		0.02 U		0.097 J		0.03 U		0.02 U	
NICKEL	314 J	107 J		96.2 J		153 J		99.4 J		11.7 J	
POTASSIUM	7760 J	3920 J		8390 J		27500 J		1750 J		10300 J	
SELENIUM	0.61 U	0.23 U		0.42 U		1.3 U		0.3 U		0.69 U	
SODIUM	22800 J	19000 J		57900 J		49600 J		50800 J		58000 J	
STRONTIUM	101 J			189 J						203 J	
TITANIUM	7.8 J	4.7 J		180 J		659 J				85 J	
VANADIUM	0.79 J	0.32 U		34.3 J		135 J		1.1 J		15.8 J	
ZINC	358 J	97.3 J		114 J		334 J		183 J		30.3 J	

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED					254 J		164 U		124 J		826 J
ARSENIC, FILTERED					0.8 J		0.32 U		0.44 U		0.51 U
BARIUM, FILTERED					22.8 J		26.2 J		27.9 J		41.6 J
BERYLLIUM, FILTERED					0.46 U		0.5 U		0.93 U		0.05 U
CALCIUM, FILTERED					39800 J		33900 J		26100 J		34900 J
CHROMIUM, FILTERED					2.6 J		0.39 U		1.2 U		1.3 J
COBALT, FILTERED					35 J		39.3 J		38.2 J		1.3 J
COPPER, FILTERED					3.4 J		2.5 J		5.2 U		0.63 U
IRON, FILTERED					93.8 J		184 U		55.3 U		772 J
LEAD, FILTERED					0.21 U		0.37 U		0.53 U		0.3 U
LITHIUM, FILTERED					27.4 J						9.7 J
MAGNESIUM, FILTERED					32200 J		26000 J		20000 J		16700 J
MANGANESE, FILTERED					133 J		141 J		111 J		543 J
NICKEL, FILTERED					90.5 J		93.8 J		87.6 J		3.2 J
POTASSIUM, FILTERED					4540 J		2050 J		1540 J		7110 J
SELENIUM, FILTERED					0.28 U		0.17 U		0.1 U		0.29 U
SODIUM, FILTERED					55000 J		50500 J		40500 J		49700 J
STRONTIUM, FILTERED					188 J						159 J
TITANIUM, FILTERED					4.5 J		3.3 U				9.3 J
VANADIUM, FILTERED					0.46 U		0.11 U		0.15 U		1.1 J
ZINC, FILTERED					111 J		190 J		168 J		3.6 J
Field Parameters											
ALKALINITY						10 U					
CARBON DIOXIDE						33					
DISSOLVED OXYGEN			1.62			4		0.87			
DISSOLVED OXYGEN - METER	4.3	4.14		0.6		3.96				3.15	
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0.11					
MANGANESE(+2)						1.3					
NITRITE-N						0.012					
OXIDATION REDUCTION POTENTIAL (MV)	216.1	243.6	455.2	76		432		97		88	
PH (S.U.)	4.77	5.24	5.03	5.83		5.4		6.6		6.63	
SPECIFIC CONDUCTANCE (MS/CM)	0.316	0.228	0.201	0.632		0.558		0.468		0.495	
SULFIDE						0.09					
TEMPERATURE (°C)	13.73	16.45	18.86	15.18		15.42		20.05		12.46	
TURBIDITY (NTU)	6	6.85	7.9	8.8		18.6		75		650	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.39	0.08 J		0.05		0.65				0.02	
NITRITE/NITRATE-N	0.24	0.27 J		0.03		0.09				0.03	
TOTAL ORGANIC CARBON											

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	03	01	02	02	03
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0703	13GWT0801	13GWT0802	13GWT0802-F	13GWT0803
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	ORIG	ORIG	NORMAL
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	7/25/2004	4/26/2003	11/23/2003	11/23/2003	7/23/2004
Volatile Organics (ug/L)										
TRICHLOROETHENE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
1,3-DINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.26 U	0.345 U	0.25 U		0.25 U
2,4,6-TRINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.272 U				0.255 U			0.25 U		
2,4-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.272 U				0.255 U			0.25 U		
2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
2-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
3-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.26 U	0.345 U	0.25 U		0.25 U
4-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.26 U	0.345 U	0.25 U		0.25 U
DNX	0.272 U				0.255 U			0.25 U		
HMX	1.2		1.9 J	0.6 U	0.51	0.26 U	0.345 U	0.3 J		0.3 J
MNX	0.272 U				0.255 U			0.25 U		
RDX	1.7		1.9 J	7.2	7.9	9.3	0.325 U	0.61 J		0.25 U
TNX	0.272 U				0.255 U			0.25 U		
Total Metals (ug/L)										
ALUMINUM	1960 J			4320 J	4630 J		907 J	5280 J		
ARSENIC	0.61 U			1.6 J	1.6 J		0.2 U	0.79 U		
BARIUM	47.3 J			10.4 J	11.3 J		24.5 J	40 J		
BERYLLIUM	0.11 U			8.4 J	9.3 J		0.14 U	0.26 U		
CADMIUM	0.15 U			0.64 U	0.46 U		0.05 UJ	0.07 U		
CALCIUM	27600 J			69400 J	76700 J		2580 U	2030 J		
CHROMIUM	3.7 J			0.71 U	0.71 U		0.99 J	5.7 J		
COBALT	0.48 U			140 J	121 J		2.2 J	2.4 J		
COPPER	1.3 U			5 J	5.1 J		1 J	2.9 J		
IRON	1520 J			128 J	683 J		600 J	3520 J		
LEAD	1.1 U			8.4 J	9.2 J		0.34 U	1.7 U		
LITHIUM				154 J			6.6 J			
MAGNESIUM	13000 J			54300 J	56300 J		2230 J	2540 J		
MANGANESE	33.6 J			1800 J	1810 J		57.6 U	38.3 J		
MERCURY	0.007 U			0.16 J	0.19 J		0.02 U	0.007 U		
NICKEL	2.9 J			299 J	315 J		4.2 J	6.1 J		
POTASSIUM	4010 J			4380 J	4660 J		240 J	718 J		
SELENIUM	0.16 U			0.13 U	0.12 U		0.08 U	0.08 U		
SODIUM	44500 J			82300 J	92000 J		8360 J	8580 J		
STRONTIUM				163 J			14.5 J			
TITANIUM	22.2 J			4.4 J	2 U		16.8 J	87.5 J		
VANADIUM	2.7 J			0.14 U	0.2 U		1.4 J	8.3 J		
ZINC	4.8 J			382 J	408 J		7.4 J	10.9 J		

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	03	01	02	02	03
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0703	13GWT0801	13GWT0802	13GWT0802-F	13GWT0803
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	ORIG	NORMAL	ORIG	ORIG	NORMAL
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	7/25/2004	4/26/2003	11/23/2003	11/23/2003	7/23/2004
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED		18.3 U							92.7 U	
ARSENIC, FILTERED		0.36 U							0.12 U	
BARIUM, FILTERED		31.5 J							21.1 J	
BERYLLIUM, FILTERED		0.03 U							0.12 U	
CALCIUM, FILTERED		26900 J							2250 J	
CHROMIUM, FILTERED		0.53 U							0.13 U	
COBALT, FILTERED		0.11 U							1.9 J	
COPPER, FILTERED		0.87 U							0.35 U	
IRON, FILTERED		27.1 U							122 U	
LEAD, FILTERED		0.04 U							0.07 U	
LITHIUM, FILTERED										
MAGNESIUM, FILTERED		12600 J							2190 J	
MANGANESE, FILTERED		20.9 J							45.4 J	
NICKEL, FILTERED		1.6 U							3.6 J	
POTASSIUM, FILTERED		3760 J							151 U	
SELENIUM, FILTERED		0.15 U							0.04 U	
SODIUM, FILTERED		45800 J							8900 J	
STRONTIUM, FILTERED										
TITANIUM, FILTERED		0.47 U							1.1 U	
VANADIUM, FILTERED		0.41 U							0.14 U	
ZINC, FILTERED		2.1 J							3.3 J	
Field Parameters										
ALKALINITY								10 U		
CARBON DIOXIDE								45		
DISSOLVED OXYGEN			6.73			2.28		5		3.48
DISSOLVED OXYGEN - METER	7.35			0.34	1.32		2.45	6.44		
HYDROGEN SULFIDE (H2S)								0		
IRON(+2)								0.21		
MANGANESE(+2)								0		
NITRITE-N								0.001		
OXIDATION REDUCTION POTENTIAL (MV)	180.4		441.2	278	383.6	159	206	266.7		121
PH (S.U.)	6.45		6.08	3.98	3.9	4.12	5.06	5		6.11
SPECIFIC CONDUCTANCE (MS/CM)	0.363		0.399	1.03	1.054	1.078	0.74	0.076		0.085
SULFIDE								0		
TEMPERATURE (°C)	12.5		18.85	15.6	18.45	19.8	14.65	15.18		20.69
TURBIDITY (NTU)	22		26	6.8	3.01	1.5	10	36		16
Miscellaneous Parameters (mg/L)										
AMMONIA-N	0.14			0.03	0.005 U		0.01 U	0.005 UJ		
NITRITE/NITRATE-N	0.7			0.07	0.025 U		0.02 U	0.025 U		
TOTAL ORGANIC CARBON										

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12
SAMPLING ROUND	01	01	02	03	01	02	03	01	02	03	01
SAMPLE NUMBER	13GWT0901	13GWT0902	13GWT0903	13GWT0904	13GWT1001	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201
SAMPLE CODE	ORIG	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/28/2003	5/9/2003	12/4/2003	7/31/2004	4/27/2003	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003
Volatile Organics (ug/L)											
TRICHLOROETHENE	0.3 U										
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.215 U		1.3	1.1	0.265 U	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U
1,3-DINITROBENZENE	1.4 J		2.4	2.1	0.265 U	0.266 U	0.27 U	0.83 J	0.258 U	0.46 J	0.6 U
2,4,6-TRINITROTOLUENE	19		25	24	0.265 U	0.266 U	0.27 U	31	9.5	11	1.8
2,4-DIAMINO-6-NITROTOLUENE			3.9			0.266 U			1.4 J		
2,4-DINITROTOLUENE	0.215 U		0.253 U	1.4 J	0.265 U	0.266 U	0.27 U	0.43 U	1.2	1.6	0.6 U
2,6-DIAMINO-4-NITROTOLUENE			0.253 U			0.266 U			1.8 J		
2,6-DINITROTOLUENE	0.215 U		9.9	8.8 J	0.265 U	0.266 U	0.27 U	0.43 U	1.2 J	2.1 J	0.6 U
2-AMINO-4,6-DINITROTOLUENE	8.6 J		13	15 J	0.265 U	0.266 U	0.27 U	6 J	4.4 J	6.6 J	3.7 J
2-NITROTOLUENE	0.215 U		0.253 U	0.24 U	0.265 U	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U
3-NITROTOLUENE	0.215 U		0.253 U	0.24 U	0.265 U	0.266 U	0.27 U	0.43 U	0.258 U	0.58 J	0.6 U
4-AMINO-2,6-DINITROTOLUENE	18		18	19	0.265 U	0.266 U	0.27 U	19	9.8	14	5.8 J
4-NITROTOLUENE	0.215 U		0.253 U	0.24 U	0.265 U	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U
DNX			4 J			0.266 U			0.258 U		
HMX	84		130	140	0.265 U	0.45 J	0.27 U	34	44	45	50
MNX			7.1 J			0.266 U			1.2		
RDX	1100		1700	1500	0.25 U	0.266 U	0.27 U	560	520	490	150
TNX			1.5 J			0.266 U			0.258 U		
Total Metals (ug/L)											
ALUMINUM	297 J		62.3 U		1430 J	768 J		719 J	696 J		2170 J
ARSENIC	0.09 U		0.07 U		1.1 J	1 U		0.22 U	0.23 U		1.3 J
BARIUM	155 J		137 J		18.3 J	18.8 J		27.4 J	27.6 J		36.5 J
BERYLLIUM	0.41 U		0.14 U		4.3 J	3.1 J		1.6 U	1.4 U		0.27 U
CADMIUM	0.05 UJ		0.04 U		0.94 U	1.2 U		0.12 U	0.13 U		0.1 U
CALCIUM	48600 J		48500 J		26700 J	30600 J		5760 J	6320 J		2800 J
CHROMIUM	0.02 U		0.28 U		1 J	0.61 U		0.35 U	0.25 U		4.1 J
COBALT	17.2 J		14.3 J		246 J	210 J		26.3 J	24 J		8.1 J
COPPER	1.2 J		0.65 U		4.3 J	1.3 U		3 J	1.6 U		2.2 J
IRON	25 U		38.2 U		3560 J	22900 J		4250 J	4340 J		2020 J
LEAD	0.44 U		0.29 U		7.7 J	3.5 J		1.5 U	1.4 U		1.9 U
LITHIUM	31.1 J				158 J			66.8 J			15.3 J
MAGNESIUM	38700 J		36500 J		22200 J	25500 J		4770 J	4660 J		2560 J
MANGANESE	608 J		510 J		1580 J	1720 J		250 J	251 U		216 J
MERCURY	0.034 J		0.091 J		0.02 U	0.007 U		0.032 J	0.007 U		0.02 U
NICKEL	23.7 J		18.5 J		371 J	357 J		66.5 J	61 J		16.4 J
POTASSIUM	983 J		848 J		2570 J	3220 J		668 J	687 J		724 J
SELENIUM	0.05 U		0.1 U		0.07 U	0.04 U		0.05 U	0.04 U		0.25 U
SODIUM	35000 J		33900 J		25500 J	31500 J		24000 J	26000 J		21900 J
STRONTIUM	229 J				86.9 J			31 J			14.6 J
TITANIUM	2.5 J		0.65 U		5.9 J	1.8 U		6.7 J	1 U		34.6 J
VANADIUM	0.05 U		0.07 U		0.58 U	0.17 U		0.29 U	0.06 U		4.2 J
ZINC	22 J		14.5 J		208 J	245 J		82.7 J	85.3 J		14.6 J

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12
SAMPLING ROUND	01	01	02	03	01	02	03	01	02	03	01
SAMPLE NUMBER	13GWT0901	13GWT0902	13GWT0903	13GWT0904	13GWT1001	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201
SAMPLE CODE	ORIG	ORIG	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/28/2003	5/9/2003	12/4/2003	7/31/2004	4/27/2003	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED											
ARSENIC, FILTERED											
BARIUM, FILTERED											
BERYLLIUM, FILTERED											
CALCIUM, FILTERED											
CHROMIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
LEAD, FILTERED											
LITHIUM, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SELENIUM, FILTERED											
SODIUM, FILTERED											
STRONTIUM, FILTERED											
TITANIUM, FILTERED											
VANADIUM, FILTERED											
ZINC, FILTERED											
Field Parameters											
ALKALINITY			0			10 U			10 U		
CARBON DIOXIDE			48			154			165		
DISSOLVED OXYGEN			1.5	0.2		3.5	7.8		1.5	4.95	
DISSOLVED OXYGEN - METER	1.69	1.21	1.14		1.4	4.83		0.85	3.49		2.35
HYDROGEN SULFIDE (H2S)			0			0			0		
IRON(+2)			0			3.3 >			3.3 >		
MANGANESE(+2)			0.4			1.8			0.3		
NITRITE-N			0.023			0.003			0.009		
OXIDATION REDUCTION POTENTIAL (MV)	205.6	148	251	88.1	364	230.3	402.8	265	355	127	242
PH (S.U.)	5.36	5.38	5.32	6.27	3.01	4.74	4.23	3.64	3.93	3.85	4.83
SPECIFIC CONDUCTANCE (MS/CM)	0.829	0.725	0.64	0.773	0.582	0.52	0.629	0.251	0.238	0.262	0.135
SULFIDE			0.01			0.05			0.01		
TEMPERATURE (°C)	13.33	14.36	12.82	18.15	15.6	19.73	21.36	15.73	16.35	21.2	14.46
TURBIDITY (NTU)	3	0.1	4.07	3.8	10	5.79	9	10	4.52	2.5	60
Miscellaneous Parameters (mg/L)											
AMMONIA-N	3.3		3.4		0.98	0.84 J		0.1	0.1 J		0.06
NITRITE/NITRATE-N	92		54 J		0.02 U	0.025 U		0.02 U	0.19 J		1.3
TOTAL ORGANIC CARBON						1					

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15
SAMPLING ROUND	01	02	03	01	02	03	01	02	03	01	02	02
SAMPLE NUMBER	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1302	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
SAMPLE DATE	4/27/2003	11/18/2003	7/25/2004	5/7/2003	11/25/2003	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003
Volatile Organics (ug/L)												
TRICHLOROETHENE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE		0.26 U	0.27 U	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
1,3-DINITROBENZENE		0.26 U	0.27 U	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
2,4,6-TRINITROTOLUENE		1.6	2.2	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
2,4-DIAMINO-6-NITROTOLUENE		0.89 J			0.258 U			0.25 U			0.258 U	
2,4-DINITROTOLUENE		0.48 J	0.61 J	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
2,6-DIAMINO-4-NITROTOLUENE		0.26 U			0.258 U			0.25 U			0.258 U	
2,6-DINITROTOLUENE		0.26 U	1 J	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
2-AMINO-4,6-DINITROTOLUENE		3.1 J	4.4 J	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
2-NITROTOLUENE		0.26 U	0.27 U	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
3-NITROTOLUENE		0.26 U	0.27 U	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
4-AMINO-2,6-DINITROTOLUENE		4.8	6.7	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
4-NITROTOLUENE		0.26 U	0.27 U	0.37 U	0.258 U	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U	
DNX		0.5 J			0.258 U			0.25 U			0.258 U	
HMX		41	54	9.5	12	12	0.345 U	0.89 J	0.34 J	0.485 U	0.258 U	
MNX		0.68			0.258 U			0.25 U			0.258 U	
RDX		140	160	12	20	17	1.6	4.7	2	0.46 U	0.258 U	
TNX		0.26 U			0.258 U			0.25 U			0.258 U	
Total Metals (ug/L)												
ALUMINUM		67 U		1080 J	1000 J		57.1 U	47.5 U		1440 J	4310 J	
ARSENIC		0.13 U		0.39 U	0.16 U		5.8 J	3.1 J		7 J	9.2 J	
BARIUM		21.1 J		43.8 J	52.9 J		31.1 J	19.1 J		43.3 J	39 J	
BERYLLIUM		0.24 U		2.1 J	2.1 U		0.06 U	0.05 U		4.2 J	5.2 J	
CADMIUM		0.04 U		0.09 U	0.04 U		0.35 U	0.04 U		1 U	0.63 U	
CALCIUM		1720 J		3740 J	3030 J		29700 J	34100 J		14600 J	10700 J	
CHROMIUM		0.17 U		0.29 U	0.29 U		0.18 U	0.53 U		0.82 U	4.5 J	
COBALT		6.5 J		30.1 J	25.3 J		14.2 J	9.5 J		106 J	82.7 J	
COPPER		0.7 U		5 J	3.6 J		0.28 U	0.3 U		3 J	0.87 U	
IRON		129 U		860 J	162 J		10500 J	9740 J		9260 J	17500 J	
LEAD		0.08 U		1 U	0.63 U		0.2 U	0.04 U		23.8 J	35.9 J	
LITHIUM				29.3 J			33.9 J			133 J		
MAGNESIUM		2370 J		3660 J	3420 J		26100 J	29500 J		14300 J	13200 J	
MANGANESE		312 U		600 J	451 J		1910 J	1880 J		1300 J	821 J	
MERCURY		0.035 J		0.2 U	0.007 U		0.02 U	0.007 U		0.2 U	0.007 U	
NICKEL		15.3 J		25.3 J	20.4 J		24.7 J	20 J		222 J	182 J	
POTASSIUM		358 J		649 J	459 J		2080 J	2010 J		2230 J	2550 J	
SELENIUM		0.14 U		0.1 U	0.06 U		0.41 U	0.04 U		1.1 U	0.1 U	
SODIUM		20600 J		6030 J	6800 J		48300 J	57400 J		16000 J	16300 J	
STRONTIUM				18.5 J			71.7 J			65.5 J		
TITANIUM		1 U		3.7 J	0.73 U		1.9 U	0.7 U		4.6 J	26 J	
VANADIUM		0.07 U		0.07 U	0.06 U		0.08 U	0.08 U		0.32 U	4.3 J	
ZINC		10.8 J		35.1 J	25.3		17.8 J	16.9 J		266 J	240	

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15
SAMPLING ROUND	01	02	03	01	02	03	01	02	03	01	02	02
SAMPLE NUMBER	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1302	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
SAMPLE DATE	4/27/2003	11/18/2003	7/25/2004	5/7/2003	11/25/2003	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED	257 J											1990 J
ARSENIC, FILTERED	0.37 U											8.6 J
BARIUM, FILTERED	26.2 J											30.5 J
BERYLLIUM, FILTERED	0.17 U											5.2 J
CALCIUM, FILTERED	2980 J											10700 J
CHROMIUM, FILTERED	0.63 U											0.98 U
COBALT, FILTERED	9 J											82.8 J
COPPER, FILTERED	3.4 J											1.4 U
IRON, FILTERED	203 J											16000 J
LEAD, FILTERED	0.31 U											35.7 J
LITHIUM, FILTERED	14.6 J											
MAGNESIUM, FILTERED	2500 J											13000 J
MANGANESE, FILTERED	224 J											812 J
NICKEL, FILTERED	18.3 J											180 J
POTASSIUM, FILTERED	366 J											2040 J
SELENIUM, FILTERED	0.26 U											0.19 U
SODIUM, FILTERED	21800 J											16400 J
STRONTIUM, FILTERED	13.6 J											
TITANIUM, FILTERED	8.1 J											0.42 U
VANADIUM, FILTERED	0.46 U											0.63 U
ZINC, FILTERED	13.5 J											222 J
Field Parameters												
ALKALINITY		10 U			10 U						10 U	
CARBON DIOXIDE		135			120						137	
DISSOLVED OXYGEN		2	3.86		11	0.73			6.74		0.07	
DISSOLVED OXYGEN - METER		2.02		3.37	3.26		1.2	0.52		0.53	7.79	
HYDROGEN SULFIDE (H2S)		0			0						0	
IRON(+2)		0.1			0.03						3.3 >	
MANGANESE(+2)		0.4			0.5						0.9	
NITRITE-N		0			0						0.001	
OXIDATION REDUCTION POTENTIAL (MV)		305.9	444.5	268.2	385.1	132	23.2	100.5	71	286.8	322	
PH (S.U.)		4.87	4.66	4.2	3.56	4.31	5.5	5.48	6.86	3.74	3.98	
SPECIFIC CONDUCTANCE (MS/CM)		0.131	0.132	0.106	0.113	0.131	0.885	0.623	0.714	0.391	0.34	
SULFIDE		0.01			0						0.14	
TEMPERATURE (°C)		16.37	16.7	13.82	12.33	20.61	14.34	10.77	17.41	15.89	12.28	
TURBIDITY (NTU)		29.1	9.8	5.8	0.38	0.7	1.6	0	3	7.3	45.4	
Miscellaneous Parameters (mg/L)												
AMMONIA-N		0.005 UJ		0.03	0.01		0.08	0.06 J		1	1.3	
NITRITE/NITRATE-N		0.3 J		1.1	1 J		0.13	0.05 J		0.02 U	0.05 U	
TOTAL ORGANIC CARBON											1.1	

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT15	13MWT16	13MWT16	13MWT16	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02
SAMPLE NUMBER	13GWT1503	13GWT1601	13GWT1602	13GWT1603	13GWT1701	13GWT1702	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/29/2004	5/6/2003	11/20/2003	7/25/2004	5/7/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003
Volatile Organics (ug/L)											
TRICHLOROETHENE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
1,3-DINITROBENZENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 U	0.25 U	0.08 U		0.301 U	
2,4,6-TRINITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
2,4-DIAMINO-6-NITROTOLUENE			0.287 U			0.25 U				0.301 U	
2,4-DINITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
2,6-DIAMINO-4-NITROTOLUENE			0.287 U			0.25 U				0.301 U	
2,6-DINITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.28 J	0.37 J	0.08 U		0.301 U	
2-NITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
3-NITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.12 J	0.144 U	0.27 U	0.6 J	0.71	0.84	0.08 U		0.301 U	
4-NITROTOLUENE	0.25 U	0.11 U	0.144 U	0.27 U	0.43 U	0.25 UJ	0.25 U	0.08 U		0.301 U	
DNX			5.8 J			2.2 J				0.301 U	
HMX	0.25 U	22 J	120	32	92 J	140	120	8.6		14	
MNX			3.6 J			11				2.9	
RDX	0.25 U	10	16	18	430	580	490	150		240	
TNX			0.31 J			1.2				0.301 U	
Total Metals (ug/L)											
ALUMINUM		123 J	116 U		418 J	419 J		19000 J		2080 J	
ARSENIC		0.66 U	0.35 U		0.5 U	0.74 U		4.2 J		0.52 U	
BARIUM		72.9 J	69.3 J		19.3 J	19.6 J		118 J		20.7 J	
BERYLLIUM		0.13 U	0.03 U		0.04 U	0.5 U		3 J		1.5 U	
CADMIUM		0.14 U	0.04 U		0.05 U	0.43 U		0.33 U		0.04 U	
CALCIUM		27200 J	46000 J		12100 J	11400 J		19300 J		16000 J	
CHROMIUM		0.29 U	0.33 U		0.63 U	0.82 U		25.6 J		2.6 J	
COBALT		5.4 J	0.95 U		1.5 J	1.5 U		52.8 J		27.1 J	
COPPER		0.59 U	1.2 U		0.26 U	0.73 U		14 J		1.4 U	
IRON		2570 J	159 U		357 J	440 U		15800 J		2440 J	
LEAD		0.14 U	0.09 U		0.35 U	0.82 U		9.5 J		2 U	
LITHIUM		2.3 J			5.7 J			181 J			
MAGNESIUM		11600 J	14400 J		9470 J	8900 J		25600 J		16500 J	
MANGANESE		712 J	330 U		56.3 U	48.3 U		2170 J		1360 J	
MERCURY		0.2 U	0.007 U		0.2 U	0.02 U		0.2 U		0.007 U	
NICKEL		7.1 J	5.3 J		2.9 J	3.3 J		140 J		76.8 J	
POTASSIUM		576 J	500 J		481 J	605 J		6390 J		2970 J	
SELENIUM		0.26 U	0.1 U		0.1 U	0.51 U		0.42 U		0.24 U	
SODIUM		15000 J	25400 J		8450 J	8550 J		35200 J		37500 J	
STRONTIUM		129 J			27.4 J			39.8 J			
TITANIUM		3.2 J	3.3 J		7.2 J	10.9 J		166 J		35.4 J	
VANADIUM		0.27 U	0.22 U		0.72 U	0.9 U		26.6 J		2.4 J	
ZINC		3.9 J	2.8 U		3 J	2.7 J		175 J		75.7 J	

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT15	13MWT16	13MWT16	13MWT16	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02
SAMPLE NUMBER	13GWT1503	13GWT1601	13GWT1602	13GWT1603	13GWT1701	13GWT1702	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/29/2004	5/6/2003	11/20/2003	7/25/2004	5/7/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED									382 J		434 J
ARSENIC, FILTERED									1.4 J		0.33 U
BARIUM, FILTERED									20.9 J		14.3 J
BERYLLIUM, FILTERED									2 J		1.5 U
CALCIUM, FILTERED									20300 J		17900 J
CHROMIUM, FILTERED									0.2 U		0.51 U
COBALT, FILTERED									49.5 J		31.7 J
COPPER, FILTERED									6.4 J		3.1 J
IRON, FILTERED									1980 J		1940 J
LEAD, FILTERED									0.91 U		1 U
LITHIUM, FILTERED									154 J		
MAGNESIUM, FILTERED									22700 J		19600 J
MANGANESE, FILTERED									2090 J		1660 J
NICKEL, FILTERED									123 J		86.2 J
POTASSIUM, FILTERED									2590 J		2860 J
SELENIUM, FILTERED									0.29 U		0.18 U
SODIUM, FILTERED									34400 J		38800 J
STRONTIUM, FILTERED									32.8 J		
TITANIUM, FILTERED									2.8 U		1.1 U
VANADIUM, FILTERED									0.05 U		0.22 U
ZINC, FILTERED									138 J		84.2 J
Field Parameters											
ALKALINITY						10 U				10 U	
CARBON DIOXIDE						170				45	
DISSOLVED OXYGEN	0.53			3.85		0.9	2.01			5.5	
DISSOLVED OXYGEN - METER		0.81	3.87		0.53	0.84		2.17		4.61	
HYDROGEN SULFIDE (H2S)						0				0	
IRON(+2)						0.06				0.33	
MANGANESE(+2)						0				1.4	
NITRITE-N						0.006				0	
OXIDATION REDUCTION POTENTIAL (MV)	6.85	-30.4	237.8	386.4	112	338	129.4	324.1		422.2	
PH (S.U.)	3.26	6.16	6.13	6.05	5.35	5.38	5.28	3.88		4.26	
SPECIFIC CONDUCTANCE (MS/CM)	0.352	0.356	0.402	0.29	0.17	0.153	0.159	0.514		0.351	
SULFIDE						0.02				0.07	
TEMPERATURE (°C)	15.66	14.27	18.83	18.21	15.7	15.97	18.57	16.75		9.78	
TURBIDITY (NTU)	10	2.7	8.49	1.2	10	3.74	4.1	450		40.2	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.4	0.03 J		0.01	0.005 U		0.02		0.02 J	
NITRITE/NITRATE-N		0.02 U	0.84 J		0.86	0.65		0.09		0.12 J	
TOTAL ORGANIC CARBON											

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT18	13MWT19	13MWT19	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21
SAMPLING ROUND	03	01	02	03	01	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1803	13GWT1901	13GWT1902	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2102
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
SAMPLE DATE	7/29/2004	5/7/2003	10/28/2003	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	11/5/2003
Volatile Organics (ug/L)											
TRICHLOROETHENE					1 J						
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	1.3 J
1,3-DINITROBENZENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	1.8 J
2,4,6-TRINITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	26 J	69 J
2,4-DIAMINO-6-NITROTOLUENE			0.26 U					0.266 U			0.77 J
2,4-DINITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	1.4 J
2,6-DIAMINO-4-NITROTOLUENE			0.26 U					0.266 U			0.24 U
2,6-DINITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	5.8 J
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.24 UJ
2-NITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.24 UJ
3-NITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.24 UJ
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.24 U
4-NITROTOLUENE	0.27 U	0.55 U	0.26 U	0.26 U	0.37 U			0.266 U	0.26 U	0.5 J	0.24 UJ
DNX			0.26 U					0.266 U			50 J
HMX	22	6.4	6.2	7.3	0.37 U			0.266 U	0.26 U	390	640
MNX			0.26 U					0.266 U			9.3 J
RDX	390	5.9	5.4	5.9	0.35 U			0.266 U	0.26 U	2700	7700
TNX			0.26 U					0.266 U			1.4 J
Total Metals (ug/L)											
ALUMINUM		195 J	193 J		12900 J			7940 J	8860 J	354	332 U
ARSENIC		0.43 U	0.81 U		1.8 J			1.1 U	0.69 U	0.18 U	0.32 U
BARIUM		401 J	314 J		16.7 J			13.3 J	12.6 J	41.7 J	42 J
BERYLLIUM		0.77 U	0.56 U		5.8 J			5.2 J	5.2 J	0.97 U	1.7 U
CADMIUM		0.72 U	0.43 U		1 U			0.76 U	0.63 U	0.14 U	0.08 U
CALCIUM		32500 J	25700 J		72200 J			65100 J	49200 J	12000 J	10600 J
CHROMIUM		0.59 U	1 U		3.3 J			1.1 U	1.6 U	0.9 J	0.46 U
COBALT		44.1 J	14.8 J		234 J			169 J	200 J	16.4 J	15.9 J
COPPER		1.1 U	1.3 U		10.5 J			3.1 J	4.5 U	0.83 J	1.1 U
IRON		117 U	325 U		143000 J			120000 J	124000 J	127 J	193 U
LEAD		0.89 U	0.46 U		12.5 J			8.5 J	7.7 J	1.1 J	0.93 U
LITHIUM		40.8 J			340 J					45.8 J	
MAGNESIUM		37800 J	27300 J		70300 J			61400 J	52200 J	8150 J	7300 J
MANGANESE		1450 J	730 J		11600 J			9770 J	8390 J	612 J	590 J
MERCURY		0.2 U	0.02 U		0.02 U			0.007 U	0.03 U	0.02 U	0.02 U
NICKEL		79.4 J	61.5 J		477 J			397 J	427 J	35.7 J	32.8 J
POTASSIUM		1290 J	1010 J		6660 J			5750 J	4950 J	845 J	1130 J
SELENIUM		0.29 U	0.04 U		0.13 U			0.06 U	0.07 U	0.05 U	0.13 U
SODIUM		160000 J	123000 J		53500 J			56600 J	51200 J	16000 J	16800 J
STRONTIUM		173 J			72 J					45.6 J	
TITANIUM		5.1 J	3.7 J		5.5 J			0.72 U		4.4 J	0.47 U
VANADIUM		0.31 U	0.2 U		0.63 J			0.45 U	0.27 U	0.2 U	0.22 U
ZINC		57 J	48.3 J		661 J			566 J	616 J	21.9 J	30 J

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT18	13MWT19	13MWT19	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21
SAMPLING ROUND	03	01	02	03	01	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1803	13GWT1901	13GWT1902	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2102
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
SAMPLE DATE	7/29/2004	5/7/2003	10/28/2003	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	11/5/2003
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED						11800 J					
ARSENIC, FILTERED						1.7 J					
BARIUM, FILTERED						15.6 J					
BERYLLIUM, FILTERED						5.6 J					
CALCIUM, FILTERED						70900 J					
CHROMIUM, FILTERED						2.7 J					
COBALT, FILTERED						230 J					
COPPER, FILTERED						10.6 J					
IRON, FILTERED						142000 J					
LEAD, FILTERED						11.5 J					
LITHIUM, FILTERED						322 J					
MAGNESIUM, FILTERED						67900 J					
MANGANESE, FILTERED						11500 J					
NICKEL, FILTERED						470 J					
POTASSIUM, FILTERED						6520 J					
SELENIUM, FILTERED						0.19 U					
SODIUM, FILTERED						52100 J					
STRONTIUM, FILTERED						68.9 J					
TITANIUM, FILTERED						4.2 J					
VANADIUM, FILTERED						0.45 U					
ZINC, FILTERED						695					
Field Parameters											
ALKALINITY								10 U			10 U
CARBON DIOXIDE								400			125
DISSOLVED OXYGEN	5.67			27.18				0.02	15.56		1
DISSOLVED OXYGEN - METER		3.51	34.37		0.11		0.54	0.76		1.45	2.09
HYDROGEN SULFIDE (H2S)								0			0
IRON(+2)								3.3 >			0.1
MANGANESE(+2)								8.3			0.6
NITRITE-N								0			0.031
OXIDATION REDUCTION POTENTIAL (MV)	361.6	224.1	209.6	484.2	265		224	376.2	337.2	193.6	247.2
PH (S.U.)	4.44	5.12	4.87	4.57	3.48		3.65	3.43	3.47	5.46	5.59
SPECIFIC CONDUCTANCE (MS/CM)	0.293	1.241	1.21	1.397	1.504		1.445	1.3	1.288	0.212	0.195
SULFIDE								0.03			0.04
TEMPERATURE (°C)	16.27	13.81	14.98	18.49	15.78		16.7	15.9	20.04	13.01	15.17
TURBIDITY (NTU)	6.6	5	5.5	0.4	19		1.4	6.91	3.8	8.2	2.61
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.01 U	0.01 U		1.6			1.6 J		0.05	0.02
NITRITE/NITRATE-N		0.02 U	0.16		0.07			0.025 U		0.64	1.2
TOTAL ORGANIC CARBON											

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT21	13MWT22	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	02	03	01
SAMPLE NUMBER	13GWT2103	13GWT2201	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/28/2004	5/6/2003	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003
Volatile Organics (ug/L)											
TRICHLOROETHENE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.4 J	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
1,3-DINITROBENZENE	0.8	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
2,4,6-TRINITROTOLUENE	26	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
2,4-DIAMINO-6-NITROTOLUENE			0.266 U			0.26 U			0.24 U		
2,4-DINITROTOLUENE	0.65 J	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
2,6-DIAMINO-4-NITROTOLUENE			0.266 U			0.26 U			0.24 U		
2,6-DINITROTOLUENE	2.8	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
2-AMINO-4,6-DINITROTOLUENE	3.8 J	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
2-NITROTOLUENE	0.24 U	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	1	0.145 U
3-NITROTOLUENE	0.24 U	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
4-AMINO-2,6-DINITROTOLUENE	2.9 J	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
4-NITROTOLUENE	0.24 U	0.395 U	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U
DNX			0.266 U			0.26 U			0.24 U		
HMX	460	19	23	23	13	14	16	2.1	2.2	2.2	0.34
MNX			0.266 U			0.26 U			0.35 J		
RDX	4000	20	26	26	17	21	17	7.3	9	8.7	0.4
TNX			0.266 U			0.26 U			0.24 U		
Total Metals (ug/L)											
ALUMINUM		709 J	1360 J		192 J	38.2 U		47.3 U	14.2 U		39000 J
ARSENIC		0.3 U	0.4 U		0.41 U	0.09 U		0.07 U	0.14 U		15.4 J
BARIUM		25 J	31.6 J		38.4 J	35 J		22.7 J	18.6 J		303 J
BERYLLIUM		3.7 J	3.6 J		0.06 U	0.04 U		0.03 U	0.04 U		2.3 J
CADMIUM		0.4 U	0.49 U		0.13 U	0.1 U		0.05 UJ	0.06 U		2.7 J
CALCIUM		13100 J	12200 J		10300 J	12500 J		34300 J	37900 J		117000 J
CHROMIUM		0.44 U	1.7 J		0.55 U	0.35 U		0.37 U	0.27 U		64.9 J
COBALT		80.5 J	69 J		5.1 J	2.4 J		3.7 J	10.1 J		33 J
COPPER		4.8 J	6.4 J		0.35 U	0.2 U		4 J	0.19 U		89.5 J
IRON		434 J	846 J		414 J	118 U		65.7 U	3190 J		36000 J
LEAD		2.4 J	3 J		0.36 U	0.14 U		0.18 U	0.09 U		54.3 J
LITHIUM		208 J			12.2 J			18.2 J			74.4 J
MAGNESIUM		11300 J	10000 J		10800 J	10900 J		34500 J	33600 J		19900 J
MANGANESE		381 J	327 J		404 J	256 J		525 J	2010 J		2080 J
MERCURY		0.2 U	0.14 J		0.2 U	0.02 U		0.02 U	0.02 U		0.052 J
NICKEL		153 J	138 J		5.5 J	4.9 J		6.3 J	9.4 J		82.1 J
POTASSIUM		705 J	964 J		796 J	875 J		1010 J	1120 J		11000 J
SELENIUM		0.05 U	0.1 U		0.24 U	0.19 U		0.29 U	0.2 U		1.8 J
SODIUM		15400 J	15500 J		37200 J	34000 J		44200 J	41000 J		27900 J
STRONTIUM		64.9 J			49.9 J			81 J			262 J
TITANIUM		5.1 J	9.1 J		6.9 J	0.55 U		2.1 U	0.13 U		285 J
VANADIUM		0.18 U	1.4 U		0.51 U	0.08 U		0.06 U	0.06 U		75.3 J
ZINC		278 J	273		4 J	4.1 U		8.2 J	3.7 U		260 J

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT21	13MWT22	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	02	03	01
SAMPLE NUMBER	13GWT2103	13GWT2201	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/28/2004	5/6/2003	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED											
ARSENIC, FILTERED											
BARIUM, FILTERED											
BERYLLIUM, FILTERED											
CALCIUM, FILTERED											
CHROMIUM, FILTERED											
COBALT, FILTERED											
COPPER, FILTERED											
IRON, FILTERED											
LEAD, FILTERED											
LITHIUM, FILTERED											
MAGNESIUM, FILTERED											
MANGANESE, FILTERED											
NICKEL, FILTERED											
POTASSIUM, FILTERED											
SELENIUM, FILTERED											
SODIUM, FILTERED											
STRONTIUM, FILTERED											
TITANIUM, FILTERED											
VANADIUM, FILTERED											
ZINC, FILTERED											
Field Parameters											
ALKALINITY			10 U			25			90		
CARBON DIOXIDE			50			23			28		
DISSOLVED OXYGEN	2.94		1	2.51		7	3.37		0.5	1.07	
DISSOLVED OXYGEN - METER		0.64	1.65		4.09	2.37		2.89	29.68		4.21
HYDROGEN SULFIDE (H2S)			0			0			0		
IRON(+2)			0.37			0.09			3.21		
MANGANESE(+2)			0.1			0.1			1.8		
NITRITE-N			0.005			0.004			0		
OXIDATION REDUCTION POTENTIAL (MV)	107.3	264	351.6	448.2	131	397.5	141	284	59.9	395	219.1
PH (S.U.)	7.32	3.95	4.09	3.81	5.19	5.5	5.48	5.9	6.14	5.41	6.45
SPECIFIC CONDUCTANCE (MS/CM)	0.298	0.245	0.243	0.294	0.314	0.309	0.315	0.671	0.672	0.669	0.511
SULFIDE			0.06			0.01			0		
TEMPERATURE (°C)	20.07	14.15	11.4	19.61	16.46	13.67	17.26	16.76	14.27	20.16	12
TURBIDITY (NTU)	4	0	1.03	1.5	0.7	2.09	2.1	5.2	1.66	5.82	999 >
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.01 U	0.01 U		0.01 U	0.01 U		0.02	0.01 U		0.09
NITRITE/NITRATE-N		0.02 U	0.17 J		0.5	0.51		0.39	0.27		0.02 U
TOTAL ORGANIC CARBON											

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27
SAMPLING ROUND	01	02	02	03	03	01	02	03	02	03
SAMPLE NUMBER	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/6/2003	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004
Volatile Organics (ug/L)										
TRICHLOROETHENE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
1,3-DINITROBENZENE		0.25 U		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
2,4,6-TRINITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U					0.269 U		0.253 U	
2,4-DINITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U					0.269 U		0.253 U	
2,6-DINITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
2-NITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
3-NITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
4-AMINO-2,6-DINITROTOLUENE		0.25 U		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
4-NITROTOLUENE		0.25 UJ		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U
DNX		0.25 U					0.269 U		0.253 U	
HMX		0.85		2.3		2.4	2.4	1.8	15	38
MNX		0.25 U					0.269 U		0.253 U	
RDX		1.2 J		1.6		0.4 J	0.53 J	0.38 J	32	74
TNX		0.25 U					0.269 U		0.253 U	
Total Metals (ug/L)										
ALUMINUM		73500 J		836 J		241	340 J		1980 J	
ARSENIC		14.3 J		0.55 U		0.25 U	0.21 U		3.1 J	
BARIUM		355 J		39.9 J		21.2 J	13.9 J		78.1 J	
BERYLLIUM		3.4 J		0.99 U		0.03 U	0.03 U		2.3 J	
CADMIUM		2.7 J		0.42 U		0.05 U	0.04 U		0.3 U	
CALCIUM		53900 J		22900 J		22700 J	27100 J		11100 J	
CHROMIUM		89.9 J		2.2 U		0.76 J	0.51 U		3.2 J	
COBALT		48 J		56.5 J		5 J	1.7 U		41.1 J	
COPPER		82.8 J		18.2 J		0.45 U	0.31 U		19.6 J	
IRON		41000 J		961 J		238 J	334 U		17300 J	
LEAD		51.3 J		2.9 J		0.15 U	0.14 U		3.3 J	
LITHIUM						35.7 J				
MAGNESIUM		22700 J		12800 J		13700 J	14900 J		7520 J	
MANGANESE		839 J		125 J		391 J	271 U		594 J	
MERCURY		0.098 J		0.03 U		0.02 U	0.007 U		0.007 U	
NICKEL		120 J		123 J		8 J	5.9 J		67.4 J	
POTASSIUM		18100 J		1800 J		474 J	412 J		4170 J	
SELENIUM		4.1 J		1.4 U		0.09 U	0.04 U		0.04 U	
SODIUM		31400 J		39700 J		29200 J	41200 J		14900 J	
STRONTIUM						56.9 J				
TITANIUM		516 J				6.8 J	6.5 J		12.4 J	
VANADIUM		93.5 J		1.4 J		0.46 U	0.55 U		1.9 J	
ZINC		340 J		138 J		4.7 J	2.8 U		94.9	

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27
SAMPLING ROUND	01	02	02	03	03	01	02	03	02	03
SAMPLE NUMBER	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/6/2003	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED	344 J		79.8 U		154 J					
ARSENIC, FILTERED	0.36 U		0.17 U		0.11 U					
BARIUM, FILTERED	62.6 J		35.9 J		36.3 J					
BERYLLIUM, FILTERED	0.09 U		0.1 U		0.79 U					
CALCIUM, FILTERED	64700 J		28600 J		20700 J					
CHROMIUM, FILTERED	0.81 U		0.34 U		1.1 U					
COBALT, FILTERED	2.5 J		30.5 J		54.2 J					
COPPER, FILTERED	2.8 J		1.8 U		13.1 J					
IRON, FILTERED	198 J		93.6 U		130 J					
LEAD, FILTERED	0.44 U		0.14 U		1.3 U					
LITHIUM, FILTERED	57.3 J									
MAGNESIUM, FILTERED	14100 J		9360 J		11100 J					
MANGANESE, FILTERED	460 J		177 J		105 J					
NICKEL, FILTERED	26.3 J		73.9 J		118 J					
POTASSIUM, FILTERED	5560 J		2700 J		1550 J					
SELENIUM, FILTERED	2 J		2.5 J		1.4 U					
SODIUM, FILTERED	27100 J		29600 J		33300 J					
STRONTIUM, FILTERED	135 J									
TITANIUM, FILTERED	7.3 J		3.6 J							
VANADIUM, FILTERED	0.8 U		0.27 U		0.06 U					
ZINC, FILTERED	22.8 J		95.5 J		126 J					
Field Parameters										
ALKALINITY							60		10 U	
CARBON DIOXIDE							50		45	
DISSOLVED OXYGEN				1.87			1.7	0.89	5	4.96
DISSOLVED OXYGEN - METER		0.96				4.2	1.7		1.67	
HYDROGEN SULFIDE (H2S)							0		0	
IRON(+2)							0		0.21	
MANGANESE(+2)							0.3		0	
NITRITE-N							0.01		0.001	
OXIDATION REDUCTION POTENTIAL (MV)		333		717		189	354	752	223.2	423.5
PH (S.U.)		5.29		4.58		6.05	5.95	5.27	4.4	3.36
SPECIFIC CONDUCTANCE (MS/CM)		0.341		0.382		0.352	0.333	0.43	0.288	0.294
SULFIDE							0.05		0	
TEMPERATURE (°C)		16.7		21.8		12.01	15.68	19.78	14.29	20.1
TURBIDITY (NTU)		39		40		7.1	9.81	22	110	3.3
Miscellaneous Parameters (mg/L)										
AMMONIA-N		0.05 J				0.02	0.005 UJ		0.39	
NITRITE/NITRATE-N		0.17 J				0.03	0.06 J		0.1 J	
TOTAL ORGANIC CARBON										

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
Volatile Organics (ug/L)											
TRICHLOROETHENE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
1,3-DINITROBENZENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,4,6-TRINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,4-DIAMINO-6-NITROTOLUENE	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
2,4-DINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,6-DIAMINO-4-NITROTOLUENE	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
2,6-DINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2-AMINO-4,6-DINITROTOLUENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.37 J	0.266 U	0.24 U	0.25 U		0.29 U
3-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
4-AMINO-2,6-DINITROTOLUENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
4-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
DNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
HMX	0.97 J	1.7 J	0.243 U	0.26 U	4.5	8.1	0.92	0.86	5.3		11
MNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
RDX	3.8	10	1.1 J	4	9.3	22	2.7 J	2.3	4.3		4.2
TNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
Total Metals (ug/L)											
ALUMINUM	781 J		2680 J		79.1 U		168 U		17100 J		2350 J
ARSENIC	0.3 U		1.1 U		0.16 U		0.18 U		4.9 J		2.1 J
BARIUM	23.2 J		21.7 J		41.7 J		38.2 J		103 J		50.6 J
BERYLLIUM	1 U		5.9 J		0.06 U		0.03 U		1.4 U		0.37 U
CADMIUM	0.21 U		0.47 U		0.29 U		0.06 U		0.57 U		0.15 U
CALCIUM	26800 J		25700 J		34700 J		31600 J		6020 J		4300 J
CHROMIUM	4 J		0.86 U		0.36 U		0.34 U		23.8 J		6.1 J
COBALT	69.8 J		104 J		18.9 J		2.2 J		13.4 J		7 J
COPPER	0.68 U		4.5 J		0.6 U		0.45 U		9.6 J		6.9 U
IRON	60900 J		36600 J		61.5 U		276 U		16100 J		6090 J
LEAD	0.39 U		3.8 J		0.07 U		0.24 U		9.4 J		5.1 J
LITHIUM											
MAGNESIUM	18000 J		18800 J		41400 J		20000 J		5930 J		3600 J
MANGANESE	1320 J		3230 J		3170 J		84.8 J		837 J		274 J
MERCURY	0.02 U		0.007 U		0.007 U		0.007 U		0.007 J		0.03 U
NICKEL	173 J		167 J		93.8 J		7.8 J		29.9 J		21.8 J
POTASSIUM	3810 J		4150 J		4430 J		885 J		5580 J		1340 J
SELENIUM	0.04 U		0.12 U		0.14 U		0.51 U		0.53 U		0.25 U
SODIUM	44400 J		38500 J		84800 J		31000 J		11800 J		11700 J
STRONTIUM											
TITANIUM	21.6 J		0.61 U		0.72 U		1.9 U		150 J		
VANADIUM	1 U		0.28 U		0.09 U		0.24 U		25.8 J		6.2 J
ZINC	162 J		280		21.3 J		6.8 U		45.4 J		49.6 J

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED										52.6 U	
ARSENIC, FILTERED										0.87 U	
BARIUM, FILTERED										33.9 J	
BERYLLIUM, FILTERED										0.3 U	
CALCIUM, FILTERED										9670 J	
CHROMIUM, FILTERED										0.73 U	
COBALT, FILTERED										14.7 J	
COPPER, FILTERED										1.1 U	
IRON, FILTERED										4810 J	
LEAD, FILTERED										0.34 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED										7230 J	
MANGANESE, FILTERED										1110 J	
NICKEL, FILTERED										21.6 J	
POTASSIUM, FILTERED										1460 J	
SELENIUM, FILTERED										0.16 U	
SODIUM, FILTERED										13000 J	
STRONTIUM, FILTERED											
TITANIUM, FILTERED										1 U	
VANADIUM, FILTERED										0.54 U	
ZINC, FILTERED										22.4 J	
Field Parameters											
ALKALINITY	10 U										
CARBON DIOXIDE	150										
DISSOLVED OXYGEN	0.02	8.4		7.03		23.4		10.9			5.56
DISSOLVED OXYGEN - METER	0.44		0.88		5.66		8.98		3.75		
HYDROGEN SULFIDE (H2S)	0										
IRON(+2)	3.3 >										
MANGANESE(+2)	1.3										
NITRITE-N	0										
OXIDATION REDUCTION POTENTIAL (MV)	-473	2.8	396.6	142	246.7	518.6	223.6	71	91.7		559.8
PH (S.U.)	5.56	5.62	3.34	5.2	5.67	5.39	6.26	6.99	5.88		4.96
SPECIFIC CONDUCTANCE (MS/CM)	0.589	0.662	0.568	0.795	0.793	1.444	0.386	0.519	0.234		0.091
SULFIDE	0.04										
TEMPERATURE (°C)	15.52	19.73	9.18	15.4	10.09	15.98	14.73	18.79	8.83		16.12
TURBIDITY (NTU)	9.36	4	7	0.6	4.69	6.1	3.45	2.8	80		94
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.36		0.42		0.005 UJ		0.005 UJ		0.02		
NITRITE/NITRATE-N	0.025 U		0.05 U		0.13 J		0.25 J		1.2 J		
TOTAL ORGANIC CARBON											

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT36	13MWT36	13MWT37	13MWT37	13MWT39	13MWT39	13MWT39
SAMPLING ROUND	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3601	13GWT3602	13GWT3701	13GWT3702	13GWT3901	13GWT3901-F	13GWT3902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/8/2003	7/29/2004	11/6/2003	7/30/2004	11/7/2003	11/7/2003	7/29/2004
Volatile Organics (ug/L)										
TRICHLOROETHENE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 U	0.24 U	0.04 U		0.27 U
1,3-DINITROBENZENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 U	0.24 U	0.04 U		0.27 U
2,4,6-TRINITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U		0.269 U		0.26 U		0.26 U		
2,4-DINITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U		0.269 U		0.26 U		0.26 U		
2,6-DINITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
2-AMINO-4,6-DINITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 U	0.24 U	0.42 J		0.28 J
2-NITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
3-NITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
4-AMINO-2,6-DINITROTOLUENE		0.29 J	0.26 J	0.269 U	0.27 U	0.04 U	0.5	0.56 J		0.5 J
4-NITROTOLUENE		0.25 U	0.24 U	0.269 U	0.27 U	0.04 UJ	0.24 U	0.04 UJ		0.27 U
DNX		1		0.269 U		1.5 J		43 J		
HMX		29	28	0.269 U	0.27 U	25	140	48 J		74
MNX		4.5		0.269 U		5.2		7.7		
RDX		460	400	0.27 J	6.1	650	2100	180		190
TNX		0.25 U		0.269 UJ		0.73		2.4		
Total Metals (ug/L)										
ALUMINUM		277 J		147 U		140 U		2010 J		
ARSENIC		0.13 U		0.22 U		0.27 U		1.1 U		
BARIUM		17.7 J		30.5 J		38.8 J		104 J		
BERYLLIUM		0.23 U		0.09 U		0.05 U		0.12 U		
CADMIUM		0.04 U		0.54 U		0.13 U		0.23 U		
CALCIUM		14700 J		48800 J		21600 J		52200 J		
CHROMIUM		0.55 U		0.89 U		0.72 U		4.2 J		
COBALT		10.3 J		3.7 J		14.8 U		5.5 J		
COPPER		1.7 J		0.88 U		0.83 U		2.1 J		
IRON		316 J		83.6 U		1760 J		1450 J		
LEAD		0.77 U		0.42 U		0.94 U		1.1 U		
LITHIUM										
MAGNESIUM		12300 J		45800 J		14500 J		14300 J		
MANGANESE		645 J		437 J		834 J		1290 J		
MERCURY		0.007 U		0.007 U		0.02 U		0.02 U		
NICKEL		42.5 J		56.4 J		12.9 J		25.6 J		
POTASSIUM		2980 J		2330 J		1810 J		5110 J		
SELENIUM		0.26 U		0.28 U		0.1 U		0.11 U		
SODIUM		34500 J		49700 J		29600 J		15800 J		
STRONTIUM										
TITANIUM		2.8 J		4.2 J		8 J		55.3 J		
VANADIUM		0.3 U		0.23 U		0.4 U		4.1 J		
ZINC		28.8 J		31.2 J		16.8 J		14.3 J		

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT36	13MWT36	13MWT37	13MWT37	13MWT39	13MWT39	13MWT39
SAMPLING ROUND	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3601	13GWT3602	13GWT3701	13GWT3702	13GWT3901	13GWT3901-F	13GWT3902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	ORIG	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/8/2003	7/29/2004	11/6/2003	7/30/2004	11/7/2003	11/7/2003	7/29/2004
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED	66.5 U								53.1 U	
ARSENIC, FILTERED	0.33 U								0.31 U	
BARIUM, FILTERED	32.5 J								93.6 J	
BERYLLIUM, FILTERED	0.39 U								0.03 U	
CALCIUM, FILTERED	3290 J								48000 J	
CHROMIUM, FILTERED	1.4 U								0.17 U	
COBALT, FILTERED	6.7 J								5.2 J	
COPPER, FILTERED	4 U								1.3 U	
IRON, FILTERED	201 J								447 J	
LEAD, FILTERED	0.56 U								0.06 U	
LITHIUM, FILTERED										
MAGNESIUM, FILTERED	3300 J								13700 J	
MANGANESE, FILTERED	287 J								1190 J	
NICKEL, FILTERED	21.7 J								23.8 J	
POTASSIUM, FILTERED	562 J								4540 J	
SELENIUM, FILTERED	0.21 U								0.16 U	
SODIUM, FILTERED	12200 J								15500 J	
STRONTIUM, FILTERED										
TITANIUM, FILTERED									1.2 U	
VANADIUM, FILTERED	0.3 U								0.07 U	
ZINC, FILTERED	19 J								11.3 J	
Field Parameters										
ALKALINITY		10 U		10 U						
CARBON DIOXIDE		32		40						
DISSOLVED OXYGEN		1	13.42	5.5	16.14		2.9			6.07
DISSOLVED OXYGEN - METER		2.35		4.91		4.82		5.35		
HYDROGEN SULFIDE (H2S)		0		0						
IRON(+2)		0.18		0.03						
MANGANESE(+2)		0.8		0.3						
NITRITE-N		0.005		0.003						
OXIDATION REDUCTION POTENTIAL (MV)		276	149.6	252.1	350.1	-144.9	133.5	135.1		321
PH (S.U.)		4.97	5.06	5.68	5.51	5.75	6.26	6.4		5.85
SPECIFIC CONDUCTANCE (MS/CM)		0.312	0.347	0.721	0.68	0.307	0.174	0.391		0.352
SULFIDE		0		0.01						
TEMPERATURE (°C)		10.94	18.58	12.24	15.66	13.32	17.35	13.29		16.31
TURBIDITY (NTU)		6.07	21	6.06	9.9	3.2	5	17.9		2.2
Miscellaneous Parameters (mg/L)										
AMMONIA-N		0.04		0.01 U		0.005 U		0.36		
NITRITE/NITRATE-N		0.3 J		0.08		0.28		0.77		
TOTAL ORGANIC CARBON										

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT40	13MWT40	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT47	13MWT47
SAMPLING ROUND	02	03	02	02	03	02	03	02	03
SAMPLE NUMBER	13GWT4001	13GWT4002	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4701	13GWT4702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/5/2003	7/30/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/9/2003	8/1/2004
Volatile Organics (ug/L)									
TRICHLOROETHENE									
Energetics (ug/L)									
1,3,5-TRINITROBENZENE	0.04 U	0.25 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
1,3-DINITROBENZENE	0.04 U	0.25 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
2,4,6-TRINITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
2,4-DIAMINO-6-NITROTOLUENE	0.26 U		0.26 U			0.24 U		0.26 U	
2,4-DINITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
2,6-DIAMINO-4-NITROTOLUENE	0.26 U		0.26 U			0.24 U		0.26 U	
2,6-DINITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
2-AMINO-4,6-DINITROTOLUENE	0.04 U	0.25 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
2-NITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
3-NITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
4-AMINO-2,6-DINITROTOLUENE	0.52 J	1.1	0.04 U		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
4-NITROTOLUENE	0.04 UJ	0.25 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.26 U	0.24 U
DNX	0.9 J		0.26 U			0.24 U		0.26 U	
HMX	14	22	64		330 J	0.97 J	1.2	0.26 U	0.24 U
MNX	3.3		0.32 J			0.24 U		0.26 U	
RDX	140	230	41		140 J	0.72 J	0.27 U	0.26 U	0.24 U
TNX	0.26 U		0.26 U			0.24 U		0.26 U	
Total Metals (ug/L)									
ALUMINUM	221 J		24300 J			2500 J		16500 J	17400 J
ARSENIC	0.35 U		5.8 J			1.9 J		3.2 J	4.1 J
BARIUM	49.2 J		130 J			28.9 J		14.1 J	14.9 J
BERYLLIUM	0.09 U		0.98 U			3 J		12.8 J	12.4 J
CADMIUM	0.42 U		0.19 U			1.1 U		1.5 U	1.4 U
CALCIUM	14900 J		11800 J			21400 J		41500 J	41200 J
CHROMIUM	0.58 U		39.6 J			0.72 U		1 U	1.6 U
COBALT	31.4 J		17.8 J			65 J		194 J	249 J
COPPER	1.3 J		10 J			4.3 J		29.9 J	35.2 J
IRON	272 J		20000 J			4600 J		24300 J	41600 J
LEAD	0.78 U		8.7 J			1.1 U		13.3 J	14.8 J
LITHIUM									
MAGNESIUM	11800 J		6730 J			9940 J		37500 J	40500 J
MANGANESE	855 J		2330 J			825 J		3960 J	3750 J
MERCURY	0.02 U		0.02 U			0.007 U		0.29	0.03 U
NICKEL	26.4 J		28.4 J			129 J		400 J	463 J
POTASSIUM	1840 J		8410 J			2890 J		2570 J	2860 J
SELENIUM	0.39 U		0.28 U			0.18 U		0.11 U	0.11 U
SODIUM	33000 J		7420 J			16400 J		63900 J	69900 J
STRONTIUM									
TITANIUM	6.1 J		237 J			0.71 U		1 U	
VANADIUM	0.42 U		34.4 J			0.41 U		0.12 U	0.16 U
ZINC	14.4 J		32.8 J			250		1070 J	1220 J

TABLE 3-42

SUMMARY OF CHEMICALS DETECTED IN
UPPER AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT40	13MWT40	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT47	13MWT47
SAMPLING ROUND	02	03	02	02	03	02	03	02	03
SAMPLE NUMBER	13GWT4001	13GWT4002	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4701	13GWT4702
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/5/2003	7/30/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/9/2003	8/1/2004
Dissolved Metals (ug/L)									
ALUMINUM, FILTERED				73.6 U					
ARSENIC, FILTERED				1.6 J					
BARIUM, FILTERED				30.4 J					
BERYLLIUM, FILTERED				0.1 U					
CALCIUM, FILTERED				12000 J					
CHROMIUM, FILTERED				0.36 U					
COBALT, FILTERED				13.2 J					
COPPER, FILTERED				0.69 U					
IRON, FILTERED				112 U					
LEAD, FILTERED				0.17 U					
LITHIUM, FILTERED									
MAGNESIUM, FILTERED				4200 J					
MANGANESE, FILTERED				2000 J					
NICKEL, FILTERED				12.8 J					
POTASSIUM, FILTERED				2520 J					
SELENIUM, FILTERED				0.76 U					
SODIUM, FILTERED				7100 J					
STRONTIUM, FILTERED									
TITANIUM, FILTERED				2 U					
VANADIUM, FILTERED				0.23 U					
ZINC, FILTERED				3.3 J					
Field Parameters									
ALKALINITY									
CARBON DIOXIDE									
DISSOLVED OXYGEN		0.39			2.12		3.43		0.51
DISSOLVED OXYGEN - METER	6.28		1.46			4.37		1.5	
HYDROGEN SULFIDE (H2S)									
IRON(+2)									
MANGANESE(+2)									
NITRITE-N									
OXIDATION REDUCTION POTENTIAL (MV)	100.3	538	105		132.1	298.5	364.8	409.9	181.2
PH (S.U.)	5.53	5.04	6.39		5.66	4.47	4.19	3.46	3.4
SPECIFIC CONDUCTANCE (MS/CM)	0.273	0.329	0.19		0.101	0.303	0.263	1634	1.056
SULFIDE									
TEMPERATURE (°C)	13.28	15.02	14.03		16.71	12.83	14.5	12.42	18.41
TURBIDITY (NTU)	6.2	1.28	1000 >		1000 >	1.9	8.9	5.4	7
Miscellaneous Parameters (mg/L)									
AMMONIA-N	0.11 J		0.16 J			0.11		0.44	
NITRITE/NITRATE-N	0.28		0.025 U			0.05 U		0.05 U	
TOTAL ORGANIC CARBON									

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
J - estimated value
U - less than laboratory method detection limit
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-43

SUMMARY OF CHEMICALS DETECTED IN
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT28	13MWT28	13MWT28	13MWT35	13MWT35	13MWT35	13MWT38	13MWT38	13MWT38	13MWT41
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02
SAMPLE NUMBER	13GWT2801	13GWT2801-F	13GWT2802	13GWT3501	13GWT3501-F	13GWT3502	13GWT3801	13GWT3801-F	13GWT3802	13GWT4101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/7/2003	12/7/2003	7/31/2004	12/10/2003	12/10/2003	8/1/2004	11/10/2003	11/10/2003	7/31/2004	11/23/2003
Energetics (ug/L)										
2-NITROTOLUENE	0.258 U		0.25 U	0.236 U		0.25 U	0.253 UJ		0.24 U	0.269 UJ
3-NITROTOLUENE	0.258 U		0.25 U	0.236 U		0.25 U	0.253 UJ		0.24 U	0.269 UJ
Total Metals (ug/L)										
ALUMINUM	6270 J			20900 J			4720 J			29800 J
ANTIMONY	2.9 J			6.7 J			3.8 J			5.6 J
ARSENIC	15.2 J			15 J			24.5 J			20.6 J
BARIUM	65.3 J			94.7 J			32.2 J			114 J
CALCIUM	10600 J			18000 J			5790 J			18500 J
CHROMIUM	11.7 J			35 J			12.5 J			38.7 J
COBALT	2 J			5.6 J			1.6 U			11.2 J
COPPER	1.4 U			6.1 J			1.6 J			10.9 J
IRON	2460 J			10300 J			5410 J			23700 J
LEAD	2.5 U			7.2 J			5.8 J			12 J
MAGNESIUM	2950 J			6520 J			1040 J			6520 J
MANGANESE	66.7 J			118 J			67.4 J			300 U
NICKEL	7.1 J			22 J			5.7 J			34 J
POTASSIUM	3670 J			10100 J			5180 J			7170 J
SELENIUM	4.1 J			1.7 U			2.2 U			5.1 J
SODIUM	124000 J			166000 J			71400 J			86700 J
TITANIUM	99 J			104 J			26.6 J			101 J
VANADIUM	12.5 J			31.6 J			25.6 J			33.9 J
ZINC	6.7 J			30.6 J			11.6 J			77.6 J
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED		102 U			130 U			285 J		
ANTIMONY, FILTERED		3 J			7.3 J			4 J		
ARSENIC, FILTERED		13.6 J			13.1 J			21.3 J		
BARIUM, FILTERED		36.9 J			24 J			9.6 J		
CALCIUM, FILTERED		8960 J			17000 J			3980 J		
CHROMIUM, FILTERED		0.81 U			2.3 J			0.8 U		
COBALT, FILTERED		0.55 U			3 J			1.5 U		
MAGNESIUM, FILTERED		1800 J			3130 J			140 U		
MANGANESE, FILTERED		3.7 U			9 J			4.2 U		
NICKEL, FILTERED		3.1 J			0.75 U			0.48 U		
POTASSIUM, FILTERED		1880 J			5390 J			4260 J		
SELENIUM, FILTERED		3.9 J			2.4 U			2 U		
SODIUM, FILTERED		122000 J			161000 J			65200 J		
VANADIUM, FILTERED		2 J			2.8 J			7 J		
ZINC, FILTERED		3.5 J			4 J			1.7 U		
Field Parameters										
ALKALINITY	150			200			108			
DISSOLVED OXYGEN	0.5		0.26	5.5		0.98	3.5		1.7	
DISSOLVED OXYGEN - METER	0.57			5.28			4.7			3.72

TABLE 3-43

SUMMARY OF CHEMICALS DETECTED IN
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT28	13MWT28	13MWT28	13MWT35	13MWT35	13MWT35	13MWT38	13MWT38	13MWT38	13MWT41
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02
SAMPLE NUMBER	13GWT2801	13GWT2801-F	13GWT2802	13GWT3501	13GWT3501-F	13GWT3502	13GWT3801	13GWT3801-F	13GWT3802	13GWT4101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/7/2003	12/7/2003	7/31/2004	12/10/2003	12/10/2003	8/1/2004	11/10/2003	11/10/2003	7/31/2004	11/23/2003
HYDROGEN SULFIDE (H2S)	0			0			0			
IRON(+2)	0.01			0.02			0			
MANGANESE(+2)	0			0			0.1			
NITRITE-N	0.007			0			0			
OXIDATION REDUCTION POTENTIAL (MV)	-34.1		73.5	105.2			10.3		72.9	170
PH (S.U.)	9.15		8.08	9.08		7.58	11.39		8.44	8.36
SPECIFIC CONDUCTANCE (MS/CM)	0.495		1.217	0.781		0.718	0.332		0.665	0.394
SULFIDE	0			0.01			0			
TEMPERATURE (°C)	13.59		17.98	13.6		15.91	13.18		21.72	14.01
TURBIDITY (NTU)	260		65	1000 >		1000 >	999 >		18	1000 >
Miscellaneous Parameters (mg/L)										
AMMONIA-N	0.46 J			0.56			0.44			0.18 J
NITRITE/NITRATE-N	0.66 J			0.05 U			0.11			0.025 U

TABLE 3-43

SUMMARY OF CHEMICALS DETECTED IN
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 3 OF 4

WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT41	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4101-F	13GWT4102	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
Energetics (ug/L)									
2-NITROTOLUENE		0.45 J	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
3-NITROTOLUENE		0.24 U	0.255 U	0.24 U	0.34 J		0.24 U	0.278 U	0.26 U
Total Metals (ug/L)									
ALUMINUM			135 J		4300 J			472 J	
ANTIMONY			0.65 U		0.81 U			0.05 U	
ARSENIC			1.4 U		2.1 J			0.5 U	
BARIUM			29.6 J		64.3 J			23.1 J	
CALCIUM			20200 J		14000 J			67700 J	
CHROMIUM			0.43 U		5.6 J			0.67 U	
COBALT			0.36 U		0.91 U			2.9 J	
COPPER			0.25 U		4.8 J			0.42 U	
IRON			168 J		1630 J			2350 J	
LEAD			1 U		1.5 U			0.37 U	
MAGNESIUM			6020 J		3510 J			34100 J	
MANGANESE			58.1 J		120 J			495 J	
NICKEL			1.4 U		3.1 J			6 J	
POTASSIUM			3630 J		3440 J			3260 J	
SELENIUM			0.46 U		1.2 U			0.13 U	
SODIUM			145000 J		87500 J			120000 J	
TITANIUM			1.6 U		58.6 J			5.4 J	
VANADIUM			0.33 U		6.7 J			0.58 U	
ZINC			0.5 J		8.5 J			6.1 J	
Dissolved Metals (ug/L)									
ALUMINUM, FILTERED	95.6 U					103 U			
ANTIMONY, FILTERED	5.6 J					1 U			
ARSENIC, FILTERED	9.4 J					1.4 U			
BARIUM, FILTERED	16.7 J					43.8 J			
CALCIUM, FILTERED	17300 J					13500 J			
CHROMIUM, FILTERED	0.34 U					0.61 U			
COBALT, FILTERED	3.9 J					3.1 J			
MAGNESIUM, FILTERED	2810 J					3160 J			
MANGANESE, FILTERED	30.9 U					104 J			
NICKEL, FILTERED	2.6 J					1.4 U			
POTASSIUM, FILTERED	2960 J					2360 J			
SELENIUM, FILTERED	4.2 J					1.6 U			
SODIUM, FILTERED	82100 J					91500 J			
VANADIUM, FILTERED	0.68 U					0.68 U			
ZINC, FILTERED	17 J					2.8 J			
Field Parameters									
ALKALINITY									
DISSOLVED OXYGEN		0.53		0.56			7.97		0.05
DISSOLVED OXYGEN - METER			0.79		0.55			0.99	

TABLE 3-43

SUMMARY OF CHEMICALS DETECTED IN
LOWER AQUIFER GROUNDWATER SAMPLES ROUNDS 2 AND 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT41	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4101-F	13GWT4102	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
HYDROGEN SULFIDE (H2S)									
IRON(+2)									
MANGANESE(+2)									
NITRITE-N									
OXIDATION REDUCTION POTENTIAL (MV)		149	-70	76.3	55.5		116.5	-32.5	131
PH (S.U.)		6.85	7.77	7.74	8.19		6.78	6.6	6.25
SPECIFIC CONDUCTANCE (MS/CM)		1.001	0.595	0.853	0.357		0.703	1.021	0.786
SULFIDE									
TEMPERATURE (°C)		14.73	11.37	23.1	13.36		25.29	12.45	14.1
TURBIDITY (NTU)		110	4.6	110	75		19	8.72	2.81
Miscellaneous Parameters (mg/L)									
AMMONIA-N			0.42		0.26			0.12	
NITRITE/NITRATE-N			0.51 J		0.05 U			0.05 U	

Groundwater samples from the lower aquifer were only collected in sampling Rounds 2 and 3.
J - estimated value
U - less than laboratory method detection limit
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-44

SUMMARY OF CHEMICALS DETECTED IN
VALLEY AQUIFER GROUNDWATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	03	03	03	03	03
SAMPLE NUMBER	13GWT4801	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	ORIG	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
Energetics (ug/L)					
2-AMINO-4,6-DINITROTOLUENE	0.275 U	0.27 U	0.27 U	0.39 J	
4-AMINO-2,6-DINITROTOLUENE	0.275 U	0.62	0.27 U	0.27 U	
HMX	0.86	27	0.27 U	120	
RDX	0.54 J	32	0.27 U	250	
Total Metals (ug/L)					
ALUMINUM	8.35 U	39.4 U	93.9 J	1990 J	
ARSENIC	0.21 U	0.43 U	1.2 J	2 J	
BARIUM	100 J	119 J	148 J	67 J	
CALCIUM	148000 J	69400 J	62400 J	22700 J	
CHROMIUM	0.81 U	0.84 U	0.98 U	4.6 J	
COBALT	0.97 U	1.1 J	2.2 J	29 J	
COPPER	0.46 U	0.62 U	1.4 J	3.4 U	
IRON	26.9 U	158 J	92.9 J	5620 J	
LEAD	0.069 U	0.08 U	0.14 U	2.8 J	
MAGNESIUM	13300 J	11800 J	45700 J	9000 J	
MANGANESE	156	357	146	3370 J	
NICKEL	3.2 J	2.2 J	9.7 J	22.4 J	
POTASSIUM	4220 J	11900 J	5210 J	20100 J	
SELENIUM	0.094 U	0.094 U	6 J	0.18 U	
SODIUM	32200 J	9640 J	146000 J	7740 J	
VANADIUM	1.14 U	1.14 U	1.14 U	4.9 J	
Dissolved Metals (ug/L)					
BARIUM, FILTERED					51.6 J
CALCIUM, FILTERED					24700 J
COBALT, FILTERED					30.4 J
MAGNESIUM, FILTERED					8400 J
MANGANESE, FILTERED					3890 J
NICKEL, FILTERED					18.8 J
POTASSIUM, FILTERED					20800 J
SODIUM, FILTERED					7410 J
Field Parameters					
DISSOLVED OXYGEN	0.15	0.3	2.42	8.32	
OXIDATION REDUCTION POTENTIAL (MV)	113.7	104.4	244.1	299	
PH (S.U.)	6.93	6.37	7.18	5.94	
SPECIFIC CONDUCTANCE (MS/CM)	0.719	0.45	0.881	0.278	
TEMPERATURE (°C)	19.88	20.31	16.11	20.57	
TURBIDITY (NTU)	1.95	1.54	8.34	33	

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Groundwater samples from the valley aquifer were only collected in sampling Round 3.
J - estimated value
U - less than laboratory method detection limit
MV - millivolts
S.U. - standard unit
ms/cm - milliSiemen per centimeter
°C - degrees Celsius
NTU - nephelometric turbidity unit

TABLE 3-45

DESCRIPTIVE STATISTICS FOR
VEGETATION SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration [(1)]	Average of Positive Detects	Sample of Maximum Detect
Energetics (mg/kg)							
2,6-DIAMINO-4-NITROTOLUENE	1/15	1.4 J	1.4 J	0.5	0.327	1.40	13VG001010001
2,6-DINITROTOLUENE	7/16	0.93 J	7.9 J	0.5	1.36	2.78	13VG011020001
2-AMINO-4,6-DINITROTOLUENE	1/16	3.4 J	3.4 J	0.5	0.447	3.40	13VG007020001
4,4'-TN-AZOXY	1/16	1.68 J	1.68 J	1	0.574	1.68	13VG003010001
DNX	2/15	3.1 J	3.8 J	0.5	0.677	3.45	13VG005030001
HMX	6/16	0.57 J	2.6 J	0.5	0.518	0.965	13VG012010001
MNX	12/16	0.54 J	2.3 J	0.5	1.16	1.46	13VG005030001
NITROBENZENE	1/16	1.1 J	1.1 J	0.5	0.303	1.10	13VG011020001
RDX	7/16	1.6 J	8.6 J	0.5	1.97	4.19	13VG016030001
TNX	1/16	0.58 J	0.58 J	0.5	0.271	0.580	13VG001010001

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Vegetation samples were only collected in Round 3.
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
J - estimated value
mg/kg - milligrams per kilogram

TABLE 3-46

SUMMARY OF CHEMICALS DETECTED IN
VEGETATION SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03
LOCATION	13VG01	13VG01	13VG02	13VG02	13VG03	13VG03	13VG04	13VG04	13VG04
SAMPLE NUMBER	13VG001010001	13VG002020001	13VG003010001	13VG004020001	13VG008030001	13VG009010001	13VG005030001	13VG006010001	13VG007020001
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	NORMAL
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004
Energetics (mg/kg)									
2,6-DIAMINO-4-NITROTOLUENE	1.4 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ
2,6-DINITROTOLUENE	0.93 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3 J
2-AMINO-4,6-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.4 J
4,4'-TN-AZOXY	1 UJ	1 UJ	1.68 J	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
DNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	3.8 J	0.5 UR	0.5 UJ
HMX	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.57 J	0.5 U	0.5 UJ	0.5 U
MNX	1.5 J	0.5 UJ	1.3 J	1.8 J	1.3 J	0.54 J	2.3 J	0.86 J	0.5 UJ
NITROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	0.5 U	0.5 U	1.9 J	0.5 U	0.5 U	1.6 J	0.5 U	0.5 U	4.5 J
TNX	0.58 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

TABLE 3-46

SUMMARY OF CHEMICALS DETECTED IN
VEGETATION SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03
LOCATION	13VG05	13VG05	13VG06	13VG06	13VG07	13VG08	13VG09
SAMPLE NUMBER	13VG010030001	13VG011020001	13VG012010001	13VG013020001	13VG014030001	13VG015040001	13VG016030001
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004
Energetics (mg/kg)							
2,6-DIAMINO-4-NITROTOLUENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
2,6-DINITROTOLUENE	2 J	7.9 J	1.8 J	2.1 J	0.5 U	0.5 U	1.7 J
2-AMINO-4,6-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4,4'-TN-AZOXY	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
DNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	3.1 J
HMX	0.75 J	0.64 J	2.6 J	0.5 U	0.5 U	0.57 J	0.66 J
MNX	1.3 J	1.4 J	1.2 J	2 J	2 J	0.5 UJ	0.5 UJ
NITROBENZENE	0.5 U	1.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	4.8 J	0.5 U	1.9 J	0.5 U	6 J	0.5 U	8.6 J
TNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.
Vegetation samples were only collected in sampling Round 3.
J - estimated value
U - less than laboratory method detection limit
mg/kg - milligrams per kilogram

4.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

4.1 PHYSIOGRAPHY AND TOPOGRAPHY

MFB is located in the Crawford Upland area of the NSWC facility. MFB lies on top of a ridge that was flattened to some extent in the 1940s prior to the construction of buildings, roads, and associated parking and staging areas. The areas in between buildings and roads are grass covered. The active operations of MFB lie within an elongated trapezoid with a long axis that runs in a northeast-southwest direction (Figure 2-3). The main road (Highway 45) and a rail line also run in a northeast-southwest direction and lie along the southwestern side of MFB. Most buildings are located on the northwestern side of this road, within the fenced area. At the fenceline on the northwestern side of MFB, the ridge top abruptly ends and the land surface slopes steeply down to an unnamed tributary of Boggs Creek. On the southeastern side of the main road, the other side of the ridge drops steeply in elevation to the southeast. Both sides of the ridge beyond the fenceline and the main road are heavily forested, except along numerous rights-of-way that contain power lines, pipelines, and other utilities.

Elevations at MFB range from a low of approximately 550 feet above mean sea level (amsl) along the unnamed tributary of Boggs Creek up to approximately 720 feet amsl along the main roadway on the northeastern side of MFB. Thus, there is a total relief in the area of approximately 170 feet.

4.2 METEOROLOGY

NSWC Crane is located in a warm, temperate climatic zone. In general, the summers are warm and humid, and winters are mild with occasional short cold periods. The temperature ranges from an average maximum July temperature of 89 degrees Fahrenheit (°F) to an average minimum January temperature of 26°F. Precipitation is fairly evenly distributed throughout the calendar year; the maximum precipitation occurs during the spring and early summer. The average annual precipitation at the facility is 44 inches and consists of 42 inches of rain and 15 inches of snow. The average humidity ranges from 40 to 90 percent in summer and 60 to 90 percent in winter. Long-term climatological records for the area indicate that the monthly prevailing wind direction is from the southwest from April through December and from the northwest during January through March [National Oceanic and Atmospheric Administration (NOAA), 1988]. The annual prevailing wind direction for the region is from the southwest, and the annual average wind speed for the area is about 9.6 miles per hour. Figure 4-1 is a wind rose summarizing the mean wind direction and wind speed distribution at the Indianapolis International Airport over a 5-year period (1985 to 1989).

4.3 SURFACE WATER HYDROLOGY

The topography at MFB consists of a ridge that runs along Highway 45 in a northeast-southwest orientation with gradual slopes to the northwest across MFB. The sides of the ridge consist of steeper slopes to the northwest and southeast that lead down to the adjacent stream valleys. Several man-made ditch systems located throughout MFB convey surface water run-off away from the buildings toward the sides of the ridge. The main road and the rail line are located on the crest of the ridge, which forms a surface water drainage divide.

Downspouts, floor drains, and floor sumps in building located around SWMU 13 drain into numerous outdoor sumps, drainage ditches, and storm sewers. Many of these conveyances drain into drainage ditches in the top of the ridge. Surface drainage at MFB is routed through storm sewers and ditches located throughout the relatively flat portion of the ridge top. The ditches lead to larger drainageways and gullies that flow down both sides of the ridge in northwest and southeast directions. Drainage from the northwestern side of the rail line flows to the northwest, down the side of the ridge, and into the unnamed tributary of Boggs Creek. One of these drainage channels is on the far northern side of MFB and includes surface water sampling stations 13SW/SD01, 13SW/SD22, and 13SW/SD29 and staff gauges 13SG01 near the top of the ridge and 13SG13 located just before the gully enters the unnamed tributary (Figure 2-3). A second gully drains a large area on the west-central side of MFB and includes surface water sampling stations 13SW/SD12, 13SW/SD13, and 13SW/SD14, and staff gauge 13SG14 (located just before the gully enters the unnamed tributary). A third gully drains the west-central side of MFB and includes surface water sampling stations 13SW/SD11 and 13SW/SD15. A fourth gully drains a small area on the western side of MFB and includes surface water sampling stations 13SW/SD10 and 13SW/SD16 and staff gauge 13SG16 (located just before the gully enters the unnamed tributary). A fifth gully is located west of MFB, but does not drain any area within MFB. This gully was sampled (surface water sampling station 13SW/SD28) and flow was monitored (staff gauge 13SG17) because of its close proximity to MFB. Because the rail line essentially lies along the crest of the ridge, a large majority of the surface drainage from MFB flows northwest toward the northwest fenceline and down the side of the ridge via the gullies described above into the unnamed tributary of Boggs Creek.

Drainage gullies leading away from the southeastern side of the rail line flow southeast, down the side of the ridge, and eventually coalesce to form two unnamed tributaries of Turkey Creek, which lies approximately 5,000 feet (1 mile) southeast of MFB. The gully leading away from the northeastern corner of MFB includes surface water sampling stations 13SW/SD02, 13SW/SD21, and 13SW/SD26. The main gully system (including several coalescing gullies) on the eastern side of MFB includes surface water sampling stations 13SW/SD03 through 13SW/SD07, 13SW/SD20, 13SW/SD24, 13SW/SD25, and

13SW/SD32, and staff gauges 13SG03 through 13SG06. A third gulley on the southeastern side of MFB includes surface water sampling stations 13SW/SD08 and 13SW/SD19. The two gullies on the southeastern side of MFB combine about 2,000 feet to the southeast and were monitored at surface water sampling station 13SW/SD25 (Figure 2-3).

A small area in the southwestern corner of MFB drains southwest and eventually flows directly into Boggs Creek about 4,000 feet southwest of MFB. This drainageway includes surface water sampling stations 13SW/SD09, 13SW/SD17, and 13SW/SD18, and staff gauge 13SG07.

Three rounds of surface water sampling and flow measurements occurred during the RFI. Based on visual observations and measurements, estimates of surface water flow were made at each surface water sampling station and at each staff gauge on one or more occasions during those three rounds (Table 4-1). Flow rates in the gullies and drainageways were relatively low during Round 1, very low to non-existent during Round 2, and much greater during Round 3.

During the three sampling events, surface water sampling stations and staff gauges located on the southeastern side of the ridge were either dry or the flow rates were small [less than 10 gallons per minute (gpm)]. On the west side of MFB along the fenceline, surface water flow was either 0 gpm or moderate (10 to 50 gpm) in the drainageways. In all three rounds of monitoring, there were moderate flows at staff gauges 13SG08, 13SG09, and 13SG10. Estimated flow rates of 10 to 20 gpm were also recorded for sampling stations 13SW/SD11 and 13SW/SD22 in October 2003 and October 2004, respectively. Thus, more surface water seemed to be draining from the northwestern side of MFB compared to the southeastern side. At the base of the ridge on the northwestern side of the SWMU, flow rates in the gullies were generally between 10 and 100 gpm during or immediately after a storm event. For example, flow at 13SW/SD14 was estimated to be 50 to 100 gpm in late November 2004 (Table 4-1). The streambed of the unnamed tributary located northwest of MFB was often dry. There were about 15 to 25 gpm of flow visible in the streambed in late October 2003. The flow rates observed in the stream channel in late October and mid-November 2004 were much greater – about 160 to 700 gpm (Table 4-1). Because of the steep terrain and generally impermeable nature of the shallow bedrock, the flow rates in gullies and the receiving stream tend to be very flashy (i.e., flow rates can quickly rise and decline during and immediately following storm events).

4.4 GEOLOGY

Bedrock underlying NSWC Crane consists of sedimentary rocks from the Lower Pennsylvanian-age Mansfield Formation of the Raccoon Creek Group and the underlying Upper Mississippian-age

Stephensport and West Baden Groups (Figure 4-2). The Pennsylvanian-age sandstones, siltstone, shales, coal beds, and thin limestone units of the Mansfield Formation can reach thicknesses of 250 to 300 feet at NSWC Crane in the central and western portions of the facility. Because the pre-Pennsylvanian bedrock is dipping to the west-southwest toward the center of the Illinois structural basin, the Mississippian-age rocks are closer to the surface and crop out along the stream valleys and lower slopes on the eastern side of NSWC Crane (Figure 4-3). On the eastern side of NSWC Crane (e.g., near the Dye Burial Ground, Ammunition Burning Ground, and Rockeye), Pennsylvanian bedrock is confined to the uppermost portions of hills and ridges.

Below the Pennsylvanian rock lies Mississippian-age limestone and sandstone formations of the Stephensport Group (Figure 4-2), including the Glen Dean, Golconda, and Beech Creek Limestones and the Big Clifty Sandstone.

The elevation of the erosional unconformity separating the Pennsylvanian and Mississippian rocks is estimated to be between 500 to 550 feet amsl near SWMU 13 (Barnhill, 1993), or approximately 168 to 218 feet below the top of the ridge. This places the base of the Pennsylvanian rock below the elevation of the tributary stream on the northwestern side of SWMU 13. Monitoring well 13MWT50, located along the base of the ridge on the northwestern side of MFB (Figure 2-2), has penetrated to the lowest elevation at MFB (bottom elevation = 532.77 feet amsl, Table 2-2). This boring encountered gray shale and gray shaley siltstone in the lower part of the borehole, which is assumed to be Pennsylvanian in age. Boreholes have not penetrated any limestone (e.g., Glen Dean, Golconda, or Beech Creek limestones) or sandstone units that might be Mississippian in age, so it is inferred that the Mississippian unconformity and Mississippian age rock formations lie below 532 feet amsl at MFB. Therefore, all of the bedrock that lies above stream level consists of Pennsylvanian rock and is at least 186 feet thick from the top of the ridge. Because the geological and hydrogeological investigations at MFB have been confined to the Pennsylvanian bedrock and surficial deposits, Mississippian-age rock formations will not be discussed further in this report.

The geology and hydrogeology of SWMU 13 were investigated during three rounds of drilling, well installation, and well testing. A total of 51 monitoring wells were installed during the three rounds of RFI field activities at MFB. The date of installation, the total depth, the ground surface elevation, the screen elevations, and other physical characteristics of each of the 51 monitoring wells are listed in Table 2-2. The boring logs and well construction logs for these wells are included in Appendix B. The locations of the 51 monitoring wells are shown on Figure 2-2.

Figure 4-4 illustrates the locations of four hydrogeological cross sections, including select borings, through SWMU 13. Figures 4-5, 4-6, 4-7, and 4-8 show hydrogeologic cross sections A-A', B-B', C-C', and D-D', respectively.

Pennsylvanian bedrock was encountered beneath natural unconsolidated materials and fill and consisted of discontinuous layers of siltstones, sandstones, shales, and coal seams. Most fractures found in the bedrock were horizontal bedding plane fractures. The top of the ridge is capped with sandstone and siltstone that is weathered and stained brown because of iron oxidation. These rock units extend from the ridge top down to about 630 to 635 feet amsl (see Figures 4-5 through 4-7). When grouped together, the ridge-capping sandstone and siltstone units form what is termed the Upper Pennsylvanian water-bearing zone (Puz); this zone is discussed in greater detail in the following subsection. Of the 51 monitoring wells that have been installed at this site, 40 wells are screened in this upper bedrock zone (Table 2-2).

Beneath the upper sandstone and siltstone units lies a mudstone (siltstone/shale) unit that extends beneath the entire MFB area. The shale is interlayered with discontinuous siltstone and sandstone lenses. The sandstone lenses are most prevalent in the northeastern portion of SWMU 13. The top of the siltstone/shale unit was encountered at approximately 630 to 645 feet amsl (see Figures 4-5 through 4-7) and the bottom of the siltstone/shale unit lies at about 605 to 615 feet amsl. The total thickness of the siltstone/shale unit is about 30 feet. This siltstone/shale unit is considered to be an aquitard and greatly restricts the downward movement of groundwater.

A sandstone layer was the next lithologic unit encountered beneath the interlayered shale and siltstone unit. The top of this sandstone unit was encountered at approximately 605 to 615 feet amsl. Seven monitoring wells located within the MFB were drilled down to this interface and penetrated as much as 10 feet into the underlying sandstone. None of these seven monitoring wells penetrated completely through the sandstone (see Figures 4-5 through 4-7). As a result, the total thickness of the sandstone is not known.

Four monitoring wells were installed in the valley of the unnamed tributary on the northwestern side of SWMU 13. One of these four wells (13MWT50) penetrated into bedrock and encountered shale and shaley siltstone. It is assumed that the Mississippian-Pennsylvanian unconformity lies a short vertical distance (10 to 30 feet) below the bottom of 13MWT50. The other three wells in the valley were drilled down to the bedrock surface and were screened in the unconsolidated overburden (soil and alluvium).

4.5 SOILS

A veneer of natural soil and fill materials blankets the top and the sideslopes of the MFB ridge. Fill was encountered in various borings and extended to a maximum depth of 6 feet bgs in soil boring 13MWT20. In some cases, the fill extended to the bedrock surface. Fill material was found in several borings installed near the railroad spurs on the western side of the SWMU (e.g., 13MWT12 and 13MWT17), in borings located near buildings (e.g., 13MWT02), and in areas of past excavation (e.g., 13MWT19 and 13MWT20). The fill material included cinders, gravel, sand, and sandstone fragments.

Natural unconsolidated materials, residual soils of the Raccoon Creek Group, underlie the fill and exist at the ground surface wherever fill is not present. The residual soils on the ridge top and sideslopes consist predominantly of fine materials, including varying amounts of clay, silt, and sand. The maximum thickness of residual soil (17.5 feet) was found in soil boring 13MWT28 (Figure 4-7). Elsewhere on the ridge top, the overburden was generally 10 feet thick or less.

In the valley bottom on the western side of SWMU 13, four monitoring wells encountered 8 to 15 feet of unconsolidated overburden materials, assumed to be a mixture of residual soil, colluvium, and stream alluvium. In the boring logs (Appendix B), these materials were described as a mixture of clayey sand, clayey sandy silt, gravel, and rock fragments.

Recently, NSWC Crane has made a decision to demolish process buildings at SWMUs 12 and 13. During a review of actions necessary to demolish these buildings, it was determined that a concrete drainage system conveyed explosive-contaminated waters out of the buildings processing explosive materials to exterior sumps. No information was available regarding the integrity of the drainage system or the sumps. Previously, it had been assumed that all explosive contamination in soils was due to the wash down of explosives that had accumulated on roofs during explosive loading operations and the direct discharge of wastewaters containing explosives into ditches. An interim removal action was conducted at both SWMUs in which explosive-contaminated soils were removed for bioremediation. With the exception of small isolated areas where soil removal would have compromised the integrity of building supports, all explosive-contaminated soils were removed, bioremediated, and replaced in the soil trenches during the interim removal action.

If the drainage system or sumps have leaked explosive-contaminated waters, the surrounding soils may also be contaminated with explosives. The purpose of investigations conducted in February 2006 was to determine whether soils at SWMU 13 have been contaminated as the result of releases of explosive-

contaminated waste waters from the drainage system and sumps. The results of this investigation are described in Section 5.0.

The sump, soil, and drainage swale sediment sampling locations, which are listed in Section 3, were selected for sampling during site walks conducted by the Navy and TtNUS on September 20 and 21, 2005 and on January 10, 2006. The site walks took place at both SWMUs (12 and 13). Process knowledge and facility drawings were used during the site walks to determine which sumps/drains/structures had the highest potential and frequency of handling explosive-contaminated waters and those with lesser potential. All features identified on facility drawings were found. No additional sumps were identified in facility drawings or found during the site walk (e.g., MFA B-3037, B-3110, B-2715, B-0155, etc.). All locations which may have handled explosive contaminated wastes at high frequencies, were selected for sampling. These included the process water sumps, boot/shoe change houses, etc. Locations were also selected for sampling where releases of explosives may have occurred during transportation of explosives while being processed.

4.6 HYDROGEOLOGY

While drilling through the overburden on top of the ridge, saturated soil conditions were often observed. The shallow groundwater presumably represents rainfall recharge that has infiltrated the surface soil of the ridge top, percolated down to the upper bedrock surface, and is perched on the bedrock surface. This perched groundwater lens is sporadic in occurrence. Perched groundwater was detected at the base of at least 12 DPT soil borings drilled on the ridge top. These 12 soil borings were 3.33 to 11.78 feet deep (to bedrock surface) and contained 0.60 to 7.67 feet of saturated soil at the bottom. The borings with the greatest thickness of saturated soil (e.g., 13TW001, 002, 004, 006, 008, 010, and 011) are all located on the southeast side of the ridge top (Figure 2-5), where ground surface elevations are generally the greatest. The highest elevations of groundwater perched in the overburden soils occurred in temporary wells 13TW001, 13TW002, and 13TW011, which are all located around Building 166 in the northeast corner of SWMU13. Presumably, the thickness of saturated soil diminishes toward the edges of the ridge top where surface elevations decrease and the residual soil layer thins. It is assumed that the majority of the groundwater perched in the overburden soils seeps downward into the underlying bedrock. Some of the perched groundwater may also be migrating laterally toward the edges of the ridge top. In general, the ridge top sandstone aquifer is recharged by downward infiltration through the residual soil, and recharge occurs more readily where the soil is thin or disturbed and supplanted with fill material.

Depth to groundwater and groundwater elevations were measured in bedrock monitoring wells on four different occasions, and data are listed in Table 2-2. Two sets of water level measurements were

collected 5 days apart, during the first round. During three rounds of water level measurements, the static depth to groundwater in the Puz ranged from 0.98 foot bgs at 13MWT07 to 18.92 feet bgs at 13MWT42. In January 2004 (Round 2), the lowest groundwater elevation measured in the Puz was 640.19 feet amsl in well 13MWT39, and the highest elevation was 711.12 feet amsl measured in well 13MWT03. The average groundwater elevation was 682.24 feet amsl. The potentiometric surface for the Puz, measured on January 20, 2004, is presented in Figure 4-9. The highest groundwater elevations form a ridge that coincides with the main road and the railroad tracks that run along the southeastern edge of the SWMU boundary. Shallow groundwater on the northwestern side of this ridge flows to the northwest and west. Shallow groundwater on the southeastern side of the ridge flows southeast. A line representing the approximate crop line of the upper sandstone unit (i.e., the Puz) is shown on Figure 4-9 and indicates the area within which the Puz is found. The Puz is absent at elevations below this line (i.e., less than 630 feet amsl). All shallow groundwater in the Puz is presumably flowing toward the crop line and discharging to the gullies that are incised on the northwestern and southeastern sides of the ridge. The hydraulic gradients in the Puz steepen as the sideslopes of the ridge are approached. The local mounding of shallow groundwater at well 13MWT34 may be a result of recent excavation of the residual soils at the well location as part of a soil remediation project.

Figure 4-10 shows groundwater elevations measured on November 14, 2004 and the potentiometric surface interpreted for the Puz. In general, groundwater elevations measured on November 14, 2004 were 0 to 3 feet lower in elevation than the measurements made during the previous round, but the flow gradients and flow directions are nearly the same.

Surface water located in drainage gullies is not hydraulically connected to the uppermost bedrock groundwater; therefore, water elevations from staff gauges 13SG01, 13SG02, 13SG06 and 13SG07 were not considered during preparation of the potentiometric surface maps for the Upper Pennsylvanian water-bearing zone. The surface water at these locations is believed to be perched on top of the clayey residual soils overlying the bedrock surface.

Groundwater elevations measured on January 20, 2004 in the seven monitoring wells completed in the Lower Pennsylvanian water-bearing zone (Plz) ranged from 595.51 feet amsl in monitoring well 13MWT46 to 625.92 feet amsl in monitoring well 13MWT28 (see Table 2-2 and Figure 4-11). The average elevation was 610.64 feet amsl. As shown in Figure 4-11, the groundwater flow direction in the Plz is to the west toward the unnamed tributary of Boggs Creek. Water levels were measured in 11 Plz wells on November 14, 2004 (Round 3). Round 3 water levels were nearly the same as Round 2 levels in five of the wells. Groundwater levels rose in the two other wells: water levels rose 1.25 feet in 13MWT28 and 2.92 feet in 13MWT45. The new wells installed in the valley during Round 3 investigations helped

define groundwater flow gradients and flow directions in the Lower Pennsylvanian strata. During Round 3, flow under MFB was toward the west-northwest (Figure 4-12). The gradient was very low between 13MWT41 and 13MWT46 and then steepened to the northwest toward the unnamed creek. Based on the groundwater elevation in 13MWT48, groundwater is flowing southeastward, from the next ridge to the northwest, toward the unnamed tributary creek (Figures 4-8 and 4-12). In other words, groundwater is flowing from both ridges toward and discharging into the creek from opposite directions.

Throughout the ridge where MFB is located, groundwater is moving primarily in a lateral direction, but there is some vertical percolation of water from the Puz downward to the Plz. Figure 4-13 shows groundwater elevations measured in Round 3 versus the bottom elevation of each monitoring well. This graph indicates that the wells screened at lower elevations consistently had lower groundwater elevations. The groundwater elevation in wells screened in the Puz were always higher than the groundwater elevations in wells screened in the Plz. There are seven pairs of wells located on the ridge that have one shallow well screened in the Puz and one deep well screened in the Plz. Groundwater elevations measured in these seven well pairs during Round 3 are shown in Figure 4-14. This figure shows that groundwater elevations in the Plz are about 50 to 70 feet lower than groundwater elevations in the Puz. Thus, there is a strong downward hydraulic gradient throughout the ridge. Because the water in the Puz is perched so far above groundwater in the Plz, it is evident that the shale that lies between the Puz and the Plz is a very effective aquitard.

During the RFI, slug tests were performed on 15 monitoring wells screened in the Puz, five monitoring wells screened in the Plz, and two monitoring wells screened in the valley colluvium and alluvium. In most cases, a rising head and falling head test were performed on each well. In a few of the wells, only a rising head test was performed. The raw data, data analysis procedures, graphs of the data, and analytical results for each test are presented in Appendix E. A summary of the results of slug tests performed on select monitoring wells are presented in Table 4-2. The hydraulic conductivities for the shallow Puz monitoring wells ranged from 0.00345 to 13.95 feet per day (1.2E-06 to 4.9E-03 centimeters per second [cm/s]). The geometric mean hydraulic conductivity (K) for the shallow bedrock was approximately 0.212 foot per day (7.5E-05 cm/s). The large variation in hydraulic conductivities determined for the Puz was not surprising because the sandstone and siltstone unit ranges from partially weathered to highly weathered, and from massive (with little fracturing) to highly fractured.

Horizontal hydraulic gradients for the Puz across the site were calculated graphically from groundwater elevations presented in Figure 4-9. A representative hydraulic gradient for the northwestern side of MFB was estimated to be 0.094. For the southeastern side of the site, the average horizontal hydraulic gradient was estimated to be 0.0478. Assuming a fracture-related porosity of about 0.005 for the

bedrock, average groundwater velocities were calculated to be approximately 3.99 feet per day and 2.0 feet per day for the western and eastern sides of the ridge top, respectively. Calculations of hydraulic gradients and average linear groundwater velocities can be found in Appendix E.

The hydraulic conductivities for the Plz monitoring wells (Table 4-2) ranged from 0.000137 to 9.40 feet per day (4.8E-08 to 2.7E-03 cm/s). Only one well (13MWT46) of the five tested exhibited a hydraulic conductivity value greater than 0.01 foot/day. The geometric mean K value for deep Pennsylvanian bedrock was approximately 0.00896 foot per day (3.2E-06 cm/s). The average horizontal hydraulic gradient across the site for the Plz groundwater, calculated graphically from groundwater elevations presented in Figure 4-11, was estimated to be 0.0387. Assuming a fracture-related porosity of about 0.005 for the bedrock, the average groundwater velocity in the Plz was calculated to be approximately 0.069 foot per day. Calculations of hydraulic gradients and average linear groundwater velocities can be found in Appendix E.

4.7 DEMOGRAPHY AND LAND USE

The economic base of communities surrounding NSWC Crane is in transition from agriculture, mining, and quarrying to manufacturing and service industries. The patterns of settlement, population statistics, and median income are similar throughout the region. Because most of the region is covered by vegetation, the area is classified as rural.

There is no state or local planning within the vicinity of NSWC Crane. The only zoning and land use regulations are in the municipalities in the region. None of the municipalities are close enough to impact NSWC Crane. None of the areas adjacent to NSWC Crane are zoned, and zoning is not anticipated in the near future. No known land use or community actions are being considered or proposed at this time.

4.8 ECOLOGY

NSWC Crane is a heavily forested facility situated within the Western Mesophytic Forest Region, Hill Section, and Beech-Maple Forest Region (Braun, 1950). Lindsey et al. (1970) further subdivided the area of the installation into the south-central Oak and Mixed Woods Division, including the Beech-Maple and the Beech-Oak-Maple-Hickory sub-elements. Deam (1940) classified the portion of Martin County in which the facility is located as consisting of the Chestnut Oak Upland based on the dominant floral components at that time. More recently, Kuchler (1964) mapped this portion of Indiana and classified it as belonging to two distinct vegetation classes, the Oak-Hickory and the Beech-Maple forest components

of the Broadleaf Forest Classification. This latter classification most closely resembles the current floristic components observed at the facility.

NSWC Crane contains old agricultural fields in various stages of biological succession. Openings on dry upland sites contain almost pure stands of grasses with some clumps of woody plants such as persimmon, sassafras, and sumac. Areas that tend to be wetter have river birch, willow, sycamore, and cottonwood. Hillside communities include hickory, white and black oak, red maple, sugar maple, tulip poplar, ash, and beech [Naval Energy and Environmental Support Activity (NEESA), 1983]. Cleared areas at the facility have various stages of grassland, old field, and scrub/shrub vegetational forms present. Dominant tree species include black oak, white oak, pignut hickory, and yellow poplar. These stands are relatively young, with the average tree diameter ranging from 6 to 12 inches. No scrubs or shrubs are present in these areas, and leaf litter, limbs, and fallen saplings cover the understory.

The wildlife habitats and vegetation types present at NSWC Crane (including many stages of forest succession, streams, ponds, Greenwood Lake, and grassy open spaces) support a diverse terrestrial and aquatic fauna. The abundance of wildlife is mainly due to the mixture of landforms and vegetation types that occur over the installation. In addition, the lack of agricultural pressures has enhanced wildlife abundance and served to provide an installation-wide "wildlife enclosure" condition. There is an adequate amount of forage materials, concealment opportunities, and shelter locations to support a highly diverse wildlife community at the site.

Terrestrial habitats (i.e., wooded and grassy areas) near the sites may provide shelter and food sources for various species of mammals such as white-tailed deer, coyote, red fox, rabbits, raccoons, and mice and for birds such as ducks, geese, wild turkey, bobwhite quail, red-tailed hawks, and American robins.

The white-tailed deer is the most conspicuous large, wild mammal at the installation. Other mammals include opossum, raccoon, rabbits, mice, bats, chipmunks, squirrels, beaver, groundhogs, gray fox, coyotes, and long-tailed weasel. Fox, coyotes, and hawks are carnivores whose presence indicates a healthy ecosystem with smaller mammals present to provide a food source (NEESA, 1983).

The birds at NSWC Crane are diverse. Previous studies identified over 100 species present at the facility during breeding seasons (Hengeveld, 1987). Because the facility is largely forested, the species found consist predominantly of those that frequent wooded habitat types. Species of waterfowl also use the facility, especially in the vicinity of Greenwood Lake (Figure 1-2). A large number of bird species frequent the non-forested grassland, old field, and scrub/shrub vegetation present over portions of NSWC Crane. The bird population includes a number of threatened, endangered, or species of special concern that use

NSWC Crane as their home range. These species include the bald eagle, osprey, sharp-shinned hawk, red-shouldered hawk, broad-winged hawk, black and white warbler, hooded warbler, and worm-eating warbler [Brown & Root Environmental, 1997].

Previous studies conducted at NSWC Crane (Nelson et al., 1987) identified 21 amphibian species and 22 reptilian species including skinks, lizards, snakes, and turtles.

A total of 46 distinct fish species were collected from the installation during a 1987 inventory of fish fauna at NSWC Crane. Other than Greenwood Lake, the 1987 study observed that the greatest number of individual fish species were recorded from the largest stream, Boggs Creek, and that the smallest number of species were recorded from Turkey Creek. Boggs Creek contained 29 species, including eight species of fish characteristic of large river-type systems. This included long-nose gar, paddlefish, bowfin, gizzard shad, ribbon shiner, big mouth buffalo, channel catfish, and flathead catfish. By contrast, the Turkey Creek survey yielded 16 species of fish, none of which were unusual to the area.

TABLE 4-1

ESTIMATED FLOW RATES AT SURFACE WATER SAMPLING LOCATIONS AND STAFF GAUGES
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Monitoring Location	Estimated Flow Rate (gpm)						
	Round 1		Round 2		Round 3		
	3/29-30/2003	5/8-11/2003	10/22-11/18/2003	1/19/2004	10/6-7/2004	10/26-27/2004	11/14/2004
Surface Water Sampling Station							
13SW/SD01	<1				0, pooled		
13SW/SD02	1-5						
13SW/SD03	1-5						
13SW/SD04	1-5		0, pooled				
13SW/SD05	1-5						
13SW/SD06	1-2						
13SW/SD07	<1		0, pooled				
13SW/SD08		1.5	0, pooled				
13SW/SD09	<1		0, pooled				
13SW/SD10	10-20		0, pooled				
13SW/SD11		<0.5	15				
13SW/SD12	10-20		0, pooled				
13SW/SD13	20-50		<1				
13SW/SD14			0, pooled		0, dry	50-100	
13SW/SD15			0, pooled		0, dry	<10	
13SW/SD16			0, pooled		0, dry	5-10	
13SW/SD17			0, dry				
13SW/SD18			0, pooled				
13SW/SD19			0, pooled				
13SW/SD20			0, pooled				
13SW/SD21			0, dry				
13SW/SD22			0, pooled		0, dry	15-20	
13SW/SD23			0, dry				
13SW/SD24			0, pooled				
13SW/SD25			20				
13SW/SD26			0, pooled				
13SW/SD27			10-15				
13SW/SD28			0, pooled		0, dry	0, pooled	
13SW/SD29			0, dry				
13SW/SD30			15-20		0, dry	200-300	
13SW/SD31			20-25		0, pooled		
13SW/SD32			3				
13SW/SD33					0, dry	400-500	
13SW/SD34					0, pooled		
13SW/SD35					0, pooled		
Staff Gauge							
13SG01		<1		0, pooled			<1
13SG02		1-5		5-10			5
13SG03		1-5		0, pooled			<5
13SG04		1-5		1-5			1.5
13SG05		<1		<1			<1
13SG06		<1		0, pooled			<1
13SG07		<1		0, pooled			0, pooled
13SG08		5-25		1-3			5-20
13SG09		5-25		10-15			12
13SG10		20-50		10-15			5
13SG11				5-10			1.5
13SG12							162
13SG13							20-30
13SG14							15
13SG15							600-700
13SG16							dry
13SG17							dry
13SG18							220-260

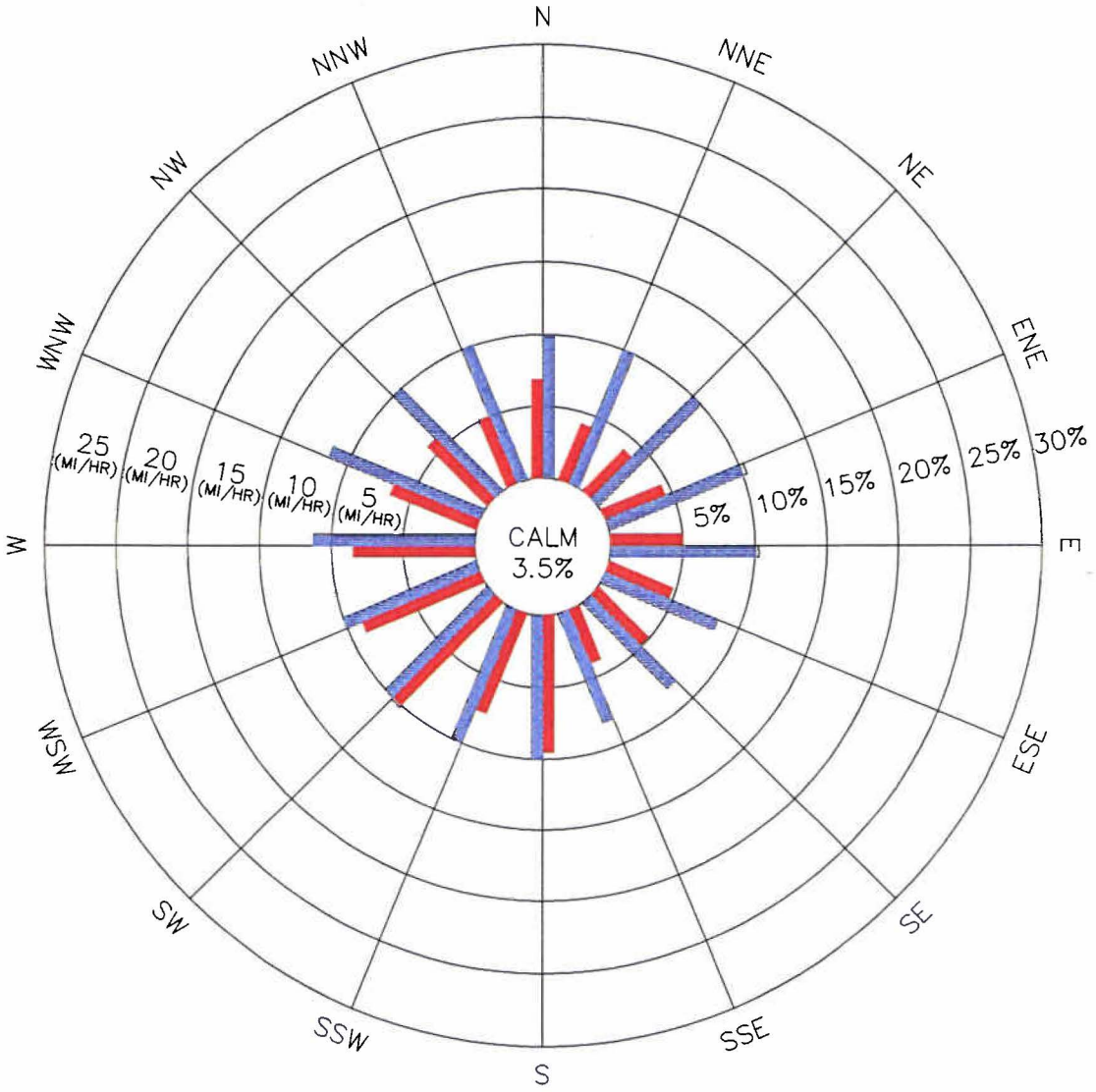
Blank spaces indicate no flow rates were measured.
gpm = Gallons per minute.

TABLE 4-2

HYDRAULIC CONDUCTIVITIES OF GEOLOGIC MATERIALS BASED ON SLUG TESTS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Well No.	Screened Material	K (rising head, ft/day)	K (falling head, ft/day)
Upper Pennsylvanian Water-Bearing Zone (Puz)			
13MWT02	Shaly sandstone	0.00302	0.00388
13MWT08	Siltstone with some interlayered sandstone	2.16	10.9
13MWT11	Siltstone with some interlayered sandstone	0.159	0.389
13MWT14	Shaley siltstone and sandstone	1.26	1.67
13MWT15	Siltstone, sandstone, and coal	0.128	0.195
13MWT17	Siltstone, sandstone, and coal	17.3	10.6
13MWT20	Siltstone, sandstone, and silty shale	0.131	0.135
13MWT26	Siltstone and sandstone	0.0132	0.0186
13MWT30	Siltstone, sandstone, and coal	0.0607	0.0873
13MWT32	Sandstone	0.231	0.303
13MWT33	Siltstone, sandstone, and silty shale	0.0147	
13MWT34	Shaly siltstone	0.163	0.199
13MWT37	Sandstone	1.03	1.37
13MWT42	Sandstone	0.0794	
13MWT47	Sandstone	0.275, 0.423	0.375
Lower Pennsylvanian Water-Bearing Zone (Plz)			
13MWT35	Sandstone	8.95E-04	
13MWT38	Fine to medium sandstone	6.78E-03	
13MWT45	Shale and siltstone	1.37E-04	
13MWT46	Sandstone	9.40	6.12
13MWT50	Shaly siltstone		0.004
Valley Colluvium and Alluvium			
13MWT49	Clayey sand with some rock fragments	137	
13MWT51	Clayey sand with some rock fragments	3.73	4.93

ACAD: 7448CD01.dwg 01/14/05 DM PIT



LEGEND:

WIND DIRECTION FREQUENCY (PERCENT)
(DIRECTION FROM WHICH THE WIND IS BLOWING)

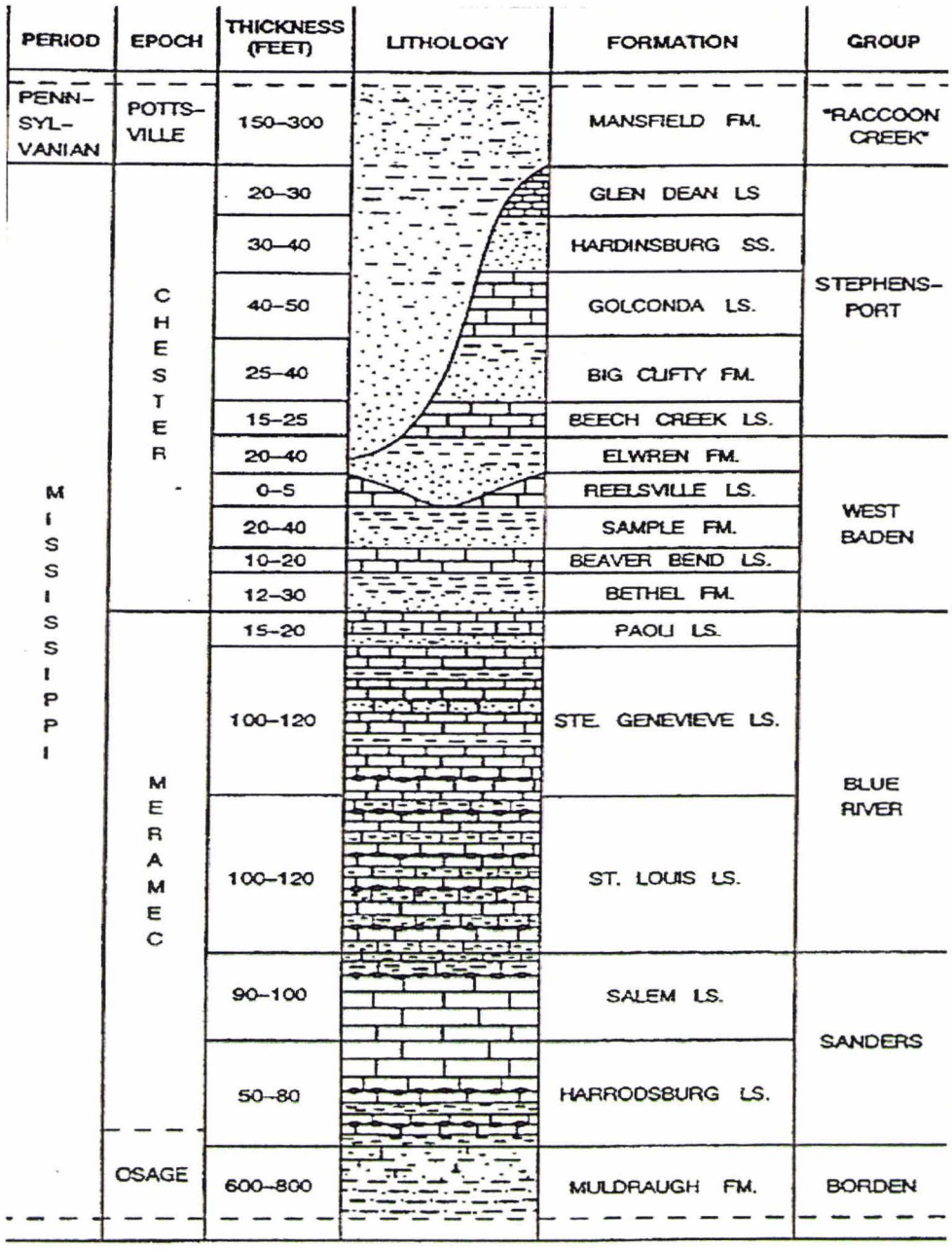
MEAN WIND SPEED (MI/HR)

DATA SOURCE: INDIANAPOLIS, INDIANA AIRPORT
PERIOD OF RECORD: 1985–1989
43,824 OBSERVATIONS

DRAWN BY: DM	DATE: 1/14/05	FIVE-YEAR WIND ROSE SUMMARY FOR INDIANAPOLIS, INDIANA NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE: AS NOTED			DRAWING NO. FIGURE 4-1 / REV. 0

NAVFAC

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98



Source: Draft Report, RCRA Facility Investigation
Phase II Groundwater Release Assessment, SWMU 06/09
Demolition Area and Phase III Release
Characterization SWMU 07/09 Old Rifle Range
November 1995 - Figure 13
by William L. Murphy and Roy Wade

DRAWN BY: J. LAMEY	DATE: 8/28/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 7448	OWNER NO.: CTO 0279
CHECKED BY: V. PLACHY	DATE: 7/12/04	GENERALIZED STRATIGRAPHIC COLUMN SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA	APPROVED BY: —	DATE: —
COST/SCHEDULE-AREA			APPROVED BY: —	DATE: —
SCALE: AS NOTED			DRAWING NO.: FIGURE 4 - 2	REV: 0

P:\GIS\NSWC_CRANE\MINEFILL_A.APR STRATIGRAPHIC COLUMN 1/17/05 KMP

P:\GIS\NSWC_CRANE\APR\SURFICIALGEO.APR SURFICIAL GEOLOGY - SWMU 13 & 16 LAYOUT 1/17/05 KMP

N

86° 54' 27"E, 38° 54' 51"N

86° 39' 42"E, 38° 54' 49"N

SWMU 16 - CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR

SWMU 13 - MINE FILL B

Select Solid Waste Management Unit (SWMU)

86° 54' 29"E, 38° 44' 8"N

86° 46' 4"E, 38° 44' 7"N

Inferred Depositional Environment		Explanation of Geology
Alluvium	Qal	*Alluvium*
Loess/Glacial Outwash	Ql	*Loess*
	Qo	*Glacial Outwash*
Residual Soil derived from Pennsylvanian bedrock/colluvium	P	*Raccoon Creek Group and undifferentiated*
	Ps	*Sandstone-dominated horizon of Lower Pennsylvanian*
Residual soil derived from Mississippian bedrock/colluvium	M6	*Glenn Dean Ls, Hardinsburg Fm, Haney Ls, Indian Springs Shale Mbr, and undifferentiated*
	M5	*Sandstone member of the Big Clifty Fm*
	M4	*Beech Creek Ls*
	M3	*Elwren Fm, Reelsville Ls, upper Sample Fm, and undifferentiated*
	M2	*Lower part of Sample Fm, Beaver Bend Ls, Bethel Fm, and undifferentiated*
	M1	*Paoli Ls, Ste Genevieve Ls, and undifferentiated*

Source: Background Soils Report. TtNUS 2001. (Modified from Blunck, 1995).

1.5 0 1.5 Miles

DRAWN BY: A. JANOCHA	DATE: 7/09/03
CHECKED BY: J. LUCAS	DATE: 4/20/04
COST/SCHEDULE-AREA	
SCALE: AS NOTED	

DEPARTMENT OF THE NAVY · NAVFAC · SOUTHERN DIVISION FACILITIES ENGINEERING

SURFICIAL GEOLOGY MAP
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NUMBER: 7448

APPROVED BY: DATE:

APPROVED BY: DATE:

DRAWING NO.: FIGURE 4 - 3

REV: 0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\RFI_SWMU13&16.APR SWMU 13 CROSS SECTION LAYOUT 1/17/05 KMP

N

13SP03
13SW/SD29
13MWT44
13MWT05
13MWT02
13MWT43
13MWT07
13SW/SD13
13MWT35
13MWT51
13MWT12
13MWT50
13MWT10
13SW/SD12
13MWT16
13MWT49
13MWT46
13MWT39
13MWT43
13MWT40
13MWT17
13MWT09
13MWT28
13MWT29
13SW/SD11
13MWT45
13MWT21
13MWT34
13MWT18
13SG11
13MWT47
13MWT36
13MWT20
13MWT22
13SW/SD10
13MWT19
13SW/SD32
13SW/SD24
13MWT33
13MWT25
13MWT26
13SW/SD20
13SW/SD25
13SW/SD18

A
A'
B
B'
C
C'
D
D'

LEGEND

- Monitoring Well
- Staff Gauge
- Surface Water/Sediment Sample Location
- Stock Pile
- Cross Section
- SWMU Boundary
- Road
- Railroad
- Wall
- Fence
- Vegetation
- Stream
- Topographic Contour
- Building

400 0 400 Feet

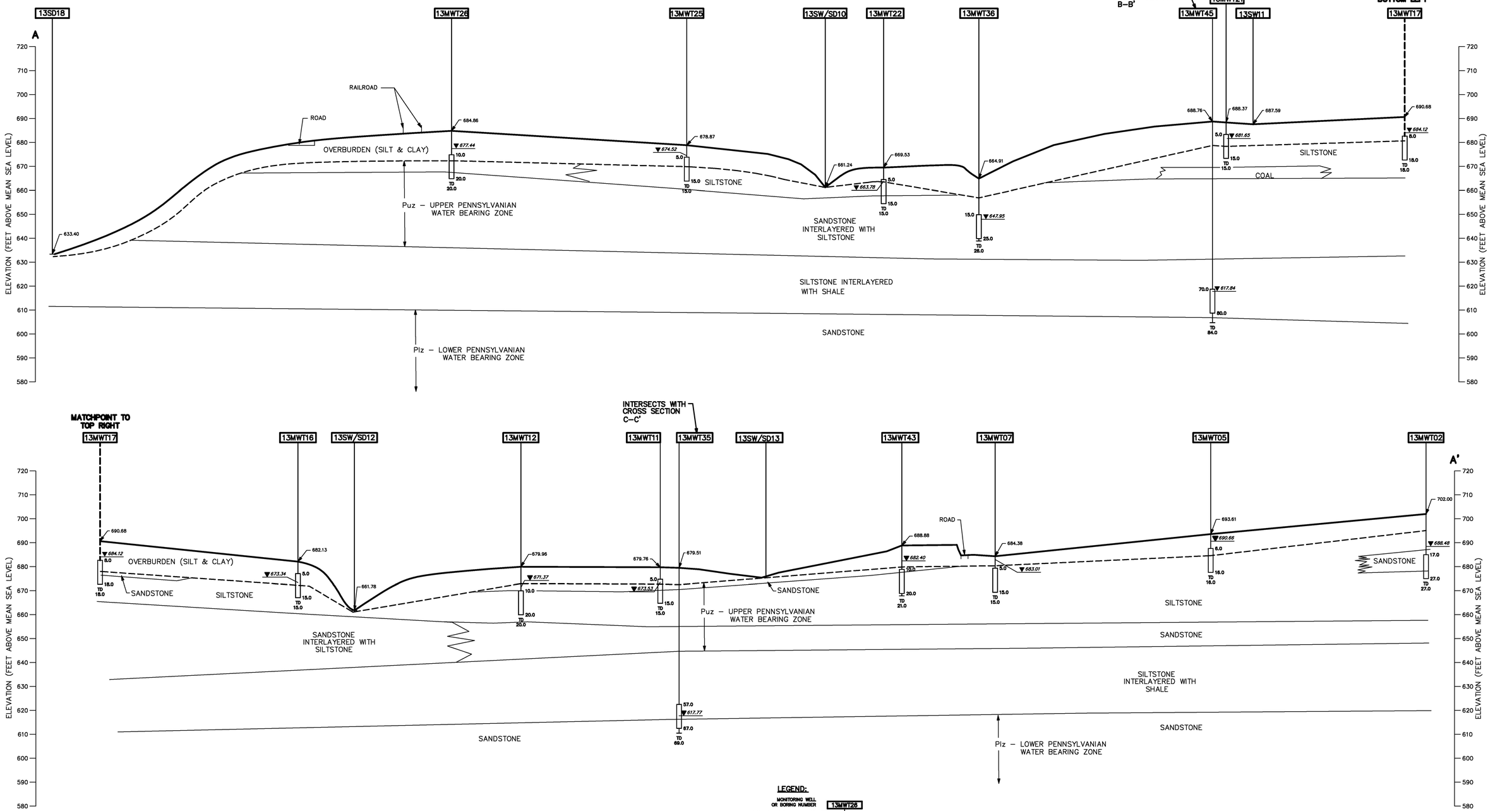
CONTRACT NO. 7448
APPROVED BY — DATE
APPROVED BY — DATE
DRAWING NO. FIGURE 4 - 4
REV 0

CROSS SECTION MAP
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

DEPARTMENT OF THE NAVY * SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

DRAWN BY A. JANOCHA DATE 3/10/04
CHECKED BY F. RAMSER DATE 3/17/04
COST/SCHED-AREA
SCALE AS NOTED

DRAWING NO. FIGURE 4–5 | REV. 0



DRAWN BY HJB	DATE 1/18/04
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

GEOLOGICAL CROSS SECTION A–A'
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 4–5	REV. 0

DRAWING NO. FIGURE 4-6 | REV. 0

B

MATCHPOINT TO LOWER LEFT

END POINT | 13MWT51 | 13MWT46 | 13MWT39 | 13MWT41 | 13MWT40 | 13MWT21 | 13MWT45 | 13MWT34 | 13MWT18 | 13MWT20

ELEVATION (FEET ABOVE MEAN SEA LEVEL)

580.00 | STREAM | ROAD | 569.28 | 567.59 | 5.0 | 15.0 | TD 18.0

651.64 | 652.42 | 640.19 | 14.0 | 24.0 | TD 25.0 | 595.51 | 55.0 | 65.0 | TD 66.0

663.65 | 664.93 | 648.63 | 15.0 | 25.0 | TD 25.5 | 599.09 | 55.0 | 65.0 | TD 66.0

FENCE LINE | 688.37 | 688.76 | 691.65 | 5.0 | 15.0 | TD 15.0

SWMU 13 AREA | 693.35 | 690.51 | 10.0 | 20.0 | TD 20.5 | 700.05 | 682.71 | 20.0 | 30.0 | TD 30.0 | 699.33 | 697.07 | 10.0 | 20.0 | TD 20.0

OVERBURDEN (SILT & CLAY)

SILTSTONE | SHALE | COAL

SANDSTONE | COAL

Puz – UPPER PENNSYLVANIAN WATER BEARING ZONE
SANDSTONE INTERLAYERED WITH SILTSTONE

70.0 | 617.84 | 80.0 | TD 84.0

SILTSTONE INTERLAYERED WITH SHALE

SANDSTONE

Plz – LOWER PENNSYLVANIAN WATER BEARING ZONE

MATCHPOINT TO UPPER RIGHT

13MWT20 | 13MWT19 | 13MWT33 | 13SW/SD20 | 13SW/SD25

RAILROAD | SWMU 13 AREA | FENCE LINE

699.33 | 697.07 | 10.0 | 20.0 | TD 20.0

703.10 | 694.86 | 10.0 | 19.0 | TD 19.0

700.14 | 691.34 | 10.0 | 20.0 | TD 20.0

SILTSTONE | SHALE

SANDSTONE INTERLAYERED WITH SILTSTONE

Puz – UPPER PENNSYLVANIAN WATER BEARING ZONE

SILTSTONE INTERLAYERED WITH SHALE

SANDSTONE

Plz – LOWER PENNSYLVANIAN WATER BEARING ZONE

578.15 | 550.41

B'

ELEVATION (FEET ABOVE MEAN SEA LEVEL)

740 730 720 710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

LEGEND:

MONITORING WELL OR BORING NUMBER — 13MWT46
GROUND SURFACE ELEVATION — 651.64
GROUND SURFACE
BEDROCK SURFACE — 595.51 BEDROCK POTENTIOMETRIC SURFACE ELEVATION
TOP OF MONITORED INTERVAL (FT BGS) — 15.0
LITHOLOGIC CONTACT (INFERRED BETWEEN BORINGS AND WHEN DASHED)
BOTTOM OF MONITORED INTERVAL (FT BGS) — 65.0
TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 66.0

0 80 160
HORIZONTAL SCALE IN FEET
0 30 60
VERTICAL SCALE IN FEET

DRAWN BY DM	DATE 1/18/05
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

NAVFAC

GEOLOGICAL CROSS SECTION B–B'
SWMU 13 MINE FILL 3
NSWC CRANE
CRANE, INDIANA

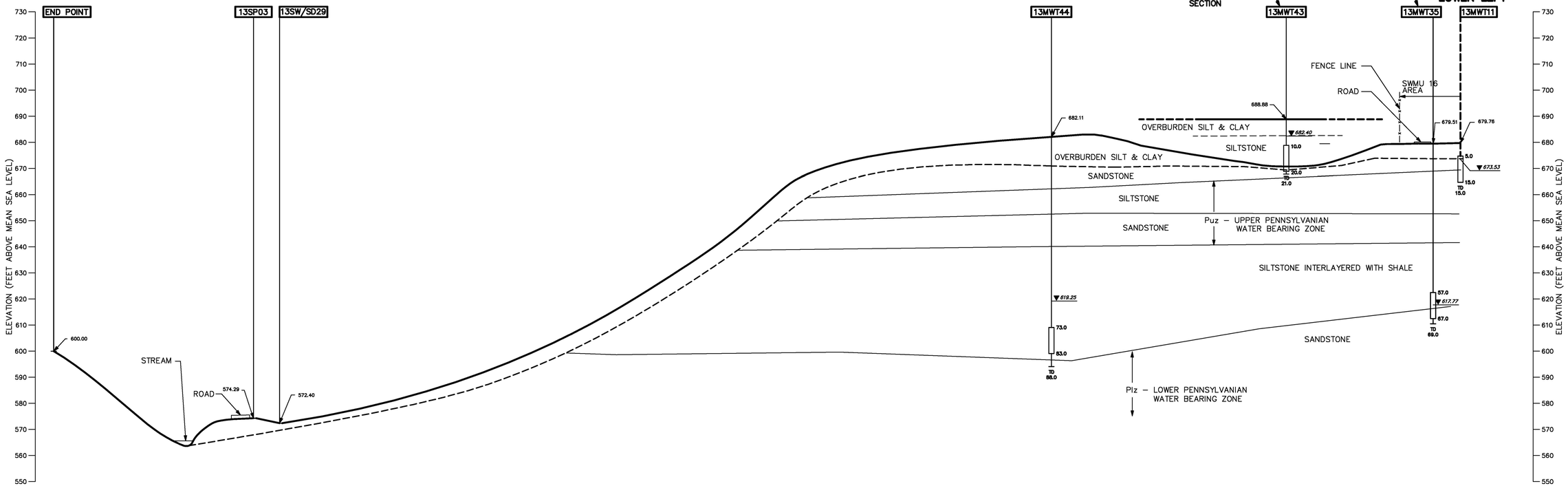
CONTRACT NO. 7448	
OWNER NO. CTO	
APPROVED BY	DATE
DRAWING NO. FIGURE 4-6	REV. 0

FIRM CADD NO. SSIV-D-STD.DWG - REV 1 - 9/14/98

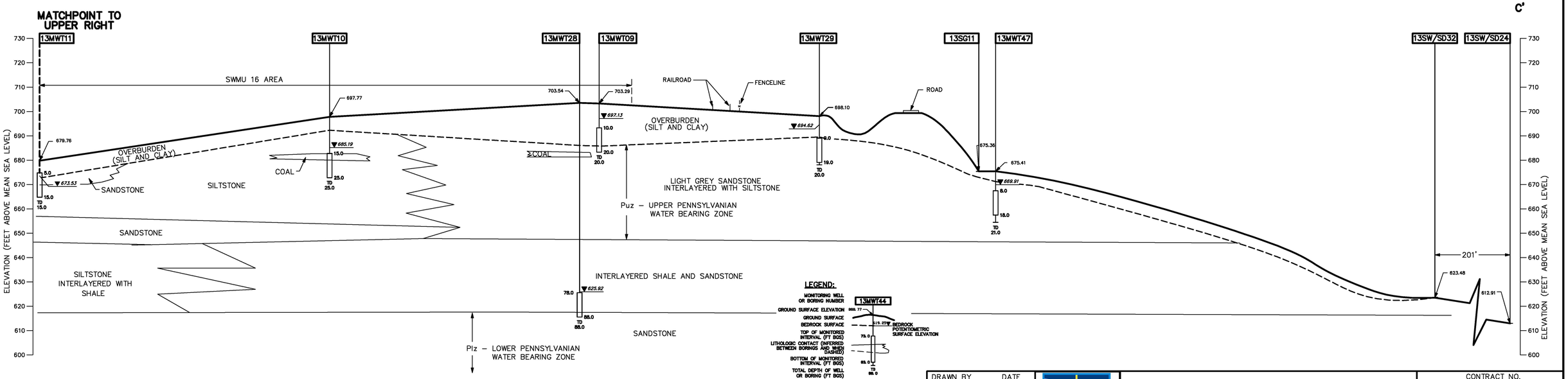
ACAD: 90602X16.dwg 03/03/05 DM PIT

DRAWING NO. FIGURE 4-7 | REV. 0

C



C'



DRAWN BY HJB	DATE 1/18/04
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REVISED BY	DATE
SCALE AS NOTED	

NAVFAC

GEOLOGICAL CROSS SECTION C–C'
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANIA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 4-7	REV. 0

FORM CADD NO. 5ZIV-D-STD.DVG - REV 1 - 9/14/98

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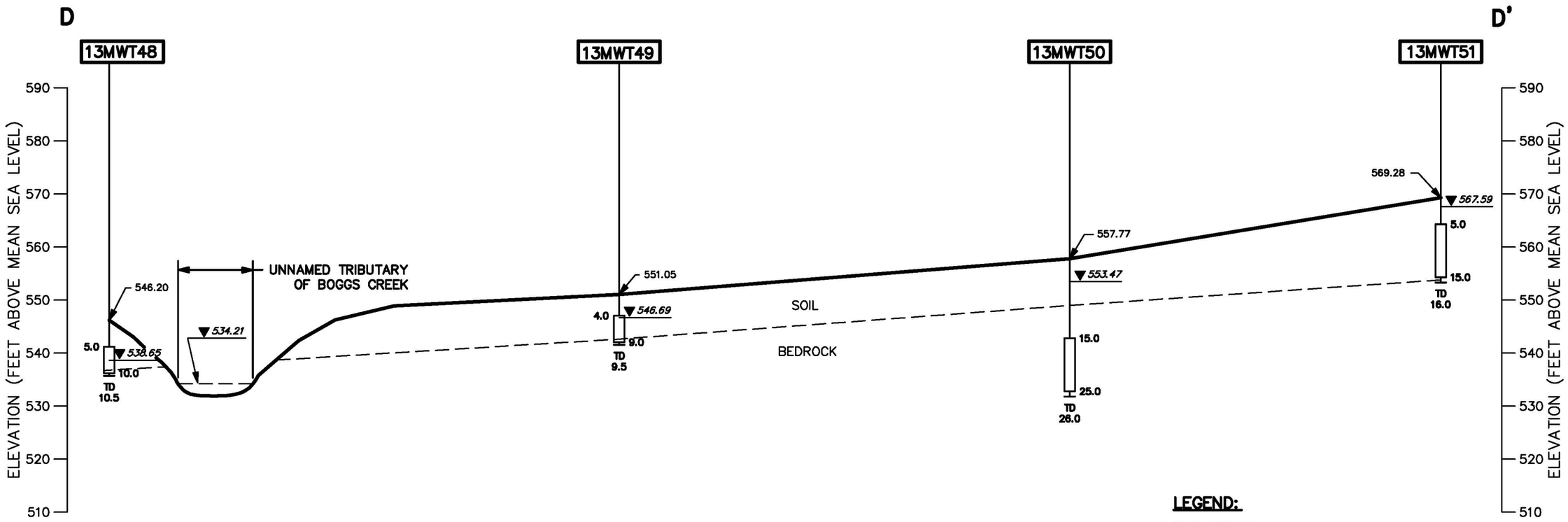
ACAD: 7448GX08.dwg 03/01/05 DM PIT

D

D'



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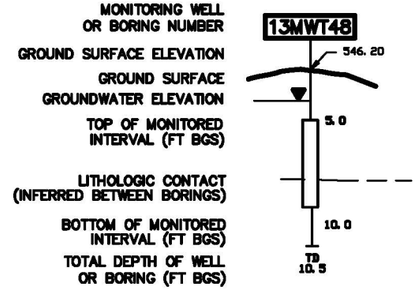


0 100 200
HORIZONTAL SCALE IN FEET

0 30 60
VERTICAL SCALE IN FEET

DRAWN BY HJB	DATE 1/20/04
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

NAVFAC

GEOLOGICAL CROSS SECTION D–D'
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 4–8	REV. 0

FORM CADD NO. SDIV-BH.DWG - REV 1 - 9/10/98

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 SHALLOW CONTOUR LAYOUT 7/7/05 KMP

N

13SG01 *
696.58
13MWT02
688.48
13SG02
698.27
13MWT05
690.66
13MWT43
682.40
13MWT07
683.01
13MWT01
707.79
13SG10
671.28
13MWT04
692.75
13MWT11
673.53
13MWT08
696.58
13MWT03
711.12
13MWT12
671.37
13MWT10
685.19
13MWT06
706.02
13MWT39
640.19
13MWT42
649.17
13MWT16
673.34
13SG09
671.15
13MWT27
688.82
13MWT09
697.13
13MWT40
648.63
13MWT17
684.12
13MWT15
682.06
13SG08
694.37
13MWT29
694.62
13MWT37
647.92
13MWT21
681.65
13MWT13
697.05
13SG04
686.54
13MWT47
669.91
13MWT34
690.51
13MWT18
682.71
13SG05
689.04
13SG11
672.62
13MWT30
687.22
13MWT36
647.95
13MWT14
691.33
13MWT20
697.07
13SG06 *
702.53
13MWT22
663.78
13MWT19
694.86
13SG08
660.87
13MWT33
691.34
13MWT23
690.64
13MWT31
685.56
13MWT25
674.52
13MWT24
684.68
13MWT26
677.44
13MWT32
686.52
13SG07
678.83

645 650 655 660 665 670 675 680 685 690 695 700 705 710

13MWT39 640.19 — Upper Pennsylvanian Monitoring Well with Groundwater Elevation in Feet Above Mean Sea Level

13SG02 698.27 — Staff Gauge with Water Elevation in Feet Above Mean Sea Level

Groundwater Flow Direction

Potentiometric Contour

Inferred Potentiometric Contour

Approximate Crop Line of Upper Pennsylvanian Water-Bearing Zone

SWMU Boundary

Road

Railroad

Wall

Fence

Vegetation

Stream

Topographic Contour

Building

* Staff gauges 13SG01 and 13SG06 not used for contouring.

400 0 400 Feet

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 19 AND 20, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-9
REV 0

NAVFAC

DRAWN BY A. JANOCHA DATE 2/23/04
CHECKED BY J. LUCAS DATE 5/13/04
COST/SCHED AREA
SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 SHALLOW NOVEMBER 2004 LAYOUT 7/7/05 KMP

N

13SG01 *
696.59
13MWT02
688.84
13MWT05
687.71
13SG02
698.24
13MWT43
681.20
13MWT07
682.38
13MWT01
707.78
13SG10
671.14
13MWT04
691.42
13MWT11
673.47
13MWT08
696.69
13MWT03
708.93
13MWT12
670.62
13MWT10
684.04
13MWT06
703.15
13MWT39
640.60
13MWT42
649.10
13MWT16
670.36
13SG09
671.12
13MWT27
688.27
13MWT09
697.26
13MWT40
648.44
13MWT17
683.97
13MWT15
681.16
13SG03
694.29
13MWT28
694.98
13MWT37
647.58
13MWT21
681.54
13MWT13
697.58
13SG04
686.53
13MWT47
670.21
13MWT34
689.48
13MWT18
682.40
13SG05
689.02
13SG11
673.06
13MWT30
687.57
13MWT36
647.65
13MWT14
690.81
13MWT20
696.84
13SG06 *
702.53
13MWT22
662.83
13MWT19
694.51
13SG08
660.85
13MWT33
690.43
13MWT23
689.89
13MWT31
685.47
13MWT25
674.78
13MWT24
683.89
13MWT26
676.40
13MWT32
685.49
13SG07
678.75

13MWT39 640.19 — Upper Pennsylvanian Monitoring Well with Groundwater Elevation in Feet Above Mean Sea Level

13SG02 698.27 — Staff Gauge with Water Elevation in Feet Above Mean Sea Level

Groundwater Flow Direction

Potentiometric Contour

Inferred Potentiometric Contour

Approximate Crop Line of Upper Pennsylvanian Water-Bearing Zone

SWMU Boundary

Road

Railroad

Wall

Fence

Vegetation

Stream

Topographic Contour

Building

* Staff gauges 13SG01 and 13SG06 not used for contouring.

400 0 400 Feet

CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 4-10

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - NOVEMBER 14, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

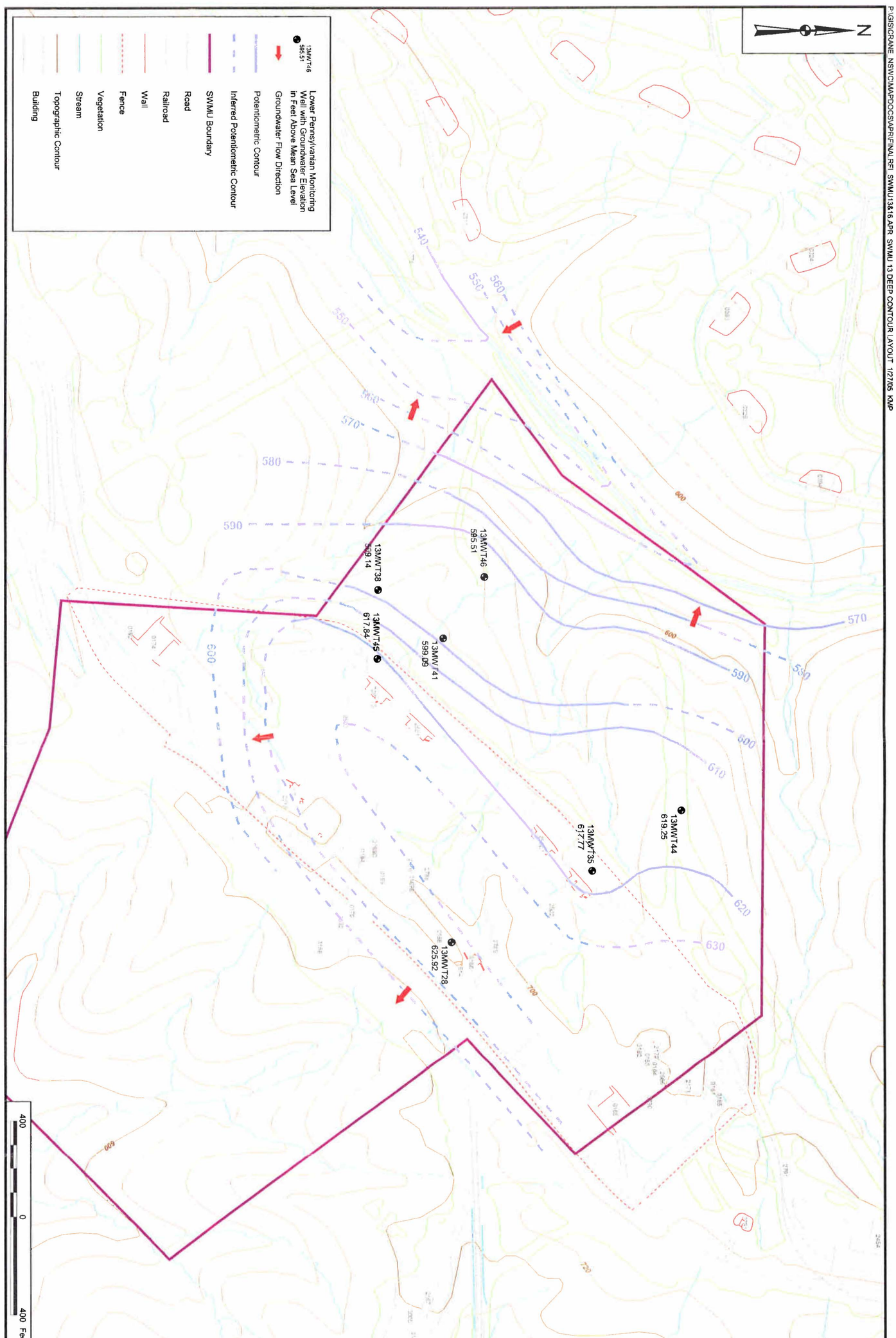
NAVFAC

DRAWN BY A. JANOCHA DATE 2/23/04

CHECKED BY J. LUCAS DATE 5/13/04

COST/SCHED-AREA

SCALE AS NOTED



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DRAWN BY A. JANOCHA	DATE 2/23/04	POTENTIOMETRIC SURFACE ELEVATION MAP FOR THE LOWER PENNSYLVANIAN WATER-BEARING ZONE - JANUARY 19 AND 20, 2004 SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NO. 7448
CHECKED BY F. RAMSER	DATE 3/17/04		APPROVED BY / DATE
COST/SCHED-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4-11 / REV 0

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N

13SG13
566.65

13SG14
561.38

13SG15
534.21

13MWT44
619.02

13MWT51
567.59

13MWT35
617.33

13MWT50
553.47

13MWT49
546.65

13MWT46
595.36

13MWT48
538.65

13MWT41
598.82

13MWT28
627.17

13MWT38
598.71

13MWT45
620.76

13MWT39
640.19

13SG13
566.65

Lower Pennsylvanian Monitoring Well with Groundwater Elevation in Feet Above Mean Sea Level

Staff Gauge with Water Elevation in Feet Above Mean Sea Level

Groundwater Flow Direction

Potentiometric Contour

Inferred Potentiometric Contour

Approximate Crop Line of Upper Pennsylvanian Water-Bearing Unit

SWMU Boundary

Road

Railroad

Wall

Fence

Vegetation

Stream

Topographic Contour

Building

400 0 400 Feet

CONTRACT NO.
7448

APPROVED BY
DATE

APPROVED BY
DATE

DRAWING NO.
FIGURE 4-12

REV
0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - NOVEMBER 14, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY
K. PEILA

DATE
1/27/05

CHECKED BY
J. SCHUBERT

DATE
1/27/05

COST/SCHED-AREA

SCALE
AS NOTED

FIGURE 4-13. GROUNDWATER ELEVATIONS IN MONITORING WELLS VERSUS WELL SCREEN DEPTH AT SWMU 13

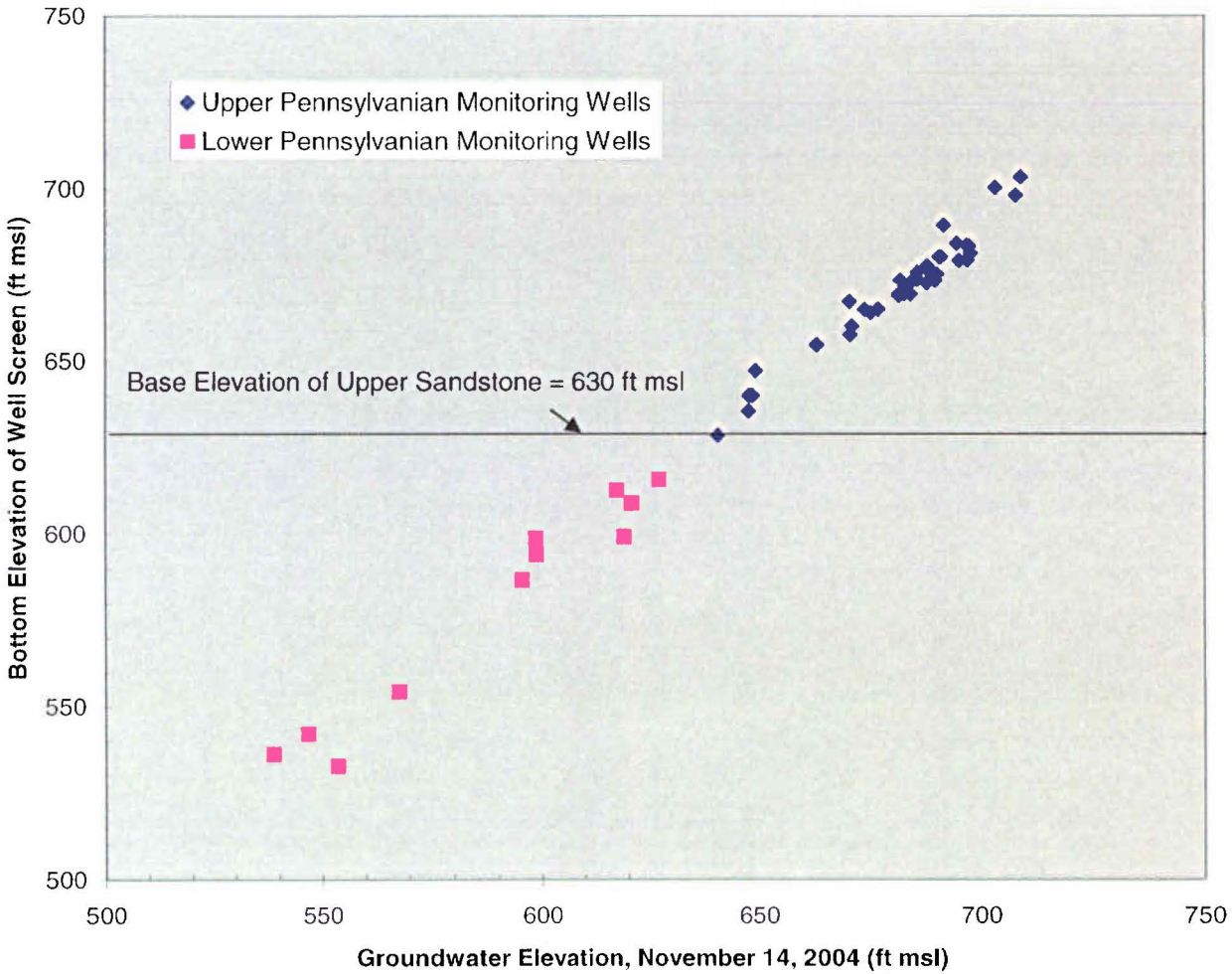
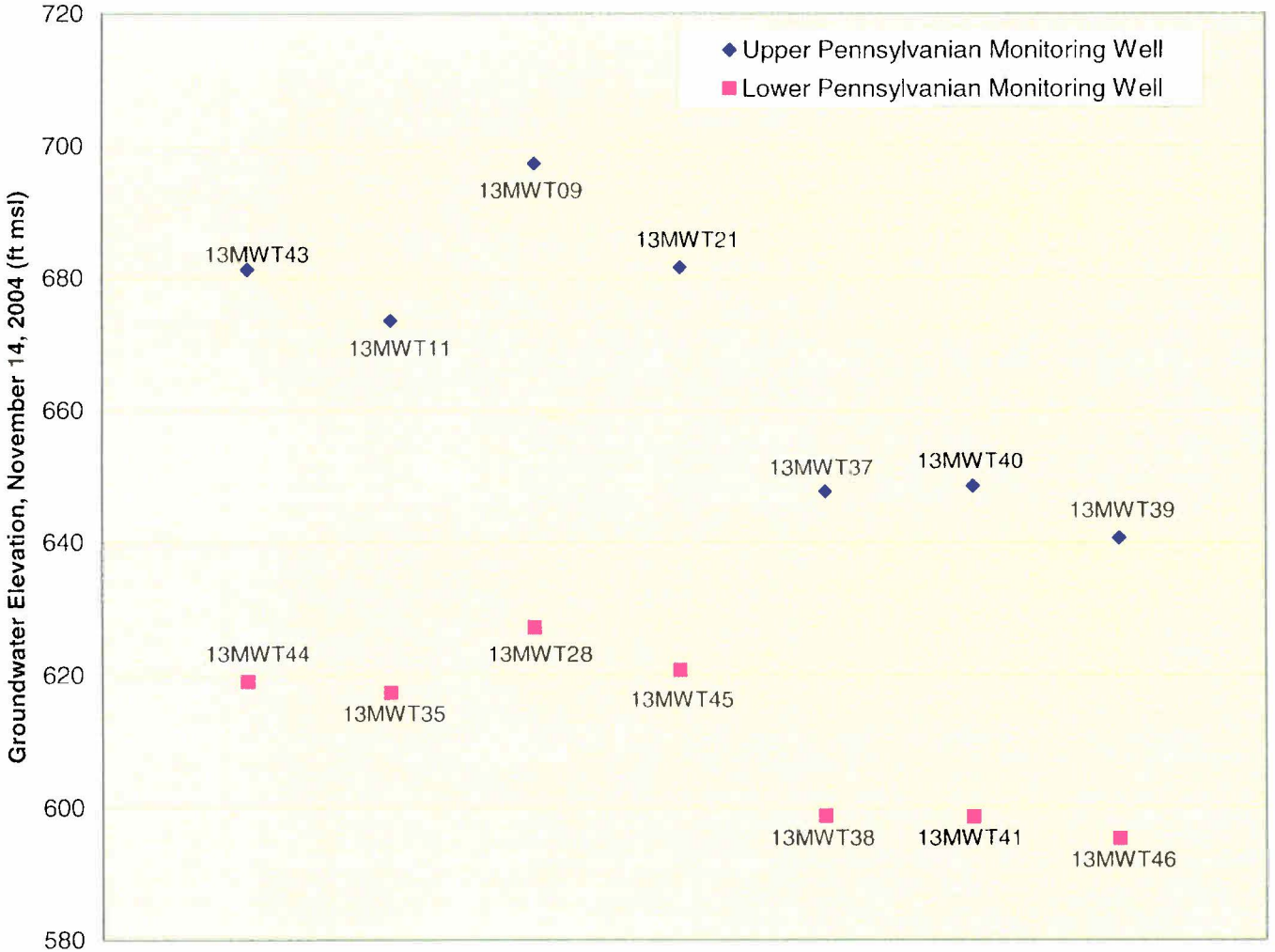


FIGURE 4-14. COMPARISON OF GROUNDWATER ELEVATIONS IN WELL PAIRS AT SWMU 13



5.0 NATURE AND EXTENT OF CONTAMINATION

This section describes the locations, spatial patterns, chemical forms, and concentrations of organic and inorganic chemical contaminants at SWMU 13. Where feasible to do so, an attempt is made to identify which chemicals appear to be site-related contaminants and which do not. No evidence could be found of metal flakes or metal salts in soils, surface waters, or sediment, nor could evidence be found for the presence of pure phase organic liquids or solids in any environmental medium. Therefore, all references to chemical contamination in the text below are to contaminants that are dissolved in surface water, groundwater, or vegetation or that are adsorbed to soils or sediment particulates. Vegetation samples were rinsed thoroughly prior to analysis so vegetation data are understood to reflect only chemicals that have been taken up by the plants and not to dust or other surficial contamination.

5.1 BACKGROUND

Organic chemical contamination is defined for this RFI as chemicals whose concentrations exceed human health or ecological screening values and therefore are considered to potentially result in unacceptable human health or ecological risks. A similar definition applies to metals, however, consideration is also given to the natural occurrence of metals in environmental media. Concentrations of metals that are within normal background levels are not considered to represent contamination. Nevertheless, if site-related metals exceed chemical of potential concern (COPC) screening levels, they are discussed in this section.

A limited range of analyses was conducted for soil samples in association with the composting operation (see Section 1.0). A broader range of analyses was conducted during the three subsequent RFI rounds (Refer to Section 2.0, Table 2-3). Subsequent to those rounds, samples were collected and analyzed for explosives during the External Sump/Drainage investigation in February 20006 then more samples were collected and analyzed for PCBs during the June/August 2006 PCB delineation near the Therminol boilers. Analytical data and data quality were presented in Section 3.0. The data show that multiple chemicals of environmental interest appear in multiple areas of SMWU 13 at concentrations greater than screening values. Comparisons to screening values are tabulated in Sections 7.0 and 8.0. These comparisons were used to focus the list of chemicals used to depict the nature and extent of contamination at SMWU 13. Details are provided below.

The purpose of this section is to describe the extent of contamination and to attempt to associate or disassociate the observed chemical concentrations to SWMU 13 operations. Sometimes, this could be

done; sometimes it could not. To facilitate succinct descriptions of the extent of contamination, representative chemicals are used to depict the extent of contamination. These chemicals represent all chemicals that were detected at concentrations greater than applicable screening values and meet one or more of the following criteria:

- Exceeds COPC screening values (described and evaluated further in Sections 7.0 and 8.0).
- Representative (based on chemical and physical properties) of a particular group of chemicals (e.g., SVOCs, PCBs, metals).
- Detected multiple times and generally pervasive, thus representing the greatest extent of contamination for similar chemicals.
- Detected infrequently but at environmentally significant concentrations.
- May be used to show a connection or no connection among various environmental media.
- May be significant daughter products that demonstrate changes in contaminant concentrations over time due to chemical or biochemical degradation.
- Ultimately, was judged to adequately represent contaminants at SWMU 13 in terms of nature and extent.

Concentrations of some of the representative chemicals are plotted to depict the spatial extent of contamination. For other representative chemicals whose extent can be easily described, only text is provided. All data can be viewed in Appendix G, Tables G-1 through G-7, so the concentration of any chemical that was analyzed but not explicitly discussed in this section is available for review.

No formal (e.g., statistical) comparisons of SMWU 13 RFI metals concentrations to background metals concentrations was conducted in this investigation, because no metals data were generated for soils in the RFI and the composting metals samples can not be subdivided into soil background groups that are comparable to the standard NSWC Crane soil background data sets. However, NSWC Crane background soil data extracted from the Final Basewide Background Soil Investigation Report (TtNUS, 2001) may be used to gain perspective on the concentrations of chemicals observed in SWMU 13 soils and sediments. This is especially true of surface soils (Soil Group 3) that may have eroded into drainage

channels such as the gullies on the hillsides of SWMU 13 that are typically dry and more akin to soil than sediments. Tables 3-1 through 3-4 present summary statistics for metal concentrations in the following soil categories that are germane to SWMU 13:

- All Crane soils (a composite of nine different soil groups)
- Soil Group 3 – Alluvial, Mississippian, and Pennsylvanian surface soil
- Soil Group 8 – Pennsylvanian Subsurface Clay and Silt
- Soil Group 9 – Pennsylvanian Subsurface Sand

Concentrations of all organic compounds were assumed to be zero in each of the background soil groups. Therefore the detections of organic compounds at SWMU 13 are considered to be site-related, unless the site history and observed concentrations or concentration patterns indicate that the contaminants are from non-site related sources. For example, chemicals such as methylene chloride or acetone are often detectable and attributable to laboratory contamination.

Two upgradient samples were collected for surface water and sediments. The concentrations of metals at these two locations, although representative of two different classes of drainage channels, were similar. Comparisons of site data to these upgradient values are discussed in the surface water and sediment section, as applicable (Section 5.3). The presentations below make use of data obtained from the Soil Interim Measures Reports (TT, 2002) as well as RFI data to describe the extent of contamination detected at SWMU 13.

Section 3.0 is a description of various data quality characteristics of the SWMU 13 data for all media. This section shows that sampling and analysis completeness goals for the project were generally met (Tables H-1 and H-2). Where they were not met, it was because representative samples could not be obtained. This typically occurred when refusal was encountered during advancement of soil borings or when surface water was not present at or near a proposed sampling location. In each of these cases a data void exists where the samples could not be collected; however, the data voids have generally not impaired the ability to understand the nature and extent of contamination. If they have, this is pointed out in the appropriate text below. Table 2-3 lists the various samples and the analyses that were conducted on the samples. Table 2-4 is a detailed list of the reasons why proposed samples were not collected and why extra samples were collected or analyses were performed.

5.2 SOIL CONTAMINATION

5.2.1 Explosives

Tables 1-4 and 1-5 of Section 1.0 present summaries of composting data for SWMU 13. Table 1-4 provides results for all composting windrows at the completion of composting. Table 1-5 provides data for windrows that had to steep longer because concentrations were still too high at the completion of composting. The most recent results provided in these tables represent concentrations of explosives immediately prior to replacement in the excavations. The explosives tallied in these tables are RDX, HMX, and TNT, although additional explosives were analyzed. These three representative explosives were the explosives used most or in the greatest quantities at SWMU 13, therefore their concentrations represent the worst case for explosives contamination at SWMU 13.

Presented in Figures 1-5 through 1-12 are depictions of the soil explosives concentrations (represented by RDX concentrations) around SWMU 13 buildings at the completion of the bioremediation effort. The reader is cautioned that the northward orientation is not the same in all figures and does not generally point upward from the reader's perspective.

In Figures 1-5 through 1-8, the concentrations of the excavation side walls and floors are depicted. Pink areas indicate levels of explosives concentrations that exceeded industrial cleanup levels at the completion of the bioremediation effort. Blue areas exhibited explosives concentrations less than industrial cleanup levels; green areas represent explosives concentrations that were less than both industrial and, more conservative, residential cleanup levels. White grids represent areas that were not excavated because they were not contaminated. In Figures 1-9 through 1-12, average soil explosives concentrations are depicted for soil that was composted to remove explosives contamination and was then replaced in the excavations. The averages represent averages for replaced soil in the individual grids. The color scheme for replaced soil is identical to the previously described pink/blue/green/white scheme. Composting data quality was satisfactory, indicating that the posted results are representations of true site conditions.

The figures show that, with few exceptions, the concentrations of explosives in the excavated areas no longer exceed industrial cleanup values. In many cases, the final explosives concentrations are less than residential cleanup levels. The exceptions are described below.

The side wall of Grid 38 (Figure 1-6) is a small sliver of earth that was not excavated. Total volume of earth associated with this exception is conservatively estimated to be less than 25 cubic yards (assuming

a 2 yard depth). The floors of Grids 136, 178, and 217 (Figure 1-7) and 66, 71, 164, and 186 (Figure 1-8) were also greater than industrial levels. The southwestern side wall of Grid 74 and the eastern side wall of Grid 141 (Figure 1-8) also exceeded residential cleanup levels. Except for this last side wall and the western corner of Grid 71, each of these exceptional grid cells is surrounded by cells where the explosives concentrations in side walls and floors are less than industrial levels. Many of the adjacent grid cells meet residential levels.

Explosives were released to SWMU 13 surface soils by periodically rinsing them from building roof tops to surface soil around the buildings. The composting excavations, which targeted concentrations greater than industrial cleanup levels, were generally not very deep, perhaps 2 feet bgs, on average. This indicates that after decades of precipitation infiltration, the contaminants, which began their migration on the ground surface, have not moved very rapidly to deep soils at concentrations greater than industrial and residential cleanup levels. Therefore, the depth of residual explosives contamination that exceeds residential cleanup levels in the excavation floors is not expected to be more than a couple of feet below floor depth. Based on this expectation, the total volume of pink-colored grids shown in Figures 1-5 through 1-8 is estimated to be less than 300 cubic yards. The majority of this contamination is within an area north of Buildings 2501, 172, and 173 (Figure 1-8).

Approximately one-fourth (25 percent) of the area covered by excavation side walls and floors was left in place with explosives concentrations in excess of residential cleanup levels but less than industrial cleanup levels. Figures 1-9 through 1-12 show that all soil replaced to the excavations had explosives concentrations less than industrial cleanup values and most had concentrations less than the more conservative residential cleanup values. The figures, in total, demonstrate that the residual contamination that was greater than residential cleanup levels after composting is generally well bounded (perimeter Grids are colored green or white) in all directions by concentrations that are less than residential cleanup levels. Where this is not the case, the perimeter Grids almost invariably exhibit explosives concentrations less than industrial cleanup values. Therefore, the bounding of explosives contamination in soils is virtually complete relative to industrial cleanup values. Bounding of explosives contamination is also quite good relative to residential cleanup levels. Furthermore, continued degradation of explosives after replacement to excavation is expected because the chemical and biochemical reactions will not stop upon replacement. This was demonstrated with resampling described earlier in this section.

With few exceptions (locations 13SB48, 13SB54, and 13SB60), soil samples collected during the ES/DI revealed that explosives contamination in soils at SMWU 13 is relatively limited in extent. The samples were collected from locations were explosives contamination was most likely to be detected if it were

present. Few locations had detectable levels of explosives, and of these, three out of 25 locations had RDX concentrations that exceeded the human health risk SV of 4.4 mg/kg. RDX was not detected in most samples; one RDX result was rejected because of poor quality. Figure 5-1 shows RDX concentrations in soil and sediment collected during the ES/DI. RDX is the most widely detected explosive and therefore is representative of the maximum extent of explosives contamination. The highest residual explosives contamination was observed in ES/DI samples closest to buildings where past bioremediation took place. Therefore, the observed contamination is concluded to be associated with operations at Building 166 and Building 171. With the knowledge that not all of the explosives contaminated soil could be excavated and that residual explosives contamination exists outside the previous excavations, it is possible that explosives are leaching from soils into groundwater. Other detections of RDX were observed in ES/DI soil samples but the detected concentrations did not exceed screening values (see Figure 5-1). The lateral extent of the residual explosives contamination is not bounded to the north or west of the three locations where the contamination exceeded SVs. Nevertheless, based on site history, the observation that the soil samples were biased toward locations most likely to be contaminated, and that the contamination is limited to surface soil, the extent of the contamination is likely to be limited to within a few hundred feet of the buildings. This residual contamination identified during the ES/DI is considered not to be as significant as the explosives contamination that could not be excavated for bioremediation because the concentrations are orders of magnitude less..

5.2.2 PCBs and Semivolatile Organic Chemicals

During the composting operation, some soil that was taken from a borrow area and was contaminated with PCBs was placed in the bottom of Grid 149 (located southeast of Building 173). The Aroclor-1242 and Aroclor-1260 concentrations in that material were between 1,000 µg/kg and 10,000 µg/kg. Although these concentrations are indicative of contamination, the amount of contamination is relatively low and is buried at least 2 feet underground, therefore, this small amount of PCB contamination is considered to be insignificant from an exposure point of view. A detailed evaluation of exposure for various ecological and human receptors is presented in Sections 7.0 and 8.0.

Surface and subsurface soil samples were collected during the RFI from near SWMU 13 buildings associated with the Therminol boiler area. The data were primarily designed to evaluate the nature and extent of PCB contamination, but also to verify that other contaminants were not significant. In RFI Round 1, dioxins, herbicides, semivolatile organic chemicals, volatile organic chemicals, and pesticide analyses were conducted on soil samples. Four soil samples were also analyzed for cation exchange

capacity (CEC), pH, and TOC. The latter data were designed to provide site-specific data for parameters that affect the migration of contaminants. This latter subject is the topic of Section 6.0.

Table 2-3 shows which samples were analyzed for various chemicals in all RFI rounds. In RFI Rounds 2 and 3, the soil analyses were restricted to a shorter list of chemicals than in Round 1, because it was apparent after Round 1 that the range of chemical contaminants was much less than the original analysis scope. PCBs were verified to be present in the Therminol boiler areas at unacceptably high concentrations and the contamination there had not been bounded in the vertical or lateral directions after Round 1. Except where soil could not be excavated, explosives were known to have been reduced to acceptable concentration levels in soils through the composting operation around select buildings. Therefore, soils were analyzed only for PCBs in RFI Rounds 2 and 3. PCB delineation continued into August of 2006. In June/August 2006, field test kits (RaPID Assay supplied by Strategic Diagnostics, Inc.) were used to aid the delineation. These field data were validated by analyzing a percentage of the same samples in the laboratory. As described in Section 3.0, the quantitative correlation between field and laboratory PCB data was poor. Fortunately, however, the data show that field test kit results less than the 0,5 mg/kg detection limit (500 µg/kg) correlate well to laboratory concentrations less than 1 mg/kg (1,000 µg/kg). When the field test results indicated that Aroclors were not detectable, the laboratory results typically showed that the Aroclor concentrations were less than 1 mg/kg (1,000 µg/kg). This observation was used to determine whether PCB contamination was adequately delineated relative to the 1 mg/kg level.

Tables 3-5 through 3-8 present descriptive statistics and data for chemicals detected in soils at least once during the RFI, including the ES/DI. Appendix Table G-1 is the entire RFI analytical database for SWMU 13 surface and subsurface soil. Because duplicate samples are viewed as QC samples only and not as site characterization samples, they are not included in the tallies, except where they add pertinent information.

Figures 5-2A through 5-3 are spatial depictions of representative non-explosives related organic chemical detections in surface and subsurface soil. Dioxins/furans and VOCs are not represented on these figures because their detected concentrations did not exceed applicable screening levels or because locations where they were detected are a subset of the plotted locations and the detected concentrations were not usually significantly elevated or spatially extensive. If a plotted concentration exceeds an ecological (E) or a human health (H) screening value, a flag (e.g., E, H, or EH) is shown on the tags where one or both of these screening values were exceeded. On Figures 5-2A and 5-2B, several locations had exceedances of SVs whereas just one location (13SB09/15) on Figure 5-3 had exceedances. Each tag

shows surface and subsurface soil concentrations so the vertical soil profile can be examined easily at each location. The sampling intervals (in feet bgs) are shown in parentheses underneath “Loc. ID”.

From Tables 3-5 through 3-8 and Figures 5-2A, and Figure 5-2B it is evident that the predominant contaminant in surface and subsurface soil at SWMU 13 is Aroclor-1248. This is consistent with knowledge that the Therminol boilers heated oil containing PCBs and that some oil was evidently released to surface soils.

There are two areas of the SMWU 13 ridge top that are contaminated with Aroclor-1248. One area is around and northeast of Building 171; the other area is southwest of Building 166. With few exceptions, the Aroclor-1248 concentrations (Figure 5-2A and 5-2B) are less than the 1mg/kg level (i.e., 1.0 mg/kg) at the perimeter of each sampled area and at the deepest sampled interval. This 1 mg/kg level is a commonly used, conservative cleanup level. The COPC screening values for Aroclor-1248 are 0.220 mg/kg (human health surface soil and subsurface soil) and 0.332 mg/kg (ecological risk surface soil). Although some samples were classified as sediments, the drainage channels from which they were collected are more similar to surface soils, therefore the results for these samples were evaluated relative to surface soil screening values. Many of the laboratory Aroclor-1248 concentrations are less than these values at the perimeter of the sampled areas especially in the subsurface soil at the deepest depth. Furthermore, where laboratory analyses were not conducted (indicated by “NA” in the “Lab” column of each tag), the field test kit result (in the “Field” column of each tag) was less than the nominal; 0,5 mg/kg detection limit). Values less than this test kit detection limit are taken to be equivalent to a laboratory result less than 1 mg/kg. Therefore, the PCBs are well bounded laterally and vertically. If a less conservative but commonly used industrial cleanup level of 25 mg/kg were to be used to delineate the extent of contamination, the area encompassing concentrations greater than this concentration would be much smaller. While the available data indicate that overland runoff of contaminated surface soils is well bounded, surface soils evidently migrated to nearby drainage channels and followed these channels to more downgradient locations. These grass-covered drainage channels were not sampled for surface soil PCBs during the early RFI sampling rounds but were sampled in 2006., Field test kit results for the most downgradient drainage channel location (13SD62) near Building 171 were less than the nominal 0.5 mg/kg detection limit. Because of the poor agreement between actual numerical values of field and laboratory results, however, the laboratory analyzed the same downgradient samples. The laboratory results were 0.023 mg/kg (sample 13SD810006) and 0.011 mg/kg (sample 13SD610012), which is in good agreement with the field test kits (0.5 mg/kg and 0.02 J mg/kg, respectively). Downgradient drainage channels sediments near Building 166 were not analyzed by the laboratory, however the concentration trend from upgradient to down gradient locations is similar for field and laboratory data so

there is a high level of confidence that the non-detect values obtained for these locations would yield a concentration less than 1 mg/kg if analyzed in the laboratory.

Based on the field and laboratory PCB data, the PCB contamination at SWMU 13 is well bounded laterally and vertically. All perimeter surface and subsurface soil samples near Building 161 had laboratory PCB concentration less than or equal to 0.22 mg/kg. This value is the most conservative of the applicable SVs. This value is also less than the commonly used cleanup level of 1 mg/kg. The most downgradient samples near Building 166 had field test kit results less than the laboratory equivalent of 1 mg/kg near Building 166 and the most downgradient samples near Building 171 had actual laboratory results less than 0..025 mg/kg. Near Building 171, all perimeter sampling locations had laboratory PCB concentration less than or equal to the conservative 0.22 mg/kg human health SV, or they had a field test kit equivalent to less than 1 mg/kg as measured in the laboratory. The same is true for the Building 166 area. The greatest mass of contamination is in the interior of the sampling patterns. The spatial contaminant distribution is heterogeneous within regions of high contamination surrounded by regions or much lower contamination within the interior of each sampling pattern. The regions of high PCB concentrations were hand drawn on Figures 5-2A and 5-2B using an estimated 1 mg/kg contour all concentration within each region are greater than this value and all concentrations outside each region are estimated to be less than this value. The larger regions in the Building 171 area reflect a greater magnitude and extent of contamination than for the Building 166 area.

Two pentachlorophenol results and several results of other phenols were rejected (see Table H-3). Given the general nature (low concentrations and infrequent detections) observed for phenolic compounds, the lack of phenol data probably does not have severe consequences, however, it must be recognized that some of these compounds may have been detectable if the data were not rejected. Thus, the phenolic compound detections represent a general, low level of contamination that may be slightly greater than depicted in the figures.

Most of the SVOC detections were PAHs (Figure 5-3). PAH concentrations are relatively low and fairly uniformly distributed across samples. The highest PAH concentrations occur for multiple PAHs at location 13SB09/15. Although the extent of SVOC sampling and analysis was limited, Figure 5-3 shows that all other locations with detectable PAH concentrations have no screening value exceedances, indicating that PAH contamination is rather isolated. Furthermore, Figure 5-3 shows that PAH contamination is well bounded vertically because the concentrations decrease rapidly from surface soils (0-2 feet bgs) to deeper soils. There were also two phenols (3&4-methlyphenol and phenol) and a single phthalate [bis(2-ethylhexyl)phthalate] detected. Bis(2-ethylhexyl)phthalate concentrations spanned the narrow range of 90 to 140 µg/kg and are not plotted on Figure 5-3. The phenolic compounds had relatively high

concentrations (560 µg/kg 3&4-methylphenol and 110 µg/kg phenol in sample 13SB090204). The only screening value exceedances occurred at location 13SB09/15 for the phenols although, as stated above, the phenol concentrations were generally biased low. Except for 560 µg/kg of 3&4-methylphenol in the subsurface, the contamination at this location is well bonded laterally and vertically by concentrations that are less than screening values. It is possible that additional low concentrations of phenols exist around this location but the rejected data prevent a firm conclusion on this point. Nevertheless, any detectable levels of phenolic compounds there would be expected to be near the laboratory threshold values and reporting limits.

A few dioxins and furans were also detected at near-screening value levels (see Tables 3-5 and 3-7). The worst case for this group of chemicals was 2,3,4,7,8-PECDF. This chemical was detected in surface soil at 21.8 ng/kg at location 13SB14. In subsurface soil the highest concentrations of this chemical were 15.4 ng/kg (location 13SB04) and 6.8 ng/kg (location 13SB10). The surface and subsurface soil screening value is 0.56 ng/kg for human health risk; there is no ecological screening value. No other subsurface soil samples exceeded the screening level. These, and other 2,3,4,7,8-PECDF locations of elevated concentration are bounded in all directions by dioxin and furan concentrations less than the screening values.

In summary, all soil organic chemical contamination appears to be well bounded with a few minor exceptions. The extent of Aroclor-1248 contamination near Buildings 166 and 171 that exceeds 1 mg/kg is shown on figures 5-2A and 5-2B. Soil contamination has evidently migrated via overland flow into drainage channels but the extent of drainage channel contamination is well bounded. Non-PCB contamination appears to be reasonably well bounded but rejected data compromise the ability to understand whether any detectable low levels of phenols went undetected. Phenol contamination appears to be reasonably well bounded but rejected data compromise the ability to understand whether any detectable low levels of phenols went undetected. All other non-explosives organic chemical contamination appears to lie within the areas represented by the PCB contamination.

5.2.3 Volatile Organic Chemicals

These chemicals exhibited very low concentrations during the composting operation. There was no significant VOC contamination evident and very little discussion of VOCs in soils is presented here for that reason. Several VOC results were rejected because of poor analytical performance, but the rejections have no significant effect on the usability of the data. The rejections were for chemicals that are part of the analytical VOC fraction, but not of particular interest for SWMU 13 (see Section 3.0 and Table H-3). Samples 13SS060002 (surface soil) and 13SB060204 (subsurface soil) were analyzed for

VOCs but the VOC levels were low (2 µg/kg of trichlorofluoromethane in 13SS060002, and 2 µg/kg of trichlorofluoromethane and trans-1,2-dichloroethane in 13SB060204). These concentrations are insignificant and VOCs are not discussed further for soils.

5.2.4 Metals

Metals were analyzed in soils during the composting operation. Samples collected before excavation were part of the initial characterization samples. The samples collected after excavation represented the excavation side walls and floors. No metals analyses were conducted on the composted soil that was later returned to the excavations. Several of the metals analyzed in this effort were selected as COPCs for risk assessment (see Section 7.0 and 8.0), yet the average metal concentrations are comparable to background soil concentrations or slightly elevated relative to background concentrations. For example, average aluminum concentrations for soils in all excavations ranged from 7,557 to 15,834 mg/kg. These averages are weighted averages. Weighting factors were based on estimated relative soil volumes represented by the samples (see Section 7.0). By comparison, the NSWC Crane basewide aluminum average for all Crane soils is 11,290 mg/kg. For Pennsylvanian Soil Group 3 (surface soil), 8 (subsurface silt/clay), and 9 (subsurface sand), the average aluminum concentrations range from 5,430 to 13,019 mg/kg. This range is shifted slightly higher than the excavation soil range, but only slightly. Conversely, the average excavation cadmium concentrations ranged from 0.08 to 0.47 mg/kg, whereas the average basewide all-soil cadmium concentration is 0.36 mg/kg and the three Pennsylvanian soil group average chromium concentrations ranged from 0.14 to 0.63 mg/kg. This range is shifted slightly lower than the excavation soil concentrations. The basewide values are for all results, including non-detected concentrations. The only metals that were analyzed during the composting operation and appeared to be significantly elevated above background concentrations were:

- Arsenic (average SWMU 13 excavation soil concentration ranging from 5.02 to 8.36 mg/kg)
- Barium (average SWMU 13 excavation soil concentration ranging from 66 to 101 mg/kg)
- Mercury (average SWMU 13 excavation soil concentration ranging from 0.03 to 0.32 mg/kg)
- Selenium (average SWMU 13 soil concentration ranging from 0.23 to 10.1 mg/kg)

These average concentrations, however, are within a factor of two of the average Crane background concentrations, therefore the slightly elevated SWMU 13 soil metal concentrations are not significantly elevated. Table 7-5 shows the weighted averages and Section 7.3.3 explains how the weighted averages were computed. The list below identifies those excavated areas that exhibit the upper end of the range of average concentrations for each metal:

The areas that have the most elevated metals concentrations are (atomic symbols shown in parentheses):

- Building 165 (As, Ba, Se)
- Building 166 (As, Ba, Hg, Se)
- Building 168 (As, Ba, Se)
- Building 2500 (As, Ba, Hg)
- Building 171 (As, Ba, Se)
- Building 173 (As, Ba, Se)
- Building 174 (As)

Lead, chromium, and silver were omitted from the above list. Lead and chromium are uniformly distributed across the site, indicating that they are most likely representative of background concentrations even though the measured concentrations are slightly greater than average background soil concentrations. Silver was detected very infrequently (in about 2 percent of soil samples) and does not appear to represent contamination.

In summary, the composting operation data indicate that a few metals (arsenic, barium, mercury, selenium, and silver) had slightly elevated soil concentrations, but the differences among these average soil concentrations and average Crane background soil concentrations are minor. Soils were not analyzed during the RFI for metals.

5.3 DRAINAGE CHANNEL SURFACE WATER, SEEP, DRAINAGE CHANNEL SEDIMENT, AND SUMP CONTAMINATION

Tables G-2 through G-5 of Appendix G are presentations of all surface water data, seep data drainage channel sediment data, and sump water data, respectively, that were collected during RFI Rounds 1 through 3. The composting operation did not involve collection of samples from these three media. Comparisons of the chemical concentrations to screening values and selection of COPCs for risk assessment are made in Sections 7.0 and 8.0

Tables 3-9 through 3-31 present summary statistics and results for all chemicals detected at least once in the respective medium for surface water, seep, and sediment samples, as well as sump and catch basin water and sediment. Tables 3-9 and 3-17 are for ES/DI sump water samples. Tables 3-10 through 3-13 and 3-18 are for gully surface water samples where the sampling locations are on steep slopes and are often dry. Tables 3-14 through 3-16 and 3-19 are for mainstream surface water samples where the

chance of finding water and true, water-covered sediments is higher than in the gullies. Tables 3-20 and 3-21 are for seeps; Tables 3-22 through 3-31 are for sediment samples. These tables are divided similarly to the surface water tables into tables of descriptive statistics and tables of individual results for chemicals detected at least once in sediments of sumps, catch basins or natural drainage channels. Tables 3-30 and 3-31 contain data for the additional metals delineation in RFI Round 5. Figures 5-4 through 5-7 depict representative organic chemical concentrations; Figures 5-8 through 5-16 depict representative metal concentrations in these media.

Surface water and sediment sampling locations represent the contents of sumps, catch basins and the overall surface drainage system of SWMU 13. Seeps, which are included in this system, represent groundwater that has emerged as surface water and contributes to the surface drainage thereafter. Surface drainage at elevations lower than seeps is therefore a composite of groundwater expressed as surface water and surface water runoff. Four seeps were identified and sampled during Round 2. Additional, unidentified, seeps are expected to exist . Many seeps are active only at certain times of the year (e.g., during a wet season). Therefore the observed surface water and sediment concentrations are most likely representative of known and unknown contributions from groundwater. The seeps that were sampled did not yield enough flow to sample the flow directly; instead the water was allowed to accumulate just below the seep and was sampled from the ponded water. Sediments were not sampled at the seeps.

5.3.1 Explosives

Figure 5-4 presents the concentrations of representative explosives in surface water, seep water, and sediment. RDX and its degradation products were selected for this depiction because RDX is the most pervasively detected explosive compound in SMWU 13 surface water. Sampling locations in the gullies (usually dry) are designated with “G” in the header of each tag. Mainstream sampling locations are designated “MS” in the tag headers. Data for all three RFI sampling rounds are shown on Figure 5-4, where applicable. The rounds are represented by “R-1,” “R-2,” and “R-3” on the tags of the figure and the data for each round appears beneath its Round identifier. If only one line of RDX data is shown on a tag, the data represent surface water concentrations. If RDX was analyzed in both surface water and sediment, there are two lines of RDX data. The surface water data are shown on the upper RDX line of the tag and the sediment data are shown on the lower RDX line. RDX degradation products (DNX, MNX, and TNX) were not analyzed in sediment, so there is only one line of data representing surface water concentrations for each of those compounds. Seeps have their own tags and the data are for seep water only.

The upgradient surface water location for mainstream samples, 13SW/SD31, had no detectable concentrations of RDX or other explosives. The upgradient sample location for gullies (13SW/SD28) had no detectable concentrations of explosives. Location 13SW/SD31 is upstream of all SWMU 13 sampling locations and is not influenced by SWMU operations or subsequent contaminant migration. Location 13SW/SD28 also appears to be upstream of affected areas and not to be downstream of any contaminated areas that would contribute to its chemical concentrations. Some explosives and explosives degradation products were detected in seeps but none of the concentrations exceeded human health or ecological screening levels and they are not discussed further.

Location 13SW/SD11, which was sampled for surface water only, is located in the southwest corner of the SMWU. This location, on the SWMU 13 ridge top, had the highest surface water RDX concentration (5,500 µg/L in Round 3). This concentration is in great excess of the 0.61 µg/L human health risk screening value for surface water; there is no ecological screening value. At SWMU 13 the majority of surface water and sediment explosives contamination is located on or near the ridge top (see Figure 5-4 and Tables G-2 through G-5). There are no exceedances of screening values for any explosives in sediment samples so sediment is not discussed further. The human health sediment screening value is 4.4 µg/L; there is no ecological sediment screening value.

Location 13SW/SD15 has the highest surface water explosives concentrations in downgradient directions. This location is approximately 80 percent of the distance from the ridge top to the mainstream west of the SMWU. Surface water RDX concentrations reported were 1,500 and 1,000 µg/L in Rounds 2 and 3, respectively. Upstream of this location, however, is location 13SW/SD11 where RDX concentrations in surface water were 610 µg/L in Round 1 and 5,500 µg/L in Round 2. There is evidently a connection between these two concentrations whereby the higher RDX concentrations at the top of the ridge decrease with distance traversed down the hillside. The elevated RDX concentrations at location 13SW/SD15 may also indicate an influence from groundwater discharging from the hillside. Groundwater concentrations are discussed in Section 5.4.

To the west and southwest, the most downgradient surface water samples (at location 13SW/SD33) exceeded the surface water screening value (0.61 µg/L), so the contamination is not bounded in those directions by “clean” samples. Furthermore, the mainstream that is oriented northeast to southwest and located west of the SWMU, exhibited elevated RDX concentrations that indicate RDX is moving away from SWMU 13 at concentrations more than 10 times the surface water screening value. For example, the RDX concentrations at locations 13SW/SD30 and 13SW/SD33 were approximately 8 µg/L regardless of sampling round. HMX was also detected at location 13SW/SD30 in Rounds 2 (3.2 µg/L) and 3 (2.9 µg/L).

The eastern mainstream channel begins downgradient of location 13SW/SD26. Location 13SW/SD26 and its upgradient location, 13SW/SD21, were not contaminated with explosives in two separate rounds of sampling. Location 13SW/SD27 is to the east of this mainstream channel. This location, which appears not to be affected by SWMU 13 because of its location opposite SWMU 13 from the mainstream, was contaminated with RDX at a concentration of 22 µg/L in Round 2. This is an indication that a source of RDX may be located across the mainstream from SWMU 13 and contributing to the RDX concentrations in the mainstream. Mainstream locations downgradient of this location were not sampled because they are apparently not influenced by SWMU 13. HMX was also detected at location 13SW/SD27 in Round 2 (8.2 µg/L). SMWU 12, MFA, is located in the upgradient direction from location 13SW/SD27. Detected along with the RDX were RDX degradation products, DNX (0.86 µg/L) and MNX (1.2 µg/L). These detections indicate that RDX is degrading in the surface water.

Despite the potential contribution from a non-SWMU 13 explosives source, to the east and south of SWMU 13 RDX and other explosives were not detectable in the most downgradient surface water and sediment samples that are affected by SWMU 13. In addition, the detectable concentrations were generally low (see Figure 5-4). Thus, the explosives contamination from SWMU 13 is well bounded in surface water in the eastern and southern directions.

The source of RDX in drainage channel surface water is likely to be the soils that were contaminated with RDX prior to composting. It is currently unclear whether RDX in surface water is an expression of any residual RDX contamination in soils that could not be composted. As explained in the soil subsection above, there was relatively little contaminated soil left in place after soil composting. The surface water RDX is mostly dissolved in the surface water rather than being adsorbed to sediments. This is evident from the low sediment RDX concentrations.

Other explosives were also detected in drainage channel surface water, seep water, and drainage channel sediment. The majority of explosive compound detections were in surface water. RDX degradation products DNX, MNX, and TNX were widely detected, which indicates that RDX is degrading everywhere. More on this topic is presented in Section 6.0. HMX, TNT, and TNT degradation products (2-amino-4,6-dinitrotoluene and 4-aminio-2,6-dinitrotoluene) were detected in several drainage channel surface water, seep, and drainage channel sediment samples, but at lower concentrations than RDX. Where HMX is present at its highest concentrations so is the RDX concentration also high; however, HMX was not detected everywhere RDX was detected.

The reported RDX concentrations of Round 1 appear to be biased lower than the actual site concentrations (see Section 3.0); however, after accounting for biases, the overall contamination patterns would remain unchanged.

There was not enough water to be sampled in seven of the nine targeted sumps. Nevertheless, Figure 5-5 shows that the RDX concentrations observed in the sampled sumps were 630 µg/L (sample 13SU00701) and 69 µg/L (sample 13SU00901). There are no screening values for sump water, but these values are at least two orders of magnitude greater than the 0.61 µg/L groundwater human health SV. Although screening values do not apply to sump sediments, two of the sump sediment samples had RDX concentrations much greater than the 4.4 µg/L sediment screening values. Those samples were 13SL008010006 (8,600 mg/kg) and 13SL003010006 (1,200 mg/kg). These residual contaminants are could contribute to groundwater contamination either by leaching through the sump walls, especially through cracks in the walls. Alternatively, if the sumps overflow occasionally, the sediments may be deposited onto surface soils and then leach explosives contamination into the groundwater. Evidence for this latter contaminant migration route would be elevated surface soil explosives concentrations in the immediate vicinity of sump. More discussion of contaminant migration is provided in Section 6.0.

In summary, explosives contamination in surface water, seeps, and sediments is highest on the ridge top and generally decreases in a downgradient direction along gullies. The seeps exhibited little detectable explosives contamination in comparison to the gullies and mainstream. The gullies discharge into the mainstream channel west of SWMU 13. Residual explosives contamination exists in select sumps identified above. At the most downgradient locations of the main stream the RDX concentrations exceed the 0.61 µg/L screening value and are spatially uniform for the last 1,000 feet that was sampled in Rounds 2 and 3. To the most downgradient eastern directions influenced by SWMU 13 the most downgradient RDX concentrations and other explosives are less than screening values. No particular RDX sources have been identified; however, soils may be leaching residual RDX that was left over from the composting effort or was not remediated because it was inaccessible. Sumps or catch basins may also be leaching into groundwater that migrates into surface water, although the mass of contamination associated with sumps and catch basins is small. Another source of RDX in surface water may be groundwater that has leached RDX from soils and discharged from the hillside.

5.3.2 Semivolatile Organic Compounds

Figure 5-7 displays the concentrations of PAHs, which are a subset of SVOC analytical fraction, in surface water and sediment. The selected locations are downgradient of the soils that were contaminated with PCBs possibly other oils in the past. Oils commonly contain PAHs, therefore, the

selected locations were designed to bound the extent of any SVOC contamination that may have migrated via surface water or sediment. The structure of the Figure 5-7 tags is similar to the structure of tags in Figure 5-4.

Upon review of Figure 5-7, it is evident that PAH concentrations are elevated in sediments, but not in surface water. This is consistent with PAH behavior in that they tend to adsorb strongly to soils and sediments. The reported PAH concentrations exhibit a negative bias of approximately 40 percent, based on MS recoveries discussed in Section 3.0. Therefore, the actual site concentrations may be greater than the reported concentrations (approaching two times the reported concentrations). It is noteworthy that some of the detection limits are greater than the screening values. For example, the ecological screening value for benzo(a)anthracene is 0.025 µg/L in surface water, but the lowest non-detect value in surface water is 0.049 µg/L. Nevertheless, Figure 5-7 shows that select PAH concentrations decrease from concentrations exceeding screening values at the ridge top to less than screening value levels or non-detects in downgradient directions away from the ridge top.

5.3.3 Metals and Miscellaneous Parameters

Figures 5-8 through 5-16 show the concentrations of metals in surface water, seep water, and sediments for SMWU 13. Figure 5-17 shows metals concentrations for select metals in sediments collected during the additional metal delineation effort. The layout of the tags for all but Figure 5-17 is similar to the tag layout for explosives and SVOCs with one major difference. Exceedances of screening values are indicated by a filled black dot at each sampling location instead of an “E” or “H”; the reader must consult the legend to understand which screening values are exceeded at each location, and for which medium. For example, a filled dot at location 13SW/SD05 on Figure 5-8 indicates that the aluminum concentration in surface water exceeded the ecological surface water screening value of 87 µg/L. The screening values are shown on the Figures. Figure 5-17 uses the (H) and (E) conventions to illustrate where results exceed human health or ecological screening values.

The concentrations of metals in these three media that exceeded screening values were surprisingly ubiquitous for several metals, in particular, for aluminum (Figure 5-8), arsenic (Figure 5-10), copper (Figure 5-12), iron (Figure 5-13), lead (Figure 5-14), manganese (Figure 5-15), and vanadium (Figure 5-16). To the contrary, antimony (Figure 5-9), cadmium (Figure 5-11), and several other metals had few exceedances of screening values, that depend on location. Metals for which concentrations are not plotted generally had a smaller difference between the measured SWMU 13 concentrations and the screening values, were detected less frequently than the plotted metals, or are less likely to be site-related than the plotted metals. Despite the fairly wide distribution of the metals in sediments, the most

downgradient sample in Bogg's Creek, west and southwest of SWMU 13, had lower concentrations than upgradient concentrations (locations 13SW/SD36 and 13SW/SD37) for all metals except cadmium and manganese. For Turkey Creek essentially the opposite was true. In that case, the most downgradient sediment sample had higher concentrations than upgradient concentrations for all metals except antimony, cobalt, and silver. Clearly, elevated sediment metal concentrations are bounded relative to upgradient concentrations to the west of SWMU 13 but not to the east. Nevertheless, two sediment locations immediately upgradient of 13SW/SD43, i.e. 13SW/SD44 and 13SW/SD45, had much lower metal concentrations than 13SW/SD43. Manganese was the only metal at either of these two locations to have a concentrations greater than the upgradient concentration (see Figure 5-17). Furthermore, the elevated manganese concentrations are less than the manganese concentration (812 mg/kg) of the duplicate sample collected from upgradient location 13SW/SD45. This suggests that the elevated metal concentrations are not associated with SWMU 13, but perhaps another contamination source in the Turkey Creek system. SWMU 6 is located immediately northwest and upgradient of sampling location 13SW/SD43, so this is one possibility. Further discussion of individual metal distribution patterns are provided below.

Aluminum - The highest aluminum concentrations in surface water are generally associated with the mainstream and gully upgradient locations (1,910 µg/L at 13SW/SD31 and 1,770 µg/L at 13SW/SD28) and with sampling locations at the top of the ridge (see Figure 5-8). The highest aluminum concentrations in sediment (22,100 mg/kg at 13SW/SD31; 18,500 mg/kg at 13SW/SD22; and 17,100 mg/kg at 13SW/SD28) were detected in the mainstream and gully upgradient locations. The additional metals delineation (see Figure 5-17) also revealed that the upgradient sediment aluminum concentration (10,700 mg/kg in sample 13SD3701) were greater than the downgradient samples (see Table 3-30), except at location 13SW/SD43. Based on the presence of two samples immediately upgradient that had concentrations comparable to background concentrations, and based on the knowledge that SMWU 6 lies between the most contaminated sediment sample and these tow samples, this aluminum contamination at 13SW/SD43 does not appear to be related to SWMU 13. Overall, the surface water and seep aluminum concentrations decrease in the downgradient direction from the ridge top. Sediment concentration gradients are not as clear and all SWMU 13 aluminum concentrations in sediment were less than the mainstream upgradient concentration; therefore, aluminum is not discussed further for surface water or sediment. In addition, the observed aluminum concentrations are comparable to background soil concentrations. The available data do not indicate that SWMU 13 is an aluminum contamination source or that aluminum is a true contaminant.

Antimony - Figure 5-9 (antimony concentrations in surface water, seeps, and sediment) is representative of the metals that have few exceedances of screening values and have therefore not been plotted. The

screening value exceedances are spatially well separated and concentration gradients are not clear nor are they indicative of true contamination that generally decreases away from the source and is therefore bounded by samples with concentrations less than screening values. In the additional metals delineation sampling (see Figure 5-17) antimony was not detected in downgradient sampling locations 13SW/SD38 through 13SW/SD45. Based on these observations, antimony is considered not to be a site-related contaminant and not discussed further.

Arsenic - Arsenic concentrations patterns (Figure 5-10) are very similar to aluminum in that the upgradient surface water/sediment sampling locations (e.g., 28.7 mg/kg in sample 13SD2802 and 33.3 mg/kg in sample 13SD3102 as shown in Tables 3-28 and 3-29) had some of the highest reported concentrations for both of these media and the most downgradient concentrations are generally comparable to the upgradient locations. Exceptions are the relatively high arsenic concentrations at locations 13SW/SD07 (surface water), 13SW11 (surface water), 13SW/SD12 (surface water). During the additional metals delineation arsenic concentrations were comparable to or less than the group of upgradient concentrations for locations 13SW/SD28, 13SW/SD31, 13SW/SD36 and 13SW/SD37. In general, few of the sampling locations have exceedances of the upgradient concentrations and exceedances are sparsely distributed, indicating that arsenic is probably not a site-related contaminant even though all of the sampled locations have at least one exceedance of a screening value.

Cadmium - Figure 5-11 (cadmium concentrations in surface water, seeps, and sediment) is similar to Figure 5-9. There are few exceedances of screening values and the most downgradient locations have concentrations in each medium that are less than or comparable to the upgradient locations (13SW/SD31 for mainstream and 13SW/SD28 for gullies), with few exceptions. The exceptions are the mainstream samples to the west of SWMU 13. Each of these samples had an exceedance of both the ecological screening value and the upgradient location in sediment. However, the upgradient location also exceeded the sediment ecological screening value (0.99 mg/kg) and the human health screening value (3.7 mg/kg); therefore, the exceedances of the screening values do not appear to be meaningful. Other SWMU 13 sampling locations yielded sediment samples cadmium concentrations that are clearly not greater than the upgradient location and are almost all less than the screening values. This indicates that the apparently elevated cadmium concentrations in the mainstream samples are an anomaly. During the additional metals delineation (see Figure 5-17), cadmium values in Bogg's Creek were generally greater than the immediate upgradient sample concentrations (0.12 mg/kg at 13SW/SD36 and 0.31 mg/kg at 13Sw/SD 37) but the most downgradient sample concentration (1.1 mg/kg) was slightly greater than the ecological SV of 0.99 mg/kg) and the spatial concentration distribution was fairly random. Although the maximum cadmium concentration to be observed (8.4 mg/kg) during the AMD/TT sampling was in the most downgradient of Turkey Creek sample (location 13SW/SD43) and is an order of magnitude greater

than upgradient concentrations, this contamination does not appear to originate from SWMU 13. SWMU 6 is a possible source. SMWU 6 lies immediately upgradient to and northwest of location 13SW/SD43. Based on these observations, cadmium is not considered to be a SWMU 13-related surface water, seep, or sediment contaminant.

Copper – Most of the sampled locations (Shown in Figures 5-12 and 5-17) exhibited an exceedance of one or more screening values but very few locations had concentrations in excess of the upgradient locations. Mainstream upgradient location 13SW/SD31 had 1.1 and 5.5 µg/L copper in surface water and 18.4 and 22 mg/kg copper in sediment. The additional metals delineation also revealed that an upgradient copper concentration (10.8 mg/kg in sample 13SD3701) was greater than all associated downgradient samples except sample 13SD4001, which contained 13.3 mg/kg of copper (see Table 3-30), and sample 13SD4301 which had 245 mg/kg copper. This copper concentration exceeded the ecological SV (31.6 mg/kg) but not the human health SV (310 mg/kg). Gully upgradient location 13SW/SD28 had 1.3 and 2.2 µg/L copper in surface water and 27.8 and 17.3 mg/kg copper in sediment. The few gully locations that appear to have had elevated surface water copper concentrations are 13SW/SD01 (22.8 µg/L in Round 3) and 13SW11 (27.1 and 13.9 µg/L in Rounds 1 and 2). Despite the elevated concentrations (relative to SVs and select upgradient location) all downgradient copper concentrations are generally less than upgradient concentrations and screening values, which indicates that the limited copper contamination is well bounded, except at location 13SW/SD43. This location, however, appears to be influenced by a contaminant source other than SWMU 13. SWMU 6, located northwest and immediately upgradient of this location, is one possibility.

Iron – Iron concentrations in excess of surface water or sediment screening values occur in every sampled surface water and sediment location (see Figure 5-13) for RFI Rounds 1 through 3. Surface water iron concentrations consistently decrease from the ridge top to the valleys on either side of the SWMU. Conversely, sediment concentrations increase from ridge top to valley on each side (east and west) of the SWMU. The sediment iron contamination is not bounded in the downgradient direction but the additional metals delineation (See Figure 5-17) revealed that downgradient iron concentration as high as 25,700 mg/kg would be comparable to observed upgradient iron concentrations. Although more downgradient sediment samples were analyzed for iron than upgradient samples, the highest iron concentration in the additional metals delineation sampling was 33,600 mg/kg in sample 13SD3801. Surface water concentrations in the most downgradient locations are less than the screening values and the upgradient concentrations, so surface water iron contamination is completely bounded. The source of the iron contamination is unknown. Based on the spatial patterns (i.e., high concentrations of iron in samples near the ridge toe), it appears that groundwater discharges from the hillside may be contributing to elevated iron concentrations toward the toe of the ridge.

Lead - Collocated with the elevated copper concentrations at location 13SW/SD01 are elevated lead concentrations (see Figure 5-14). Both of these metals are used extensively in munitions projectiles or shells. The high lead concentration in surface water was 137 µg/L; the high concentration in sediment was 521 mg/kg. The high surface water concentration exceeds the human health (15 µg/L) and ecological (1.17 µg/L) screening value for surface water. The sediment concentrations exceed either both of the human health (400 mg/kg) and ecological (35.8 mg/kg) sediment screening values (see Figure 5-14). Additionally, they exceed the Mainstream and gully upgradient sediment concentrations, and they exceed typical surface soil background concentrations and upper tolerance limits (UTLs) (Tables 3-1 and 3-2). A UTL represents the concentration below which 95 percent of the concentrations values fall 95 percent of the time. An exceedance of a UTL is supposed to occur in less than five percent of the data with the chance for exceedance becoming less as the exceeding concentration increases. The highest sediment and surface water lead concentrations are associated with the northeast corner of the SWMU. Downgradient of this area, concentrations decrease significantly over short distances, although the most downgradient sediment concentrations are not less than screening values nor are they less than the upgradient concentrations or typical surface soil concentrations. It appears that there is an overall elevation of lead concentrations in sediments that may not be entirely related to SWMU 13. This could be an artifact of changes in grain size where the smaller grained sediments accumulate metals to a higher degree than coarser sediments, but it is not possible to know with the available information. Without knowledge of the cause of this elevation in concentrations, lead contamination in sediments is considered to be unbounded in the downgradient direction with the understanding that the contamination may not a product of SWMU 13. Lead contamination is well bounded in surface water. The additional metals delineation sampling (See Figure 5-17) also revealed elevated lead concentrations in the main streams located east and west of SWMU 13. Table 3-30 displays the individual lead concentrations for these samples. A review of this table and Figure 5-17 shows that the downgradient lead concentrations are comparable to upgradient concentrations represented by locations 13SW/SD36 and 13SW/SD37. This, and the observation that the most downgradient locations (13SW/SD42 and 13SW/SD43) have lead concentrations comparable to the maximum background concentration of 19.9 mg/kg and much less than the maximum gully lead concentration of 521 mg/kg indicate that any lead contamination, whether from SWMU 13 or elsewhere, is reasonably well bounded. All lead concentrations were less than applicable screening values. SWMU 6 may be a source of the elevated lead concentration observed at locations 13SW/SD43.

Manganese – Manganese concentration patterns (Figure 5-15) were patchy, similar to those of iron but the concentrations of these two metals show little correlation with sampling location. The metals are also chemically similar. The highest surface water concentrations appear near the ridge top; although, unlike

iron, the highest concentrations are limited to the northeast and southwest corners of the site. Sediment concentrations generally increase in the downgradiant direction, away from the ridge top toward the valleys to where the southern most sampled reaches of the main streams are encountered. In these reaches, the manganese concentrations appear to reach a relatively uniform concentration between 400 and 1,100 mg/kg (see Figure 5-17). All but a few of the most downgradient sampled surface water locations have manganese concentrations less than screening values, so manganese is bounded in surface water. Manganese concentrations exceed sediment screening values at all downgradient locations, but the concentrations are comparable to the upgradient concentrations. Therefore, manganese is unbounded relative to screening values, but appears to be reasonably well bounded relative to upgradient concentrations. The manganese sediment concentrations are also less than the UTLs for all Crane soil (Table 3-1) and Pennsylvanian surface soil (Table 3-2). Based on these observation manganese does not appear to be a significant site-related contaminant.

Vanadium – The concentrations of this metal are distributed similarly to iron and manganese (see Figure 5-16). Ridge top surface water locations are generally more contaminated than downgradient locations; ridge top sediment locations are generally less contaminated than the downgradient locations, although the pattern is not as clear because of the variability of the data. Vanadium contamination is not bounded in downgradient sediments relative to SVs but the most downgradient samples collected during the AMD/TT sampling are comparable to the corresponding upgradient concentrations. Vanadium concentration is bounded in downgradient surface water. The additional metal delineation revealed one exceedance in Bogg's Creek (28.8 mg/kg in sample 13SD4001) and one exceedance in Turkey Creek (46.8 mg/kg in sample 13SD4301) of the maximum observed upgradient concentration (26.7 mg/kg in sample 13SD3701). This can be seen in Table 3-30. Although sample 13SD3901 had 28.8 mg/kg vanadium and exceeded the upgradient concentration of 26.7 mg/kg (in sample 13SD3701), the exceedance is viewed to be a natural consequence of having more downgradient data than upgradient data. Thus, the vanadium is concluded to not be a site-related contaminant. In Turkey Creek, although the vanadium concentration is elevated, the contamination pattern of two upgradient samples having significantly less vanadium (14.5 mg/kg in sample 13SD4401 and 14 mg/kg in sample 13SD4501) suggests that SWMU 13 is not the contaminant source. A possible source is SWMU 6, which is located northwest and immediately upgradient of SWMU 13.

Nitrite/Nitrate – These analytes were detected in surface water at several locations and at elevated concentrations over the three RFI sampling rounds (see Tables 3-18 and 3-19). The nitrate plus nitrite concentration exceeded the 1,000 µg/L human health screening value at several locations in one or more sampling rounds. Data for locations that exceeded this value are summarized below:

- Location 13SW11: 23,000 and 8,500 µg/L in Rounds 1 and 2, respectively
- Location 13SW/SD12: 5,800 µg/L in Round 1
- Location 13SW/SD13: 1,600 and 3,700 µg/L in Rounds 1 and 2, respectively
- Location 13SW/SD14: 550 and 7,400 µg/L in Rounds 2 and 3, respectively
- Location 13SW/SD15: 140 and 3,400 µg/L in Rounds 2 and 3, respectively
- Location 13SW/SD16: 660 and 1,300 µg/L in Rounds 2 and 3, respectively
- Location 13SW/SD24: 200,000 µg/L in Round 2
- Location 13SW/SD28: 4,000 µg/L in Round 2

The concentrations are generally higher on the ridge top than in the downgradient samples. Furthermore, the exceedances of the human health screening value are limited to the western side of the SWMU. The nitrate is presumed to derive from the explosives used at SWMU 13. It may be a breakdown product from the degradation of explosives or it may be a manifestation of the use of nitrate salts.

The highest concentration of ammonia was observed at location 13SW/SD11 in Round 1 (3,400 µg/L). The Round 2 ammonia concentrations at this location was 10 times less, 260 µg/L. The locations with the next highest concentrations of ammonia were 13SW/SD08 (70 µg/L in Round 1 and 400 µg/L in Round 2), 13SW/SD12 (880 µg/L in Round 1), and 13SW/SD13 (140 µg/L in Round 1 and 40 µg/L in Round 2). All other ammonia concentrations were less than 100 µg/L at all locations and most were less than 50 µg/L. Ammonia is a chemically reduced form of nitrite and nitrate and may also be indicative of leachate from the compost that was replaced into soil excavations.

In summary, metal contamination from SWMU 13 is generally well bounded. Elevated metal concentrations in the most downgradient Turkey Creek Mainstream sampling location (13SW/SD43) suggest that a source other than SWMU 13 is contributing contamination to this creek. Copper contamination is limited and bounded in surface water and sediment in downgradient directions. Lead contamination is well bounded in surface water in downgradient directions but the most downgradient sediment concentrations exceed screening values. There appears to be an overall elevated lead contribution to sediments that suggests only the higher concentrations located in the northeast corner of SWMU 13 reflect lead contamination from SWMU 13. Manganese contamination is unbounded in surface water and sediment with respect to upgradient concentrations, or ecological or human health screening values, however, this contaminant does not appear to be a significant SWMU 13-related contaminant and is probably related to natural sources. The evidence for this is the comparable concentrations in SWMU 13 downgradient and upgradient gully and stream locations. Vanadium and iron contamination is not bounded in sediments east of SWMU 13 but these metal contaminants are bounded

in surface water. Aluminum, antimony, arsenic, and cadmium have concentrations in excess of one or more screening values, but the concentrations generally appear to be consistent with natural background therefore these metals do not appear to be site-related contaminants. An elevated cadmium concentration at downgradient location 13SW/SD43 can be best explained in terms of a source other than SWMU 13. Barium, chromium, cobalt, lithium, magnesium, mercury, nickel, potassium, sodium, strontium, titanium, and zinc were not explicitly discussed in this text. These metals exhibited no exceedances or few exceedances of ecological or human health screening values and exceedances were slight. For example, the maximum surface water zinc concentrations was 260 µg/L, which is greater than the 65.7 µg/L human health screening value, however all other zinc concentrations were less than 80 µg/L and there were just three other exceedances of the screening value (67.9, 68.9, and 79,3 µg/L). Some of these latter metals may be site-related contaminants but they are of minor importance when compared to some of the other contaminants. The source(s) of apparently site-related contaminants (i.e., copper, lead, iron, manganese, and possibly vanadium) contamination is unknown. Some additional insight on this topic is provided in Section 6.0.

Location 13SW/SD15 consistently displays elevated concentrations of metals such as aluminum, copper, iron, and manganese. This one location bears special attention because of this. Location 13SW/SD15 is low on the hillside and under normal circumstances would be expected to yield more dilute concentrations than the upgradient locations because of dilution that occurs as the contaminants move down the hillside. The elevated concentrations at this location are in indication that groundwater may be discharging from the hillside upgradient of this location and contributing to the observed surface water and sediment concentrations. More detail concerning fate and transport of metals and other contaminants is presented in Section 6.0.

The majority of the following metal concentrations in surface water are consistently associated with the total metals, but less so with dissolved metals (see Table G-2) (aluminum, copper, iron, lead, manganese, nickel, titanium, vanadium, and zinc). This indicates that filtration through a filter with 0.45 micrometer (um) pore size will generally remove most of the metal from the water because it is associated with suspended matter in the water. The suspended matter may be colloidal or particles of larger size. Colloids are generally considered to range in size from 0.001 um to 1 um in size. These data are interpreted to mean that entrained soils or sediments are responsible for 50 percent or more of the reported total metals concentrations in surface water for these metals.

Nitrate, which appears to be site-related, is present at elevated concentrations greater than human health screening values in the most downgradient directions and is therefore unbounded. The highest

concentrations are generally found on the ridge top and as far as half-way down the hillside. The lower concentrations are generally in the valleys. Ammonia displays a similar distribution.

5.4 GROUNDWATER CONTAMINATION

Table G-6 of Appendix G is a presentation of all groundwater data that were collected during RFI Rounds 1 through 3. The composting operation did not involve collection of samples from groundwater. Comparisons of the chemical concentrations to screening values and selection of COPCs for risk assessment are made in Sections 7.0 and 8.0

Tables 3-32 through 3-40 present summary statistics for groundwater samples. Table 3-32 is for soil overburden perched groundwater samples collected from temporary wells during the ES/DI. Tables 3-33 through 3-36 are for Puz and Valley groundwater samples, which represent shallow groundwater on the ridge of SWMU 13 and in the valley. Tables 3-37 through 3-40 are for Plz samples, which represent deep groundwater underneath SWMU 13. Tables 3-41 through 3-44 present data for all parameters that were detected at least once in groundwater.

5.4.1 Overburden Groundwater

Figure 5-18 represents explosives contamination at the soil overburden-bedrock interface with RDX concentrations. Near Building 171 where the contamination pattern shown in Figure 5-18 indicates a relatively uniform distribution of RDX in all directions from Building 171. A nearby sump (13SU/SL009, see Figure 5-5) had detectable concentrations of RDX in the sump water and sediment. The highest RDX concentration was observed on the other side of Building 171 from sump 13SU/SL009, at temporary well 13TW010 (Figure 5-18). These patterns would not be expected if the sump were the primary source of the observed contamination. Because soils are the only other likely source of RDX contamination, this suggests that soils are the predominant source of perched water RDX contamination in this area. Near Buildings 172/173 RDX concentrations were high in temporary well 13TW004 but not in the associated soil boring (13SB70). Sump 13SU/SL007, which is about 80 feet north of this temporary well, had a high sediment RDX concentration (8,600 mg/kg) but it is not clear that there is a contaminant migration pathway from this sump to the temporary well location. Similarly, soil RDX concentrations were low (i.e., less than 2 mg/kg) at and near temporary well 13TW001 where perched groundwater had 190 µg/L of RDX. A similar situation exists at temporary well 13TW003. From these perched groundwater contamination patterns it is not possible to connect individual points sources of explosives contamination with particular perched groundwater samples. The overall impression, however, is that the groundwater must be receiving leachate from the overburden soils that is then traveling along the overburden-bedrock

interface to other locations. Whereas sumps may be leaching explosives contamination, as well, the total mass of contamination is small relative to the total mass that appears to reside in soils.

5.4.2 Pennsylvanian Upper Zone and Valley Wells

Figures 5-18 through 5-29 depict representative organic and inorganic chemical concentrations in groundwater Puz and Valley wells. Plz wells did not appear to be contaminated and are not discussed in this section.

Figures 5-18 and 5-19 are tag maps of the concentrations of explosives RDX and TNT plus their degradation products. These figures show data from each round of sampling. The Rounds are indicated by "R-1", "R-2", and "R-3" for Rounds 1, 2, and 3, respectively. RDX degradation products were only measured in Round 2, hence dashes ("---") appear for the rounds where no data are available.

The following chemical concentrations were not plotted for reasons indicated in parentheses: dioxins (not analyzed), SVOCs (no detections), VOCs (few analyses; one detection), Pesticides/PCBs (not analyzed). Table 2-3 indicates that herbicides were analyzed in groundwater, but herbicides were not actually analyzed. A herbicide analytical method was used for SVOCs analysis to obtain lower-than-normal detection limits for the SVOCs. The only SVOC or VOC detection in groundwater was trichloroethene (1 µg/L) at well 13MWT20 in Round 1. This detection is less than the applicable human health screening value of 1.4 µg/L, therefore SVOCs and VOCs are not discussed further.

RDX and its degradation products were the most widely detected explosives compounds in groundwater (Figure 5-18). The maximum detected RDX concentration was 7,700 µg/L in Round 2 at well 13MWT21, located in the southwest quadrant of the SWMU. This same well had RDX concentrations of 3,100 and 4,000 µg/L in Rounds 1 and 2, respectively. These latter concentrations are the second and third highest RDX concentrations reported in groundwater. Other wells with particularly high RDX concentrations are:

- Well 13MWT09 (1,100 to 1,700 µg/L over 3 rounds), north and downgradient of Building 166
- Well 13MWT11 (490 to 560 µg/L over 3 rounds), west and downgradient of Building 2500
- Well 13MWT17 (430 to 580 µg/L over 3 rounds), northwest and downgradient of Building 2501
- Well 13MWT18 (150 to 390 µg/L over 3 rounds), east of Buildings 172/173, near middle of SMWU 13
- Well 13MWT21 (2,700 to 7,700 µg/L over 3 rounds), west and downgradient of Buildings 172/173
- Well 13MWT34 (400 and 460 µg/L last 2 rounds), southeast of Buildings 172/173
- Well 13MWT37 (650 and 2,300 µg/L last 2 rounds), west and downgradient of Buildings 172/173

The RDX concentrations are greatest on the top of the ridge, within the SWMU operational area. From there, the concentrations decrease in a downgradient direction. Furthermore, each of the wells that had the highest RDX concentrations are near and frequently downgradient of the areas where soils were excavated and remediated soil was returned to the excavations. Thus, there is a clear connection between the highest RDX concentrations and these remediated areas. Whether the groundwater contamination reflects residual explosives contamination that was not excavated or was returned to the ground in compost is not clear. It could be residual groundwater contamination left over from pre-excavation times.

RDX contamination is not completely bounded laterally by wells that have RDX concentrations less than the 0.61 µg/L human health screening value. For example, wells 13MWT49 and 13MWT51 had 32 µg/L and 250 µg/L RDX, respectively, in Round 3. The farthest well (13MWT46) from SWMU 13, however, had 0.54 µg/L RDX in Round 3, indicating that the general trend of decreasing RDX concentrations in directions away from the SWMU is pervasive. In general, the degree of RDX contamination is greater for the western side of the SMWU than for the eastern side. RDX degradation products have also been consistently detected where RDX concentrations are high. This demonstrates that some RDX degradation is occurring. Degradation of organic compounds is discussed in more detail in Section 6.0.

Figure 5-20 shows TNT concentrations in Puz and Valley wells. The contamination pattern is similar to, and consistent with, that of RDX in groundwater, although TNT was not detected as frequently as RDX. TNT degradation products are also evident, but because the TNT contamination is essentially limited to the western half of the SWMU and downgradient directions toward the west, and the TNT degradation products are also generally limited to that half of Figure 5-20. A minor exception is well 13MWT09 where elevated TNT and 2-amino-4,6-dinitrotoluene appear at concentrations exceeding their respective human health screening criteria.

The groundwater contaminant movement is physically bounded to the east and west of SWMU 13 by the valley streams (Refer to Section 6.0 for an explanation of this). Therefore, although RDX contamination moves from the ridge top in groundwater toward the streams, it can not migrate beyond the streams from the direction of SWMU 13. This explains the elevated RDX contamination observed in surface water (see Section 5.3.1). More detail on the fate and transport of SWMU 13 contaminants is provided in Section 6.0.

Groundwater metals data are plotted for Puz and Valley wells in Figures 5-18 through 5-29. Many of the same metals concentrations plotted for surface water, seeps, and sediment are also plotted for groundwater. An exceedance of the groundwater human health screening value in one or more sampling

rounds is represented by a filled black dot at the affected sampling location. An open dot indicates that no exceedance occurred in any round. Ecological screening values do not apply to groundwater. Dashes are used to indicate where data are not available for a particular round; the rounds are Round 1, Round 2, and Round 3, reading from left to right. Each metal is discussed individually in the following text.

Aluminum – Figure 5-21 shows that there were numerous screening value exceedances in groundwater. The majority of these exeedances, which are indicated by filled black dots at the well locations, are situated at the top of the ridge, in the SMWU operational area. The northeast quadrant of the site had the greatest density of exceedances and also the highest groundwater aluminum concentration (139,000 µg/L in Round 2 at well 13MWT05). The aluminum contamination is not bounded in the immediate downgradient direction in this quadrant because the groundwater flow direction follows an arc that is predominantly northwesterly to southwesterly from a groundwater divide running northeast to southwest and located immediately west of wells 13MWT06 and 13MWT03. The predominant flow direction from the ridge is toward wells 13MWT05 and 13MWT43 (see Figure 4-9) and aluminum concentrations stay relatively constant or increase in this direction. For groundwater that has left the ridge top west of the divide, it is clear that the flow is toward the Valley wells to the west (13MWT48, 13MWT49, 13MWT50, and 13MWT51). Groundwater to the east of this divide flows in an easterly to southwesterly direction. All of the Valley wells (installed and sampled in Round 3 only) had aluminum concentrations that are less than the 3,600 µg/L screening value. Based on symmetry of groundwater flow away from the ridge in downgradient directions, a similar situation is expected for the eastern side of the ridge. At well 13MWT25, the first two rounds of sampling (39,000 and 73500 µg/L, respectively) had aluminum concentrations greater than the screening value but the Round 3 sample had just 836 µg/L aluminum. All other wells in the vicinity of this well had aluminum concentrations less than 1,400 µg/L for each round in which it was sampled. Based on the pattern of filled and open dots plus the discussion presented here, it is evident that aluminum contamination is well bounded in downgradient directions if an assumption is made that the most downgradient direction will yield aluminum concentrations comparable to the Valley wells toward the west.

Arsenic – Figure 5-22 shows that groundwater arsenic concentrations exceed the 0.045 µg/L screening value in approximately two-thirds of the wells. The arsenic screening value is so low that the analytical detection limit exceeds the screening value and every detection of arsenic exceeds the screening value. Wells with undetectable levels of arsenic are not identified as exceedances on Figure 5-22. Many of the wells that had aluminum screening value exceedances also have arsenic screening value exceedances. Well 13MWT05, which also had the highest aluminum concentration in Round 2, had the highest arsenic concentration (24.1 µg/L in Round 2). Using the logic posed for aluminum, it appears that arsenic

contamination is well bounded in the downgradient directions if an assumption is made that downgradient wells near the eastern toe of the ridge would have undetectable levels of arsenic similar to wells 13MWT48 and 13MWT49 to the west.

Beryllium – The concentrations of this metal are plotted for groundwater in Figure 5-23. This figure shows that beryllium concentrations on the SWMU 13 ridge top and downgradient of the ridge top are generally less than the 4.0 µg/L screening value or are slightly greater than this value. However, wells 13MWT07 (8.4 and 8.3 µg/L) and 13MWT47 (12.8 and 12.4 µg/L) in Rounds 2 and 3, respectively, had beryllium concentrations two or more times greater than every other groundwater beryllium concentration measured at SWMU 13. A source for beryllium at SWMU 13 is unknown. The beryllium concentrations are generally well bounded in the downgradient direction from the ridge top with the exception of the well 13MWT30 location. Based on groundwater flow symmetry (east similar to west) beryllium concentrations to the east would be well bounded a few hundred feet in the downgradient direction, but there are no wells to verify this. One line of evidence that this is true is that beryllium was not detected in surface water samples. It was detected in sediment samples, but the highest sediment concentration (4.3 mg/kg) was less than the 15 mg/kg human health screening value. There is no ecological screening value for sediments. Thus, the groundwater, which eventually migrates to the valley, does not yield beryllium concentrations that exceed screening values in these media.

Chromium – Figure 5-24 displays chromium concentrations in groundwater. The concentrations are highest in well 13MWT05. Downgradient directions have chromium concentrations that are generally less than the screening value so this metal is not discussed further.

Cobalt – Approximately one-third of all groundwater sampling locations exceeded the cobalt screening value in one or more sampling rounds (Figure 5-25). The general cobalt contamination pattern is a line of contaminated wells that runs down the center line of the SWMU from northeast to southwest, but with most downgradient wells to the west and east having cobalt concentrations less than the 73 µg/L screening value. The only wells where cobalt contamination greater than the screening value is not bounded in the downgradient direction are wells 13MWT30 (104 µg/L cobalt in Round 2) and 13MWT47 (194 and 249 µg/L cobalt in Rounds 2 and 3). Similar to beryllium, the surface water and sediment criteria are not exceeded for this metal so it appears that the physical bounding of groundwater by the mainstreams is sufficient to mitigate any cobalt contamination in groundwater.

Manganese – Figure 5-26 shows that manganese exceeded the 88 µg/L groundwater screening value in every well except 13MWT17 and 13MWT32. The manganese contamination is not bonded in any downgradient direction. The highest concentration is 11,800 µg/L in well 13MWT20 (sampling Round 1).

This same well had the second and third highest manganese concentrations observed to date in Rounds 2 and 3. This well is northeast of Building 171 where some of the highest organic chemical concentrations were detected in soils. It is in the middle of the PCB sampling pattern (Figure 5-2) and immediately adjacent to the excavation that was backfilled with composted soil near Building 171 (Figure 1-8). Therefore, the elevated concentrations appear to be related either directly to site operations or indirectly to reducing conditions that may have been generated from decomposing organic matter in the soil and rendered soluble what would have been otherwise insoluble naturally occurring manganese. The available information does not allow for distinguishing between these possibilities. Nevertheless, manganese concentrations greater than screening level are not bounded in any direction.

Iron – Figure 5-27 shows that iron concentrations mimic manganese concentrations. The highest observed iron concentrations were consistently measured in well 13MWT20, located near Building 171. Iron contamination greater than the groundwater screening value is not bounded. The elevated concentrations of this metal in groundwater, however, may not be directly related to site operations. The available information does not allow for identifying the cause of the elevated iron concentrations. In particular, high iron concentrations are not necessarily elevated near each composting excavation (four main areas of excavation are identified in Figures 1-5 through 1-12) where high organic content might be expected to induce reducing and acidic conditions that mobilize iron. There were several sediment exceedances of iron human health and ecological screening criteria in downgradient directions, therefore iron contamination is not bounded.

Nickel – Groundwater concentrations of this metal are shown in Figure 5-28. This metal does not often appear as a contaminant, but most of the wells had exceedances of the 73 µg/L nickel human health screening value. The highest nickel concentrations were consistently observed in wells 13MWT20 (477, 397, and 427 µg/L) and 13MWT47 (400 and 483 µg/L, Rounds 2 and 3 only). Once again, well 13MWT20 shows up as a consistently contaminated well near the composting excavation around Building 171. It is not clear that the composting operation had an effect on mobilizing nickel, because several of the wells near other composting operations do not exhibit comparable nickel concentrations. Whereas, wells further from the other excavations have nickel concentrations similar to those of wells 13MWT20 and 13MWT47. Nickel groundwater concentrations are bounded to the west by wells with nickel concentrations less than the 73 µg/L screening value. Nickel is not bounded to the east in this manner. However, the only exceedances of surface water or sediment criteria were exceedances of the 22 µg/L ecological screening value. The human health sediment (160 mg/kg) and surface water (73 µg/L), and the ecological surface water (28.8 µg/L) screening values were not exceeded. Therefore, nickel may not be bounded to the east, but the exceedances of the ecological screening value are slight.

Vanadium – Figure 5-29 displays groundwater vanadium concentrations. Well 13MWT05 again emerges as a well with the highest metal concentration (34.3, 135, and 1.1 µg/L), in this case, vanadium. All other vanadium concentrations are considerably less than 135 µg/L. The three values obtained vary considerably from one sampling round to another. The data quality review (Tables H-11 and H-12) did not identify vanadium as problematic with regard to analytical precision or accuracy.

The majority of the following metal concentrations in groundwater are consistently associated with the total metals, but not with dissolved metals (see Table G-6) aluminum, chromium, copper, iron, titanium, vanadium, and zinc). This indicates that filtration through a filter with 0.45 um pore size will generally remove most of the metal from the groundwater because it is associated with suspended matter in the water. The suspended matter may be colloidal or particles of larger size. Colloids are generally considered to range in size from 0.001 um to 1 um in size.

5.4.3 Pennsylvanian Lower Zone

Of the samples collected from the lower zone wells (13MWT28, 13MWT35, 13MWT38, 13MWT41, 13MWT44, 13MWT45, and 13MWT46), two had explosives detections (0.45 µg/L 2-nitrotoluene and 0.34 µg/L 3-nitrotoluene from wells 13MWT41 and 13MWT45, respectively). The 0.34 µg/L 3-nitrotoluene exceeds the 0.049 µg/L human health screening value. However, because there were few explosives detections, just one of the detections exceeds a screening level, and the two detections were close to the nominal threshold value of 0.35 µg/L (see Table H-6), no data are plotted for the Plz wells. Vertical bounding of explosives in groundwater is virtually complete, based on the data presented above and the lack of RDX (the most pervasive explosive contaminant) in the lower zone wells.

The matrix below indicates the concentrations of total metals that exceeded their respective human health groundwater screening value, and in which wells the concentrations exceed the values. Cells containing "NE" indicate that the metal did not exceed its screening value in that well.

Parameter	Screening Value, µg/L	Location						
		13MWT28	13MWT35	13MWT38	13MWT41	13MWT44	13MWT45	13MWT46
Aluminum	3,600	6,270	20,900	4,720	29,800	NE	4,300	NE
Antimony	1.5	2.9	6.7	3.8	5.6	NE	NE	NE
Arsenic	0.045	15.2	15	24.5	20.6	NE	2.1	NE
Chromium	11	11.7	35	12.5	38.7	NE	NE	NE
Iron	1,100	2,460	10,300	5,410	23,700	NE	1,630	2,350
Manganese	88	NE	118	NE	NE	NE	120	495
Vanadium	3.6	12.5	31.6	25.6	33.9	NE	6.7	NE

Wells 13MWT44 and 13MWT46 have the least number of exceedances. Manganese generally had few exceedances; whereas, aluminum, antimony, arsenic, chromium, iron, and vanadium had four or more exceedances. The most dramatic exceedances were for aluminum (20,900 and 29,800 µg/L in 13MWT35 and 13MWT41, respectively), arsenic (24.5 and 20.6 µg/L in 13MWT38 and 13MWT41), and iron (10,300 and 23,700 µg/L in 13MWT35 and 13MWT41). Despite these large exceedances of screening values, of the 25 metals analyzed in these samples, there are relatively few metals that exceed their criteria.

Not enough data are available for the lower zone wells to determine whether the detected metals are associated predominantly with suspended or dissolved phases of the surface water.

5.4.4 Summary of Overburden and Upper and Lower Bedrock Well Contamination

In summary, the primary groundwater contaminant is RDX with minor contributions from other explosives and explosives degradation products. Organic chemical contamination is confined almost completely to the overburden and shallow zone wells. The RDX groundwater contamination appears to be linked to the areas of excavated soil and to a much more limited degree, to sumps. The soil contamination source is evidently limited to residual surficial contamination, especially near Buildings 166 and 171 and subsurface soil that could not be excavated during the bioremediation effort.. Precipitation recharge appears to be infiltration the overburden and leaching explosives from the overburden. Because direct links could not be made between individual explosives contaminant sources and observed perched water RDX concentrations, it appears that the contaminated perched water migrates along the bedrock surface to more distant locations.,

For the plotted metals, if one assumes that there is symmetry in the groundwater flow to the east and west of the SWMU 13 ridge top and, consequently, in the degree of dilution of metals in groundwater as it flows away from the SWMU, most metals are bounded in all directions by the time they reach the valley streams located east and west of the SWMU. The exceptions are: iron and manganese to the east and west of SWMU 13, and nickel to the east only. Without this assumption, most metals (except iron and manganese) are bounded to the west by wells with concentrations less than the screening value, but not to the east. Surface water, however, intercepts the groundwater to the east and west, therefore surface water and sediment concentrations are indicators of ultimate groundwater expression. The extent of contamination in these media is described in Section 5.3 and the fate and transport of metals is discussed in more detail in Section 6.0.

The concentrations of several metals were not plotted for groundwater. These metals are: antimony, barium, cadmium, calcium, copper, lead, lithium, magnesium, mercury, potassium, selenium, silver, sodium, strontium, thallium, tin, titanium, and zinc. The metals either exhibited no exceedances of the human health screening value for groundwater, the exceedances were slight, or the exceedances were bounded by downgradient wells with concentrations less than the screening level. Therefore, a discussion of those metals would add no new knowledge to the extent of groundwater metal contamination at SWMU 13.

A few wells at SMWU 13 consistently represent the highest groundwater concentrations for various metals. Those wells are 13MWT05, 13MWT20, and 13MWT47. Well 13MWT25 also displays this characteristic for some metals (i.e., aluminum, arsenic, chromium, iron, and vanadium). Well 13MWT20 and 13MWT47 are close to excavated areas where composted soil was returned to the ground. Well 13MWT25 is also downgradient of the excavated area around Building 171. A high organic chemical content of that soil may explain the elevated metal concentrations at those wells, but this is not clear. For example, well 13MWT25 is relatively far downgradient of Building 171 and another well, 13MWT22, which is also downgradient but closer to Building 171 and does not exhibit the elevated metal concentrations that well 13MWT25 does. Additionally, two other areas, around Buildings 172/173 and 168 were similarly treated but the metal elevations are not as pronounced in the wells that are downgradient of those areas. Thus, the available data do not yield a clear connection between composted areas and elevated metal concentrations, although some connection is evident. This is contrary to explosives contamination for which there appears to be a very clear connection between elevated RDX concentrations and proximity of groundwater wells to the composting excavations located upgradient of the contaminated groundwater.

Location 13SW/SD15 consistently displays elevated concentrations of metals such as aluminum, copper, iron, and manganese. Location 13SW/SD15 is low on the hillside and under normal circumstances would be expected to yield more dilute concentrations than the upgradient locations because of dilution that occurs as the contaminants move down the hillside. The elevated concentrations at this location are in indication that groundwater may be discharging from the hillside upgradient of this location and contributing to the observed surface water and sediment concentrations. More detail concerning fate and transport of metals and other contaminants is presented in Section 6.0.

5.5 VEGETATION

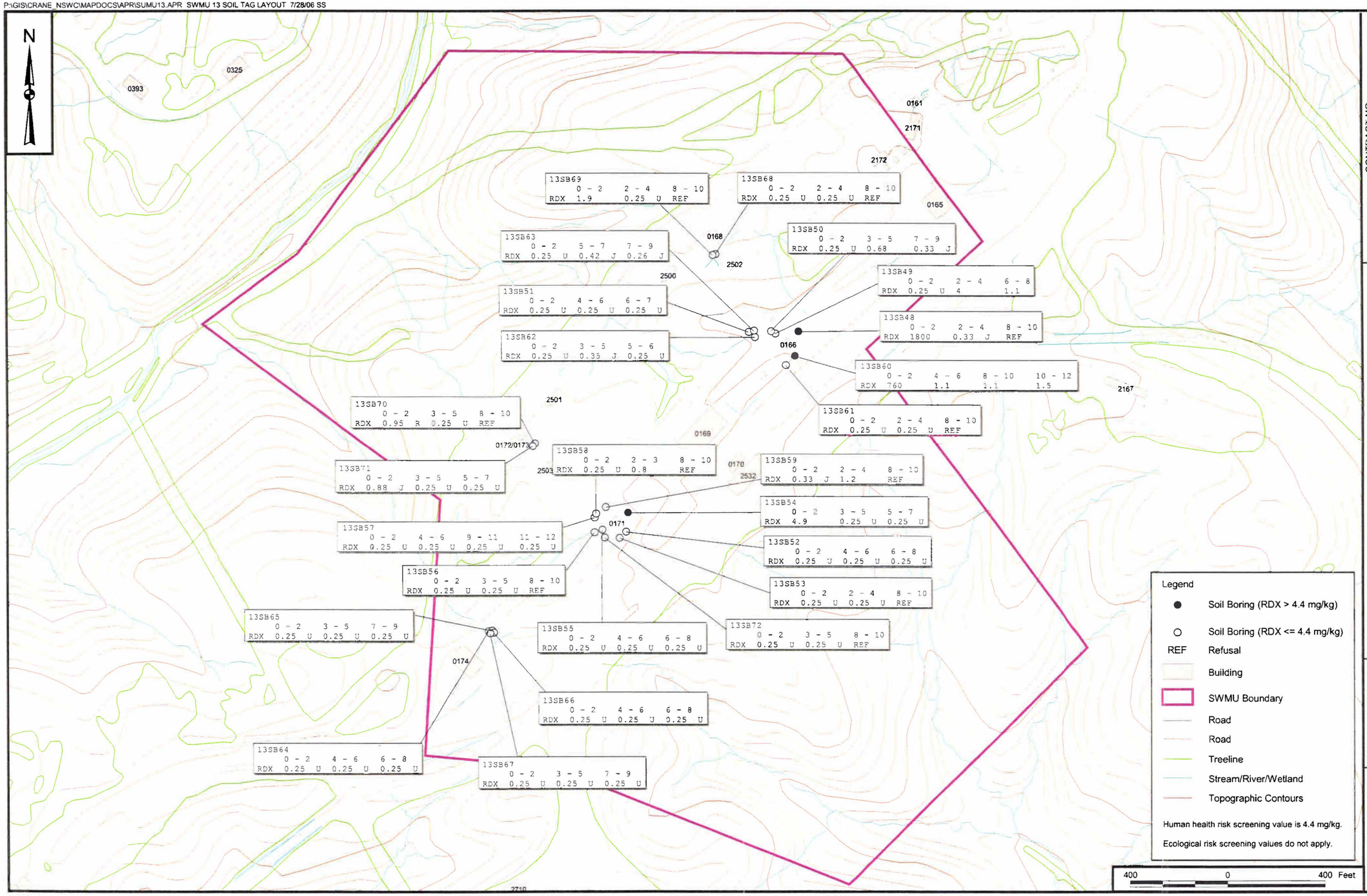
Vegetation sampling was conducted in the area on the western slope of the SMWU (see Figure 2-4) and the samples were analyzed for explosives. The results are not plotted spatially but are presented in Table G-7. Tables 3-45 and 3-56 present statistics and data for all chemicals detected at least once in

vegetation samples, respectively. The vegetation sampling was exploratory in nature to determine whether SWMU 13 plants are taking up RDX and other explosives. The sampled species were sugar maple, white oak, and white snake root. In addition, an acorn sample was collected from a white oak.

Section 3.0 identified some data quality problems that are particular to the vegetation analyses. Despite the data quality problems (i.e., primarily probable false negatives and wholesale rejection of tetryl results), the data show that RDX and related compounds are taken up by trees and other plants at SWMU 13.

RDX and its degradation products were detected in several vegetation samples, indicating that the RDX and related contamination extends from the groundwater and soils into the vegetation. The vegetation uptake did not appear to be species-specific. Whereas TNT was not detected in the plant tissue samples, some samples had detectable concentrations of TNT breakdown products (2-amino-4,6-dinitrotoluene in one sample, 2,6-diamino-4-nitrotoluene in one sample, 2,6-dinitrotoluene in seven samples, and nitrobenzene in one sample). Because similar vegetation is located around the SWMU, the plant uptake observed in the sampled area is expected to occur in the other, unsampled, areas of the SWMU.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SUMU13.APR SWMU 13 SOIL TAG LAYOUT 7/28/06 SS



CONTRACT NO. CTO 0343

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 1

REV 0

RDX CONCENTRATIONS
IN SURFACE AND SUBSURFACE SOIL (mg/kg)
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

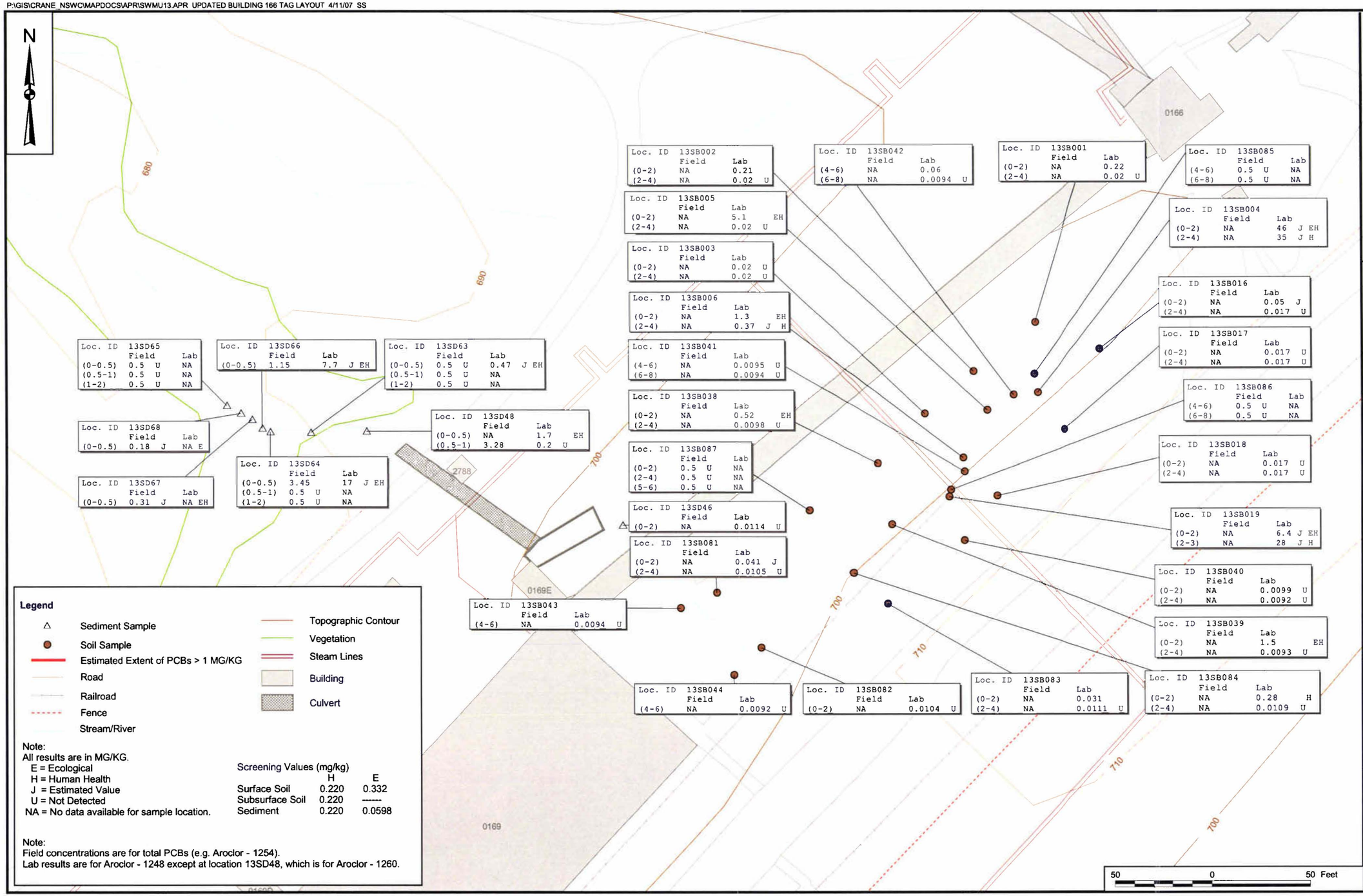
DRAWN BY S. STROZ DATE 7/28/06

CHECKED BY J. LUCAS DATE 8/14/06

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR UPDATED BUILDING 166 TAG LAYOUT 4/11/07 SS



Legend

- Sediment Sample
- Soil Sample
- Estimated Extent of PCBs > 1 MG/KG
- Road
- Railroad
- Fence
- Stream/River
- Topographic Contour
- Vegetation
- Steam Lines
- Building
- Culvert

Note:
All results are in MG/KG.
E = Ecological
H = Human Health
J = Estimated Value
U = Not Detected
NA = No data available for sample location.

Screening Values (mg/kg)	H	E
Surface Soil	0.220	0.332
Subsurface Soil	0.220	------
Sediment	0.220	0.0598

Note:
Field concentrations are for total PCBs (e.g. Aroclor - 1254).
Lab results are for Aroclor - 1248 except at location 13SD48, which is for Aroclor - 1260.

CONTRACT NO. 0357

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 2A

REV 0

AROCLOR TAG MAP
SWMU 13 - BUILDING 166 AREA
RFI ROUND 1 AND PCB DELINEATION
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY S. PAXTON DATE 2/16/07

CHECKED BY J. LUCAS DATE 4/11/07

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR UPDATED BUILDING 171 TAG LAYOUT 4/11/07 SS

Loc. ID	13SB077	
	Field	Lab
(0-2)	NA	0.94 EH
(2-4)	NA	2.7 H
Loc. ID	13SB077 (DUP)	
	Field	Lab
(0-2)	NA	1.3 EH

Loc. ID	13SB010	
	Field	Lab
(0-2)	NA	160 EH
(2-4)	NA	210 H

Loc. ID	13SB030	
	Field	Lab
(0-2)	NA	0.0092 U
(2-4)	NA	0.009 U
Loc. ID	13SB030 (DUP)	
	Field	Lab
(2-4)	NA	0.0091 U

Loc. ID	13SB088	
	Field	Lab
(0-1)	0.5 U	NA

Loc. ID	13SB093	
	Field	Lab
(0-2)	0.11 J	NA

Loc. ID	13SB020	
	Field	Lab
(0-2)	NA	36 J EH

Loc. ID	13SB078	
	Field	Lab
(0-2)	NA	2.5 EH
(2-4)	NA	0.11

Loc. ID	13SB032	
	Field	Lab
(0-2)	NA	0.14
(2-4)	NA	0.22

Loc. ID	13SB033	
	Field	Lab
(0-2)	NA	0.0092 U
(2-4)	NA	0.0092 U

Loc. ID	13SB031	
	Field	Lab
(4-6)	NA	0.0092 U
(6-8)	NA	0.013 J
Loc. ID	13SB031 (DUP)	
	Field	Lab
(4-6)	NA	0.0092 U

Loc. ID	13SB034	
	Field	Lab
(0-2)	NA	0.0088 U
(2-4)	NA	0.0098 U

Loc. ID	13SB089	
	Field	Lab
(0-1)	0.08 J	NA

Loc. ID	13SB076	
	Field	Lab
(0-1)	NA	20 J EH

Loc. ID	13SB094	
	Field	Lab
(0-2)	0.08 J	NA

Loc. ID	13SB029	
	Field	Lab
(0-2)	NA	5.8 EH
(2-4)	NA	0.28 H

Loc. ID	13SB075	
	Field	Lab
(0-1)	NA	25 EH

Loc. ID	13SB079	
	Field	Lab
(0-2)	NA	1.2 J EH
(2-4)	NA	0.0109 U

Loc. ID	13SB021	
	Field	Lab
(0-2)	NA	8.8 J EH
(2-4)	NA	0.1 J
Loc. ID	13SB021 (DUP)	
	Field	Lab
(2-4)	NA	0.035 J

Loc. ID	13SD57	
	Field	Lab
(0-0.5)	3.47	36 J EH

Loc. ID	13SB035	
	Field	Lab
(0-2)	NA	0.11
(2-4)	NA	0.026

Loc. ID	13SB026	
	Field	Lab
(0-2)	NA	0.042
(2-4)	NA	0.0099 U

Loc. ID	13SB012	
	Field	Lab
(0-2)	NA	0.33 J H
(2-4)	NA	0.59 J

Loc. ID	13SD51	
	Field	Lab
(0-2)	NA	1.2 EH
(2-4)	NA	0.8 J EH

Loc. ID	13SB013	
	Field	Lab
(0-2)	NA	39 J EH
(2-4)	NA	0.22 J

Loc. ID	13SB090	
	Field	Lab
(0-2)	0.5 U	0.024
(2-3)	0.03 J	NA

Loc. ID	13SB045	
	Field	Lab
(4-6)	NA	0.3 H

Loc. ID	13SB011	
	Field	Lab
(0-2)	NA	67 J EH
(2-4)	NA	0.059 J

Loc. ID	13SB102	
	Field	Lab
(0-2)	0.13 J	1.6 J EH

Loc. ID	13SB091	
	Field	Lab
(0-1)	NA	0.9 J EH
(0-1)	0.35 J	NA EH

Loc. ID	13SB103	
	Field	Lab
(0-2)	0.2 J	0.28 J H

Loc. ID	13SB036	
	Field	Lab
(0-2)	NA	0.01 U
(2-4)	NA	0.0094 U

Loc. ID	13SB096	
	Field	Lab
(0-2)	13.85 J	NA EH
(2-4)	0.1 J	0.37 J H

Loc. ID	13SB022	
	Field	Lab
(0-2)	NA	2.6 EH
(2-4)	NA	0.13 J

Loc. ID	13SB097	
	Field	Lab
(0-2)	0.03 J	NA
(2-3)	0.09 J	NA

Loc. ID	13SB009/15	
	Field	Lab
(0-2)	NA	5.4 J EH
(2-4)	NA	0.19 J
Loc. ID	13SB009/15 (DUP)	
	Field	Lab
(0-2)	NA	6.7 J EH

Loc. ID	13SD59	
	Field	Lab
(0-1)	0.64	2.7 J EH
(1-2)	0.5 U	NA

Loc. ID	13SB037	
	Field	Lab
(0-2)	NA	51 EH
(2-4)	NA	0.3 H

Loc. ID	13SB098	
	Field	Lab
(0-2)	0.05 J	NA
(2-4)	0.5 U	NA

Loc. ID	13SB027	
	Field	Lab
(0-2)	NA	2.8 EH
(2-4)	NA	0.84 H

Loc. ID	13SB099	
	Field	Lab
(0-2)	0.5 U	NA
(2-4)	0.5 U	NA

Loc. ID	13SB080	
	Field	Lab
(0-2)	NA	0.0106 U
(2-4)	NA	0.0104 U

Loc. ID	13SB052	
	Field	Lab
(0-2)	NA	17 J EH
(2-4)	NA	2.4 EH
Loc. ID	13SD52 (DUP)	
	Field	Lab
(0-2)	NA	46 J EH

Loc. ID	13SB023	
	Field	Lab
(0-2)	NA	0.63 EH
(2-4)	NA	0.021 J

Loc. ID	13SD60	
	Field	Lab
(0-1)	3.95	12 J EH
(1-2)	0.5 U	NA

Loc. ID	13SB073	
	Field	Lab
(0-2)	NA	2 J EH
(2-4)	NA	0.0105 U

Loc. ID	13SD61	
	Field	Lab
(0-1)	0.5 U	NA

Loc. ID	13SB074	
	Field	Lab
(0-2)	NA	0.87 EH

Loc. ID	13SD54	
	Field	Lab
(0-0.5)	NA	1.1 EH

Loc. ID	13SB024	
	Field	Lab
(0-2)	NA	0.16 J
(2-3)	NA	0.024 J

Loc. ID	13SB100	
	Field	Lab
(0-2)	0.5 U	NA
(2-4)	0.5 U	NA

Loc. ID	13SB014	
	Field	Lab
(0-1)	NA	150 EH

Loc. ID	13SD53	
	Field	Lab
(0-2)	NA	17 J EH
(2-3)	NA	1.3 J EH

Loc. ID	13SB095	
	Field	Lab
(0-1)	NA	14 J EH
(0-1)	4.81	NA EH
(1-2)	10.4 J	64 J EH
Loc. ID	13SB095 (DUP)	
	Field	Lab
(1-2)	NA	400 J EH

Loc. ID	13SD62	
	Field	Lab
(0-1)	0.5 U	0.023 J
(1-2)	0.02 J	0.011 UJ

Loc. ID	13SB047	
	Field	Lab
(4-6)	NA	0.049

Loc. ID	13SB101	
	Field	Lab
(0-2)	0.5 U	NA
(2-4)	0.5 U	NA

Loc. ID	13SB028	
	Field	Lab
(2-4)	NA	0.0094 U
(4-6)	NA	0.0095 U

Loc. ID	13SB107	
	Field	Lab
(0-2)	0.1 J	NA

Loc. ID	13SB105	
	Field	Lab
(0-2)	2.24	12 J EH
(2-4)	0.5 U	NA
(4-6)	0.5 U	NA

Loc. ID	13SB104	
	Field	Lab
(0-2)	0.5 U	NA
(2-4)	0.5 U	NA
(4-6)	0.5 U	NA

Loc. ID	13SD50	
	Field	Lab
(0-1)	NA	36 EH

Loc. ID	13SB046	
	Field	Lab
(4-6)	NA	0.0099 U

Loc. ID	13SD49	
	Field	Lab
(0-1)	NA	8 J EH

Loc. ID	13SB106	
	Field	Lab
(0-2)	0.01 J	NA

Loc. ID	13SB025	
	Field	Lab
(0-2)	NA	0.017 U
(2-4)	NA	0.017 U

Legend

- Soil Sample
- Sediment Sample
- Road
- Stream/River
- Topographic Contour
- Vegetation
- SWMU Boundary
- Building
- Culvert
- Drainage Way

Note:
All results are in MG/KG.
E = Ecological
H = Human Health
J = Estimated Value
U = Not Detected
NA = No data available for sample location.

Screening Values (mg/kg)	H	E
Surface Soil	0.220	0.332
Subsurface Soil	0.220	------
Sediment	0.220	0.0598

50 0 50 Feet

DRAWN BY	DATE
S. PAXTON	2/05/07
CHECKED BY	DATE
J. LUCAS	4/11/07
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

AROCLOR TAG MAP
SWMU 13 - BUILDING 171 AREA
RFI ROUND 1 AND PCB DELINEATION
NSWC CRANE
CRANE, INDIANA

CONTRACT NO.	0357
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	5 - 2B
REV.	0

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N

13SB02		
3&4MP	(0 - 2)	80 U
	(2 - 4)	78 U
BAA	(0 - 2)	4 U
	(2 - 4)	3.8 U
BAP	(0 - 2)	4 U
	(2 - 4)	3.8 U
BBF	(0 - 2)	4 U
	(2 - 4)	3.8 U

13SB01		
3&4MP	(0 - 2)	80 U
	(2 - 4)	81 U
BAA	(0 - 2)	3.9 U
	(2 - 4)	4 U
BAP	(0 - 2)	3.9 U
	(2 - 4)	4 U
BBF	(0 - 2)	3.9 U
	(2 - 4)	4 U

13SB03		
3&4MP	(0 - 2)	78 U
	(2 - 4)	79 U
BAA	(0 - 2)	3.8 U
	(2 - 4)	3.9 U
BAP	(0 - 2)	3.8 U
	(2 - 4)	3.9 U
BBF	(0 - 2)	3.8 U
	(2 - 4)	3.9 U

13SB04		
3&4MP	(0 - 2)	84 U
	(2 - 4)	81 U
BAA	(0 - 2)	20
	(2 - 4)	4 U
BAP	(0 - 2)	27
	(2 - 4)	4 U
BBF	(0 - 2)	37
	(2 - 4)	4 U

13SB06		
3&4MP	(0 - 2)	87 U
	(2 - 4)	87 U
BAA	(0 - 2)	32
	(2 - 4)	4.3 U
BAP	(0 - 2)	42
	(2 - 4)	4.3 U
BBF	(0 - 2)	58
	(2 - 4)	4.3 U

13SB05		
3&4MP	(0 - 2)	99 U
	(2 - 4)	80 U
BAA	(0 - 2)	4.9 U
	(2 - 4)	3.9 U
BAP	(0 - 2)	4.9 U
	(2 - 4)	3.9 U
BBF	(0 - 2)	7 J
	(2 - 4)	3.9 U

13SB11		
3&4MP	(0 - 2)	80 U
	(2 - 4)	78 U
BAA	(0 - 2)	5 J
	(2 - 4)	3.9 U
BAP	(0 - 2)	6 J
	(2 - 4)	3.9 U
BBF	(0 - 2)	9
	(2 - 4)	3.9 U

13SB12		
3&4MP	(0 - 2)	82 U
	(2 - 4)	76 U
BAA	(0 - 2)	4 J
	(2 - 4)	3.8 U
BAP	(0 - 2)	4 U
	(2 - 4)	3.8 U
BBF	(0 - 2)	4 U
	(2 - 4)	3.8 U

13SB10		
3&4MP	(0 - 2)	82 U
	(2 - 4)	77 U
BAA	(0 - 2)	7 J
	(2 - 4)	3.8 U
BAP	(0 - 2)	7 J
	(2 - 4)	3.8 U
BBF	(0 - 2)	14
	(2 - 4)	3.8 U

13SB13		
3&4MP	(0 - 2)	81 U
	(2 - 4)	83 U
BAA	(0 - 2)	4 U
	(2 - 4)	4.1 U
BAP	(0 - 2)	4 U
	(2 - 4)	4.1 U
BBF	(0 - 2)	4 U
	(2 - 4)	4.1 U

13SB09/15		
3&4MP	(0 - 2)	90 U
	(2 - 4)	560 (H)
BAA	(0 - 2)	1100 J (H)
	(2 - 4)	3.7 U
BAP	(0 - 2)	1000 J (H)
	(2 - 4)	3.7 U
BBF	(0 - 2)	1100 J (H)
	(2 - 4)	3.7 U

13SB14		
3&4MP	(0 - 2)	85 U
	(2 - 4)	REF
BAA	(0 - 2)	8 J
	(2 - 4)	REF
BAP	(0 - 2)	10
	(2 - 4)	REF
BBF	(0 - 2)	14 J
	(2 - 4)	REF

SCREENING VALUES (ug/kg)

PARAMETER	SAMPLE DEPTH	ECOLOGICAL	HUMAN HEALTH
3&4MP	(0 - 2)	163600.0	66.0
	(2 - 4)		66.0
BAA	(0 - 2)	5210.0	160.0
	(2 - 4)		160.0
BAP	(0 - 2)	1520.0	62.0
	(2 - 4)		62.0
BBF	(0 - 2)	59800.0	490.0
	(2 - 4)		490.0

Legend

- Soil Boring Location
- 13SB10 — Sample Location ID
- 3&4MP — 3- and 4- methylphenol
- BAA — Benzo (a) anthracene
- BAP — Benzo (a) pyrene
- BBF — Benzo (b) Fluoranthene
- (H) — Exceeds Human Health Risk Screening Value
- (0 - 2) — Sample Depth
- REF — Refusal prevented collection of Sample
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

650 700 2501 172/173 2503 189 170 2532 171

150 0 150 Feet

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APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 3

REV 0

CONCENTRATIONS OF SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL (ug/kg)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

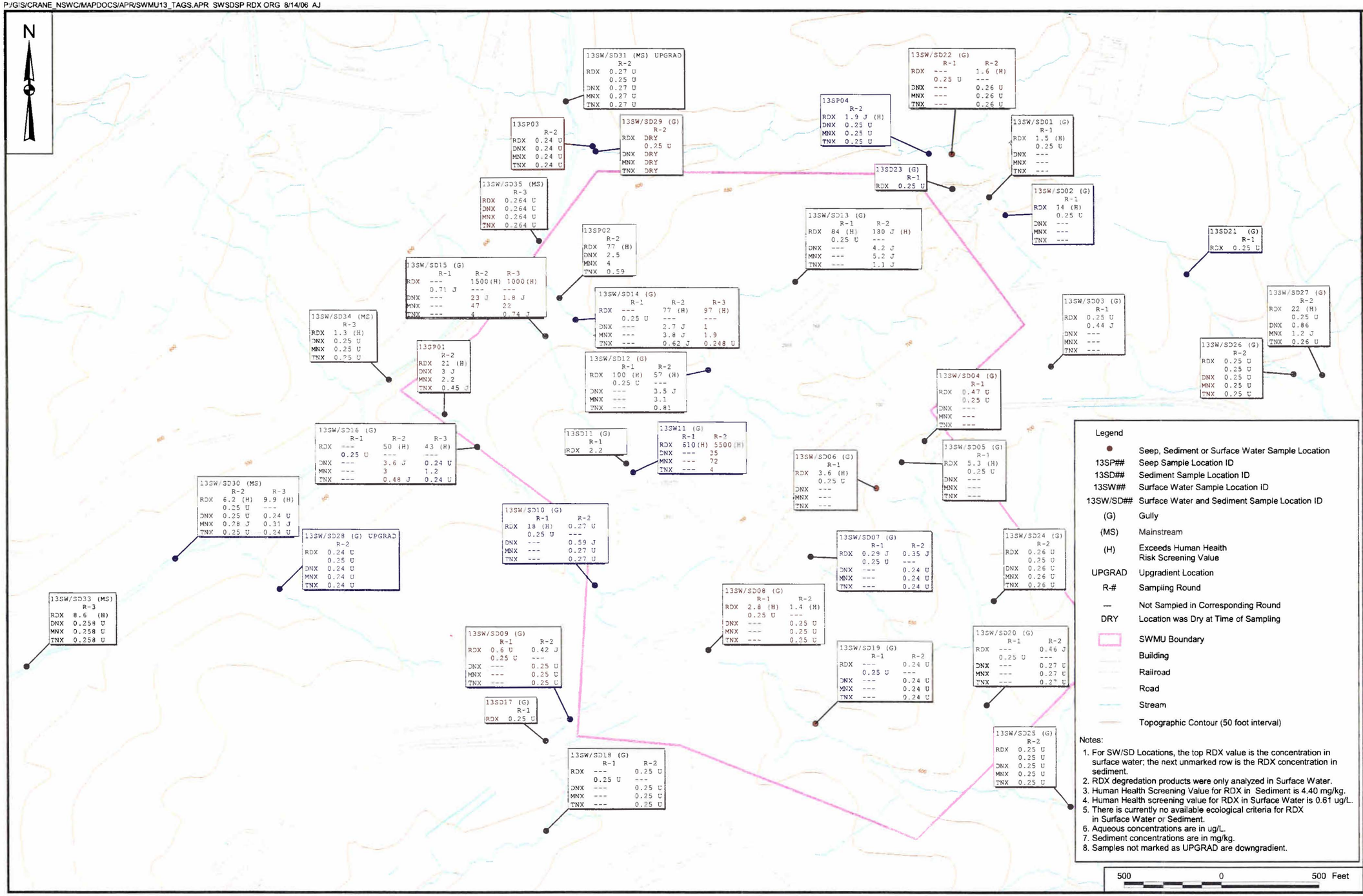
DRAWN BY C. FOSTER DATE 2/15/05

CHECKED BY J. LUCAS DATE 8/14/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP RDX ORG 8/14/06 AJ



CONTRACT NO.
CTO 0343

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 4

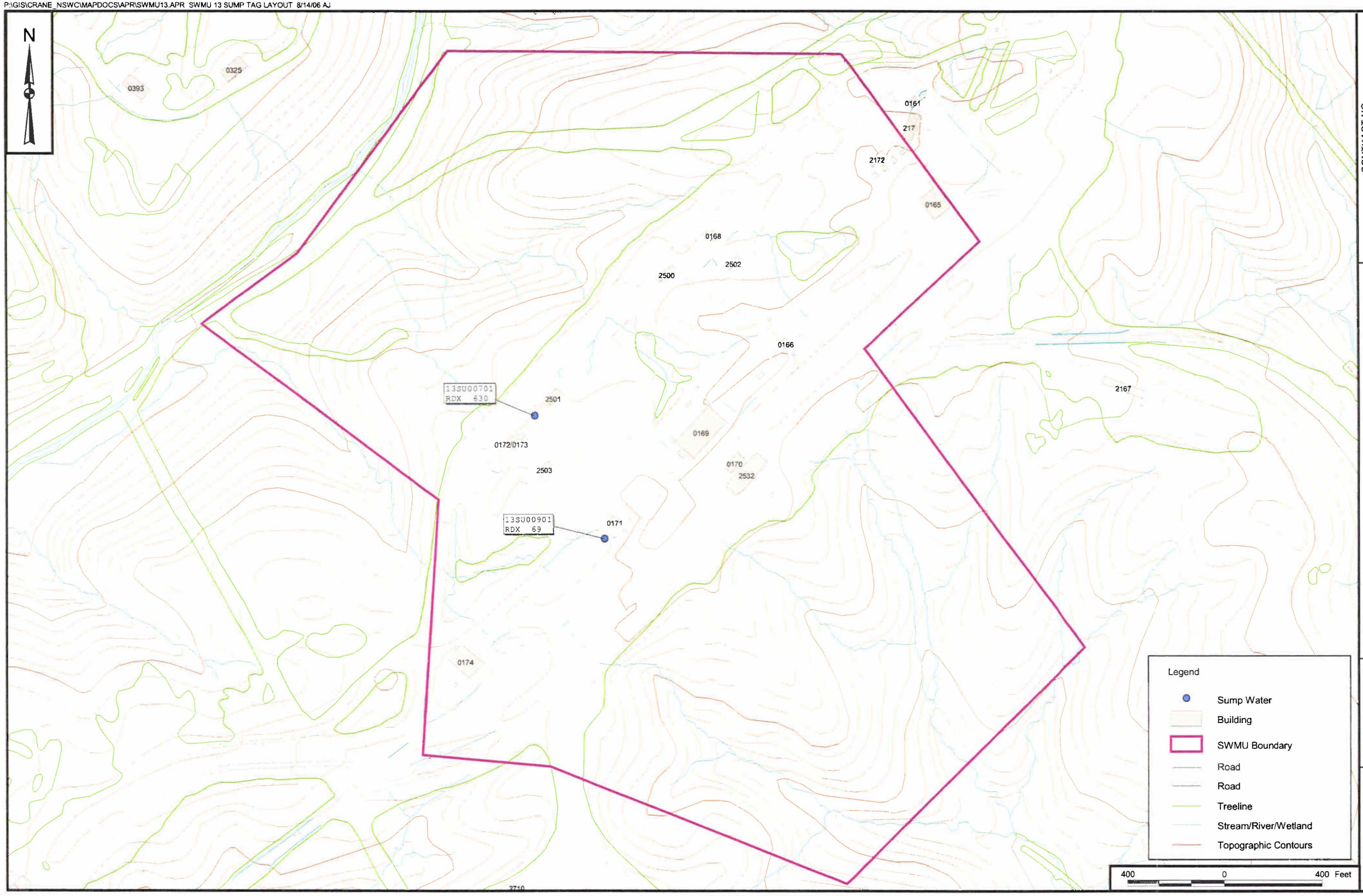
REV 0

RDX CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE	SCALE	
C. FOSTER	2/21/05	AS NOTED	
CHECKED BY	DATE		
J. LUCAS	6/08/06		
COST/SCHED-AREA			

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SWMU 13 SUMP TAG LAYOUT 8/14/06 AJ



CONTRACT NO. CTO 0343

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 5

REV 0

RDX CONCENTRATIONS IN SUMP WATER (ug/L)
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

DRAWN BY S. STROZ DATE 7/28/06

CHECKED BY J. LUCAS DATE 8/14/06

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SWMU 13 SUMP SEDIMENT TAG LAYOUT 9/06/06 SS

N

0325
0393
0161
2171
2172
0165
0168
2502
2500
0166
2167
0169
0170
2532
0172/0173
2503
2501
0171
0174
2710

13SL001010006
RDX 2.4

13SL002010006
RDX 2.3

13SL003010006
RDX 1200

13SL007010006
RDX 0.41 J

13SL006010006
RDX 3.1

13SL008010006
RDX 8600

13SL005010006
RDX 10

13SL004010006
RDX 5.8

13SL009010006
RDX 1.1 J

Legend

- Sump Sediment
- Building
- SWMU Boundary
- Road
- Road
- Treeline
- Stream/River/Wetland
- Topographic Contours

400 0 400 Feet

RDX CONCENTRATIONS IN SUMP SEDIMENT (mg/kg)
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO.
CTO 0343

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 6

REV 0

DRAWN BY S. STROZ DATE 7/28/06

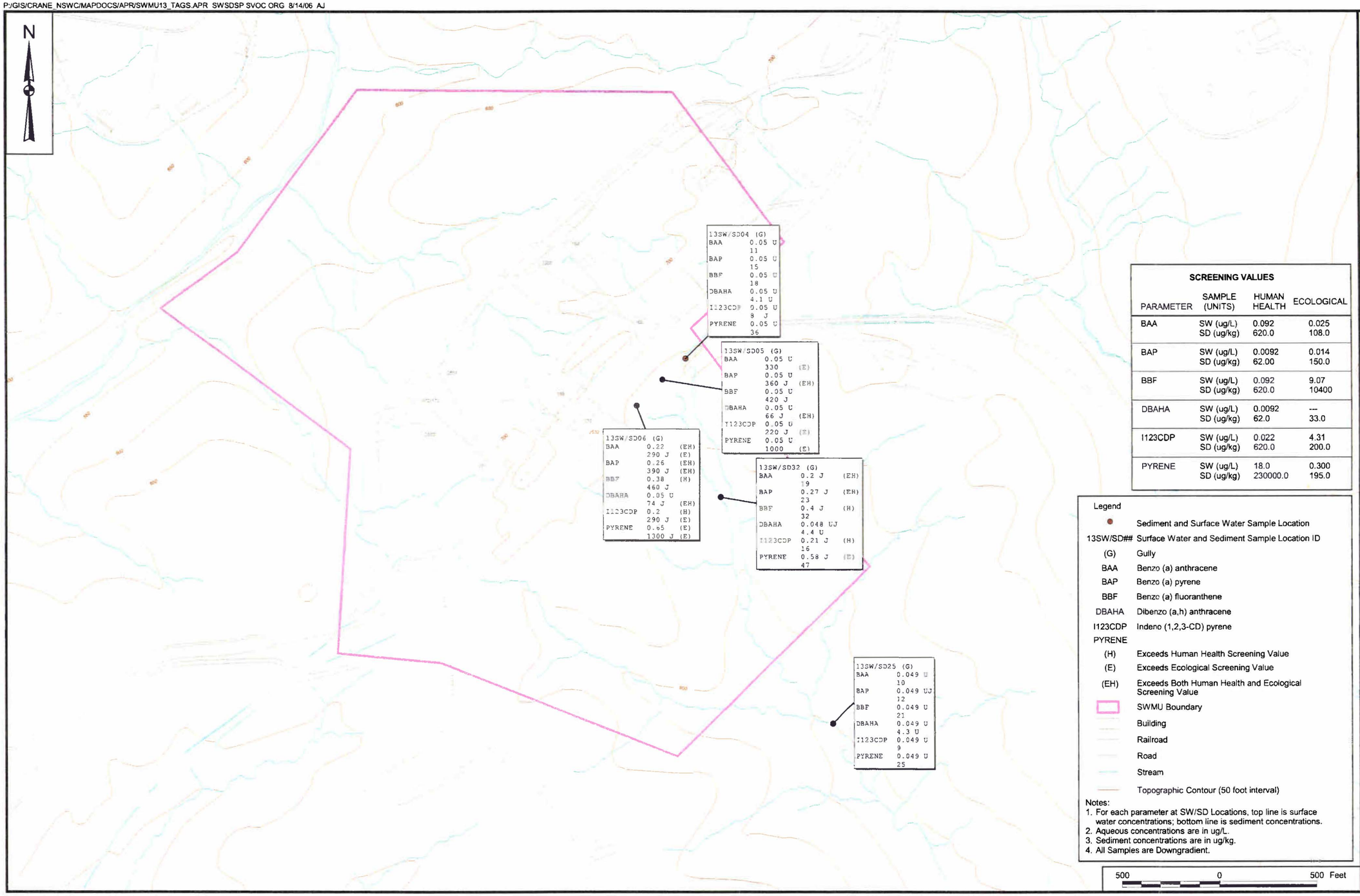
CHECKED BY J. LUCAS DATE 9/06/06

COST/SCHED-AREA

SCALE AS NOTED

NAVFAC

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP SVOC ORG 8/14/06 AJ



SCREENING VALUES

PARAMETER	SAMPLE (UNITS)	HUMAN HEALTH	ECOLOGICAL
BAA	SW (ug/L)	0.092	0.025
	SD (ug/kg)	620.0	108.0
BAP	SW (ug/L)	0.0092	0.014
	SD (ug/kg)	62.00	150.0
BBF	SW (ug/L)	0.092	9.07
	SD (ug/kg)	620.0	10400
DBAHA	SW (ug/L)	0.0092	--
	SD (ug/kg)	62.0	33.0
I123CDP	SW (ug/L)	0.022	4.31
	SD (ug/kg)	620.0	200.0
PYRENE	SW (ug/L)	18.0	0.300
	SD (ug/kg)	230000.0	195.0

Legend

- Sediment and Surface Water Sample Location
- 13SW/SD## Surface Water and Sediment Sample Location ID
- (G) Gully
- BAA Benzo (a) anthracene
- BAP Benzo (a) pyrene
- BBF Benzo (a) fluoranthene
- DBAHA Dibenzo (a,h) anthracene
- I123CDP Indeno (1,2,3-CD) pyrene
- PYRENE
- (H) Exceeds Human Health Screening Value
- (E) Exceeds Ecological Screening Value
- (EH) Exceeds Both Human Health and Ecological Screening Value
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Notes:
1. For each parameter at SW/SD Locations, top line is surface water concentrations; bottom line is sediment concentrations.
2. Aqueous concentrations are in ug/L.
3. Sediment concentrations are in ug/kg.
4. All Samples are Downgradient.

CONTRACT NO. CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 7

REV 0

SVOC CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (ug/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L), ROUND 1
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

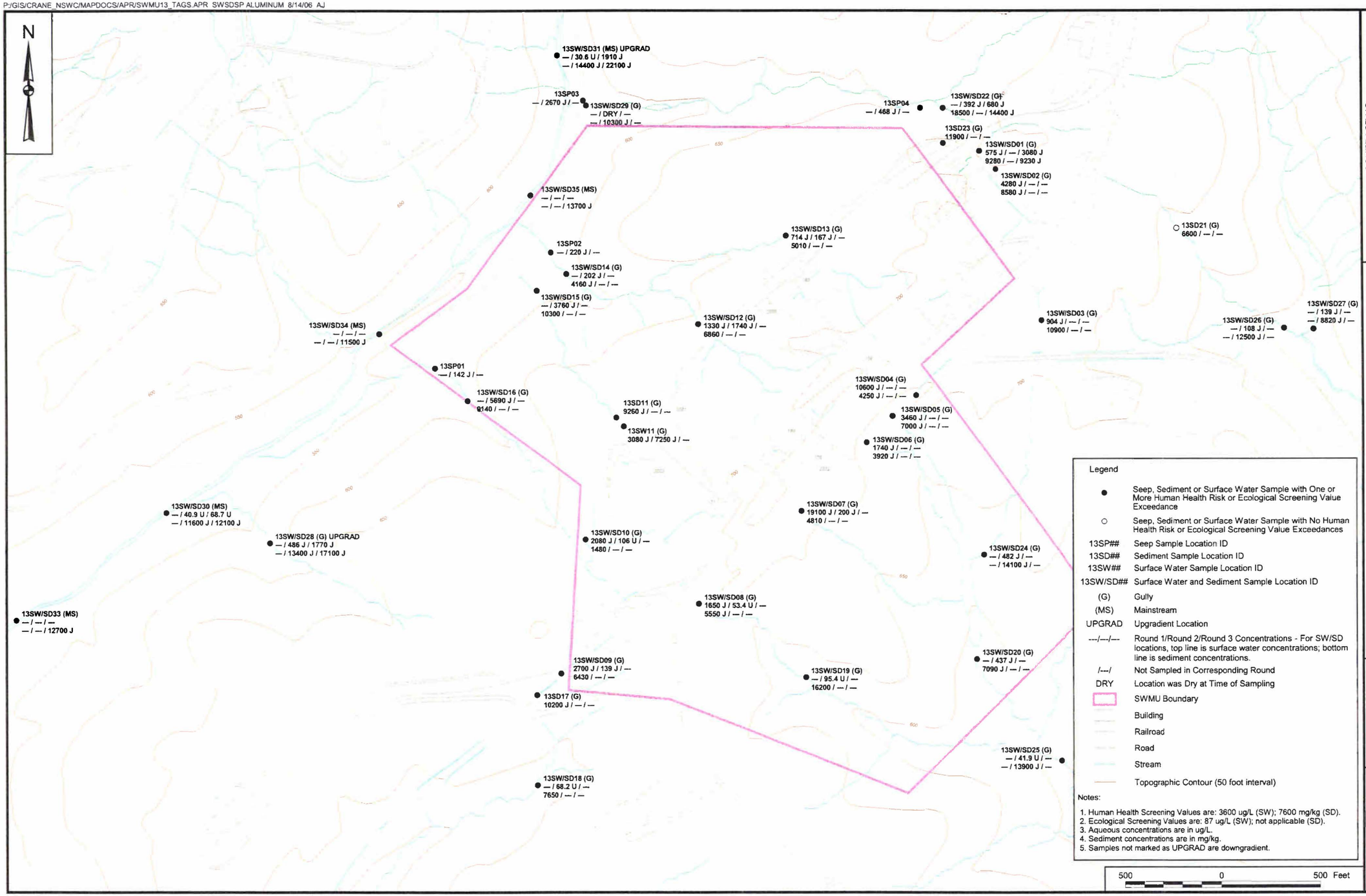
DRAWN BY C. FOSTER DATE 2/21/05

CHECKED BY J. LUCAS DATE 8/14/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP ALUMINUM 8/14/06 AJ



CONTRACT NO. CTO 0343

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 5 - 8

REV 0

ALUMINUM CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

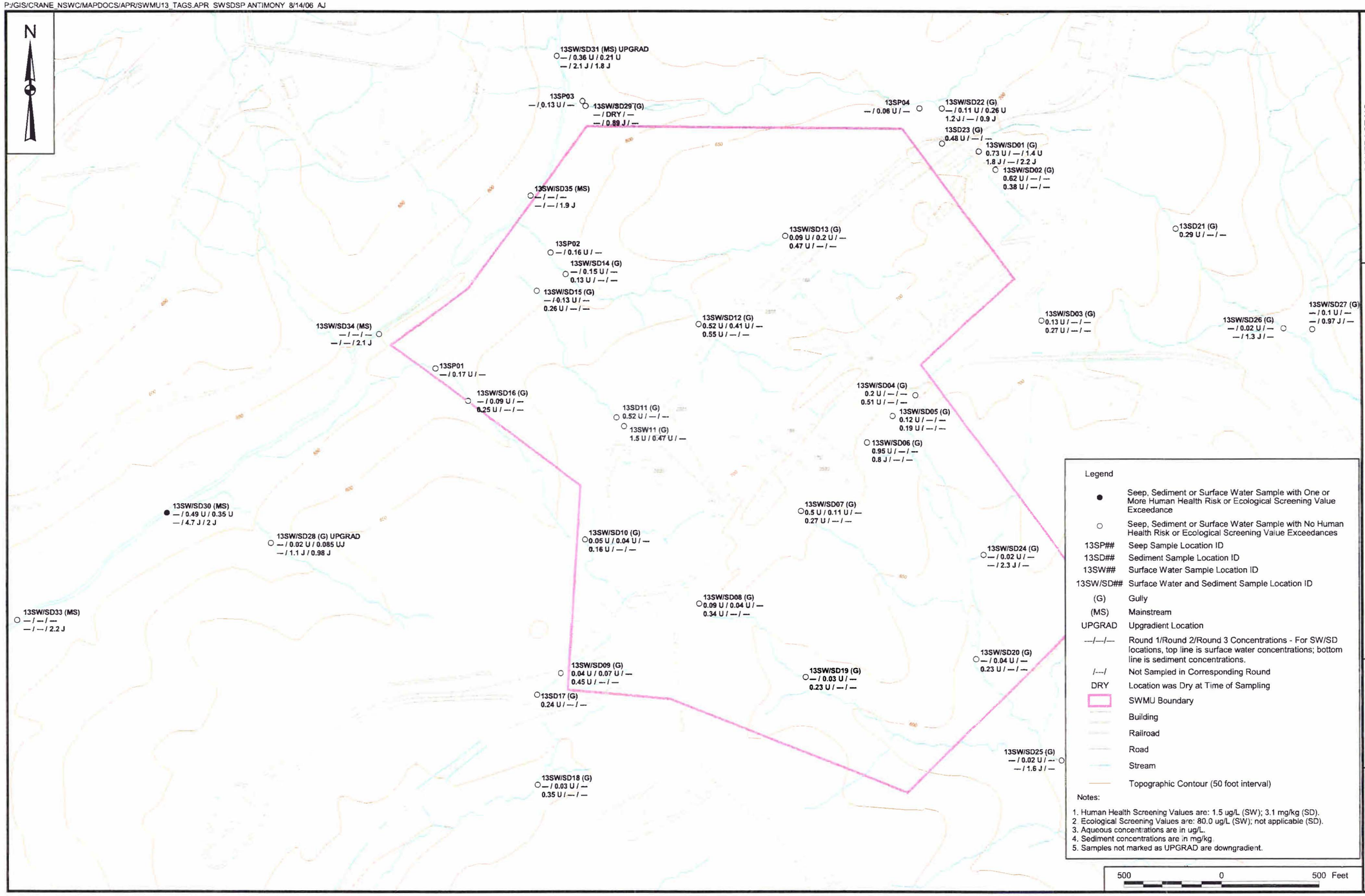
DRAWN BY C. FOSTER DATE 2/18/05

CHECKED BY J. LUCAS DATE 8/14/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP ANTIMONY 8/14/06 AJ

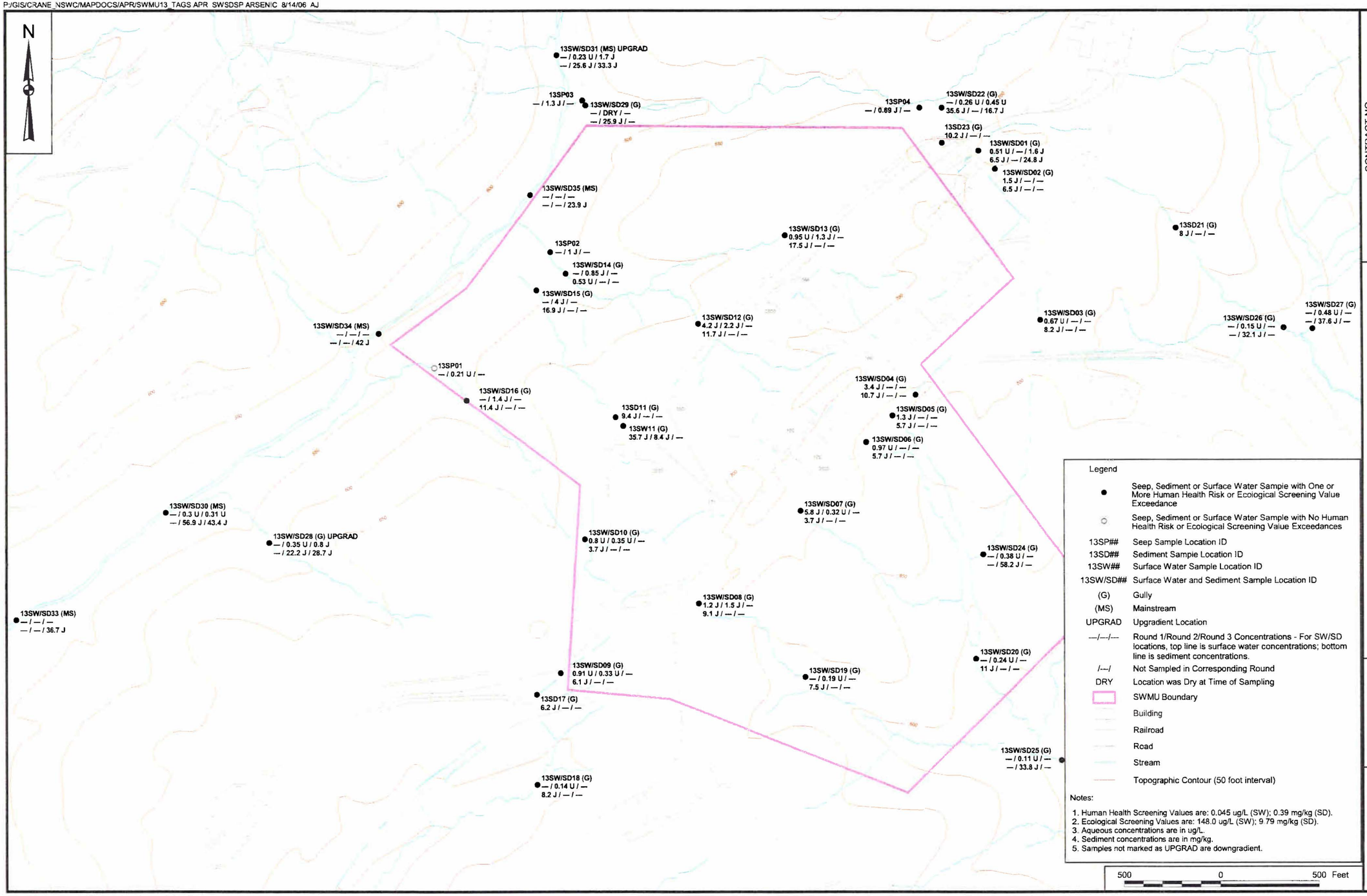


ANTIMONY CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY _____ DATE _____
APPROVED BY _____ DATE _____
DRAWING NO. FIGURE 5 - 9
REV 0

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS APR_SWSDSP ARSENIC 8/14/06 AJ



CONTRACT NO.
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 10

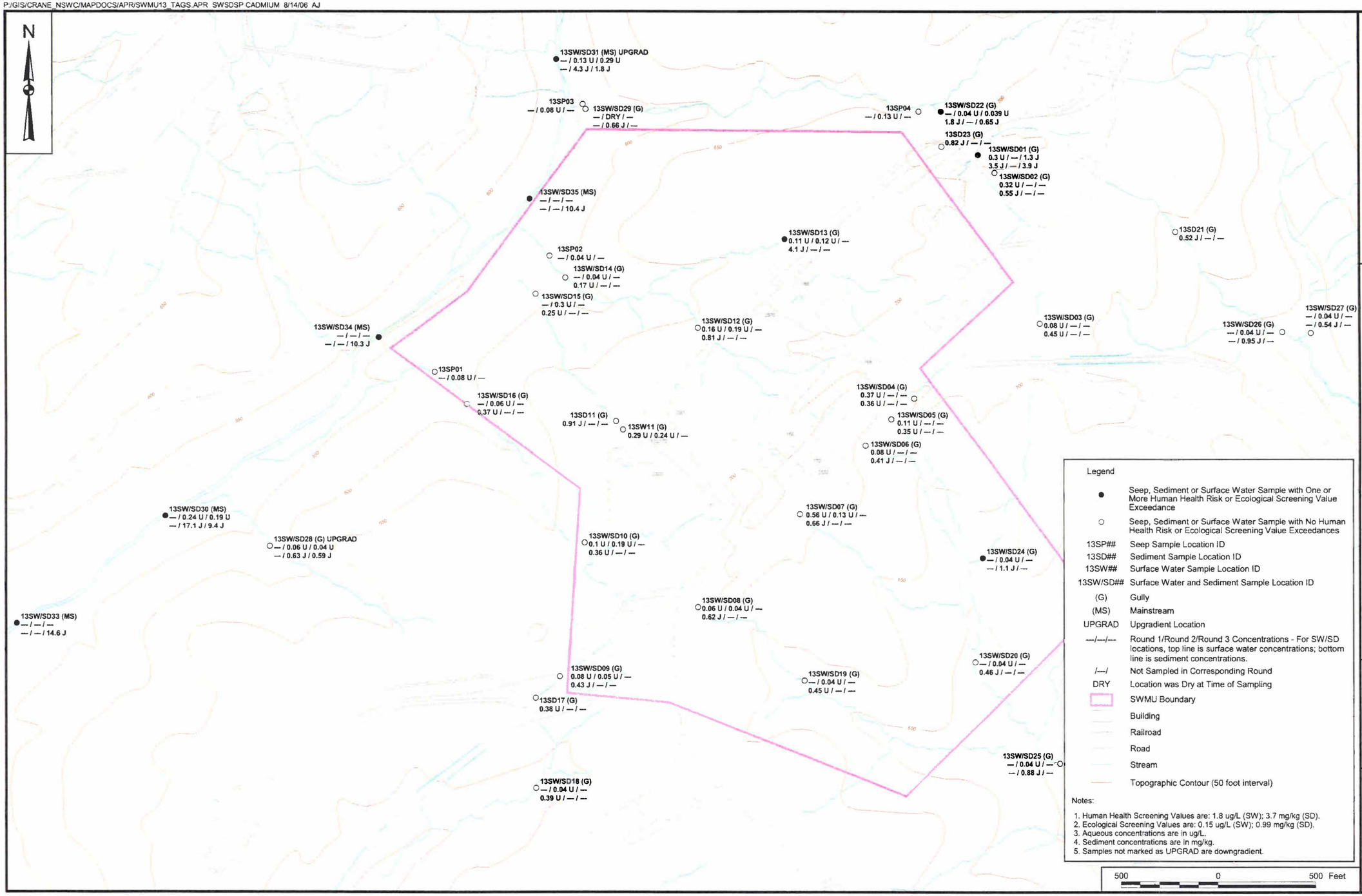
REV 0

ARSENIC CONCENTRATIONS IN SURFACE WATER (ug/L),
SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE	SCALE	
C. FOSTER	2/18/05	AS NOTED	
CHECKED BY	DATE		
J. LUCAS	8/14/06		
COST/SCHED-AREA			

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP CADMIUM 8/14/06 AJ



CONTRACT NO.
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 11

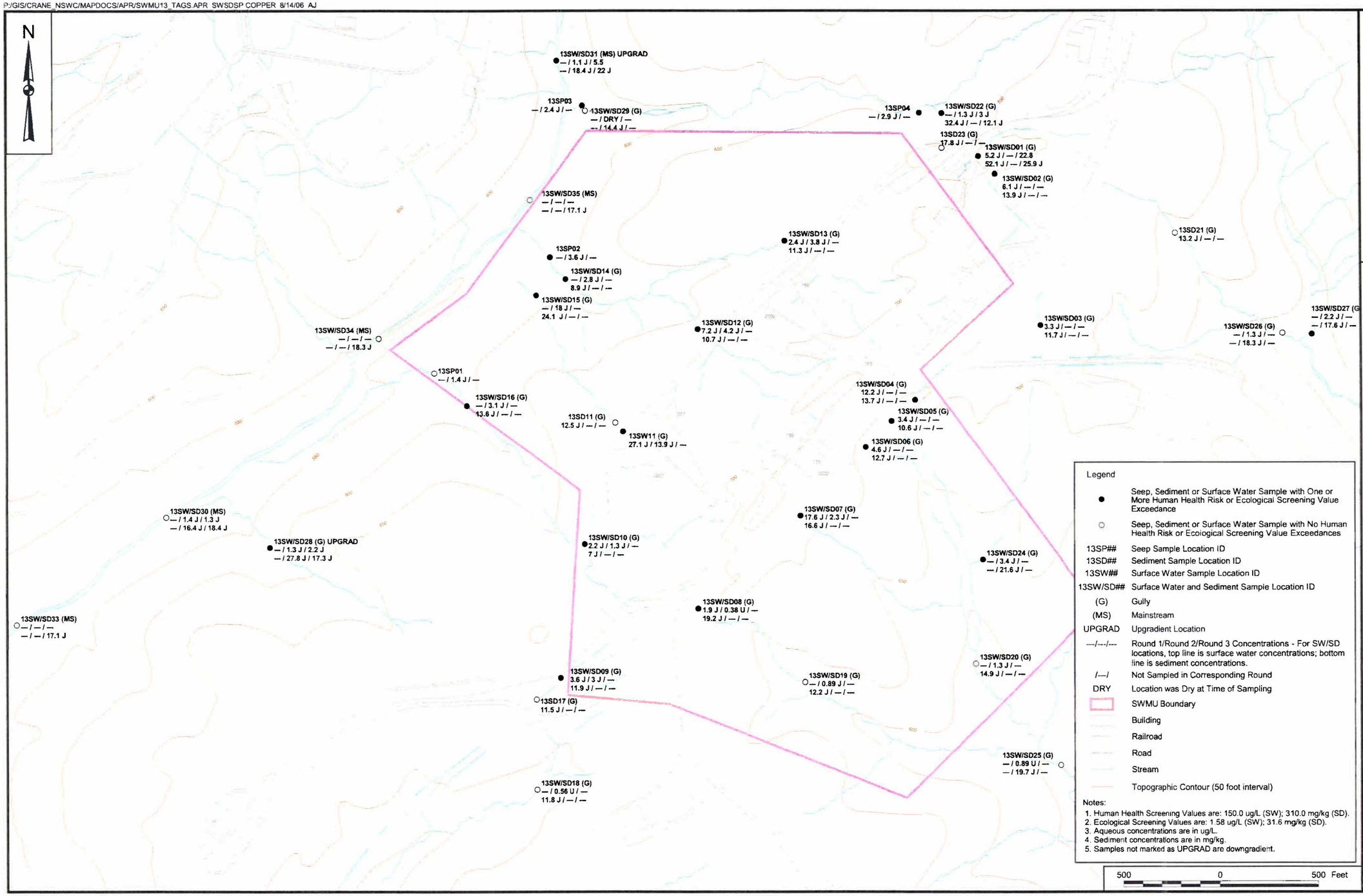
REV 0

CADMIUM CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP COPPER 8/14/06 AJ



COPPER CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY ____ DATE ____
APPROVED BY ____ DATE ____
DRAWING NO. FIGURE 5 - 12
REV 0

NAVFAC

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP IRON 8/14/06 AJ

N

13SW/SD31 (MS) UPGRAD
— / 24.5 U / 2460
— / 121000 J / 120000 J

13SP03
— / 2070 J / —

13SW/SD29 (G)
— / DRY / —
— / 74300 J / —

13SP04
— / 922 J / —

13SW/SD22 (G)
— / 116 U / 767 J
171000 J / — / 41900 J

13SD23 (G)
19900 J / — / —

13SW/SD01 (G)
467 J / — / 3690
21300 J / — / 55500 J

13SW/SD02 (G)
3180 J / — / —
16700 J / — / —

13SW/SD35 (MS)
— / — / —
— / — / 89600 J

13SW/SD13 (G)
673 J / 337 J / —
83600 J / — / —

13SD21 (G)
14900 J / — / —

13SP02
— / 143 U / —

13SW/SD14 (G)
— / 147 U / —
18400 J / — / —

13SW/SD15 (G)
— / 6220 J / —
25900 J / — / —

13SW/SD34 (MS)
— / — / —
— / — / 202000 J

13SW/SD12 (G)
1090 J / 1920 J / —
46300 J / — / —

13SW/SD03 (G)
700 J / — / —
22200 J / — / —

13SW/SD26 (G)
— / 75.4 U / —
— / 135000 J / —

13SW/SD27 (G)
— / 162 U / —
— / 81000 J / —

13SP01
— / 91.4 U / —

13SW/SD16 (G)
— / 3600 J / —
26900 J / — / —

13SD11 (G)
25900 J / — / —

13SW11 (G)
2340 J / 6180 J / —

13SW/SD04 (G)
8940 J / — / —
46100 J / — / —

13SW/SD05 (G)
3060 J / — / —
20800 J / — / —

13SW/SD06 (G)
1380 J / — / —
17500 J / — / —

13SW/SD30 (MS)
— / 175 J / 70.1 U
— / 299000 J / 210000 J

13SW/SD28 (G) UPGRAD
— / 415 J / 1600 J
— / 112000 J / 93700 J

13SW/SD07 (G)
16200 J / 198 J / —
9900 J / — / —

13SW/SD10 (G)
1740 J / 406 J / —
1990 J / — / —

13SW/SD24 (G)
— / 432 J / —
— / 195000 J / —

13SW/SD08 (G)
1140 J / 2750 J / —
26100 J / — / —

13SW/SD33 (MS)
— / — / —
— / — / 243000 J

13SW/SD09 (G)
2350 J / 152 J / —
34800 J / — / —

13SW/SD19 (G)
— / 74.8 U / —
33100 J / — / —

13SW/SD20 (G)
— / 455 J / —
36500 J / — / —

13SD17 (G)
18300 J / — / —

13SW/SD25 (G)
— / 34.7 U / —
— / 121000 J / —

13SW/SD18 (G)
— / 47.8 U / —
24900 J / — / —

Legend

- ● Seep, Sediment or Surface Water Sample with One or More Human Health Risk or Ecological Screening Value Exceedance
- ○ Seep, Sediment or Surface Water Sample with No Human Health Risk or Ecological Screening Value Exceedances
- 13SP## Seep Sample Location ID
- 13SD## Sediment Sample Location ID
- 13SW## Surface Water Sample Location ID
- 13SW/SD## Surface Water and Sediment Sample Location ID
- (G) Gully
- (MS) Mainstream
- UPGRAD Upgradient Location
- ---/---/--- Round 1/Round 2/Round 3 Concentrations - For SW/SD locations, top line is surface water concentrations; bottom line is sediment concentrations.
- /---/ Not Sampled in Corresponding Round
- DRY Location was Dry at Time of Sampling
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Notes:
1. Human Health Screening Values are: 1100 ug/L (SW); 2300 mg/kg (SD).
2. Ecological Screening Values are: 1000 ug/L (SW); not applicable (SD).
3. Aqueous concentrations are in ug/L.
4. Sediment concentrations are in mg/kg.
5. Samples not marked as UPGRAD are downgradient.

500 0 500 Feet

IRON CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY ____ DATE ____
APPROVED BY ____ DATE ____
DRAWING NO. FIGURE 5 - 13
REV 0

NAVFAC

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

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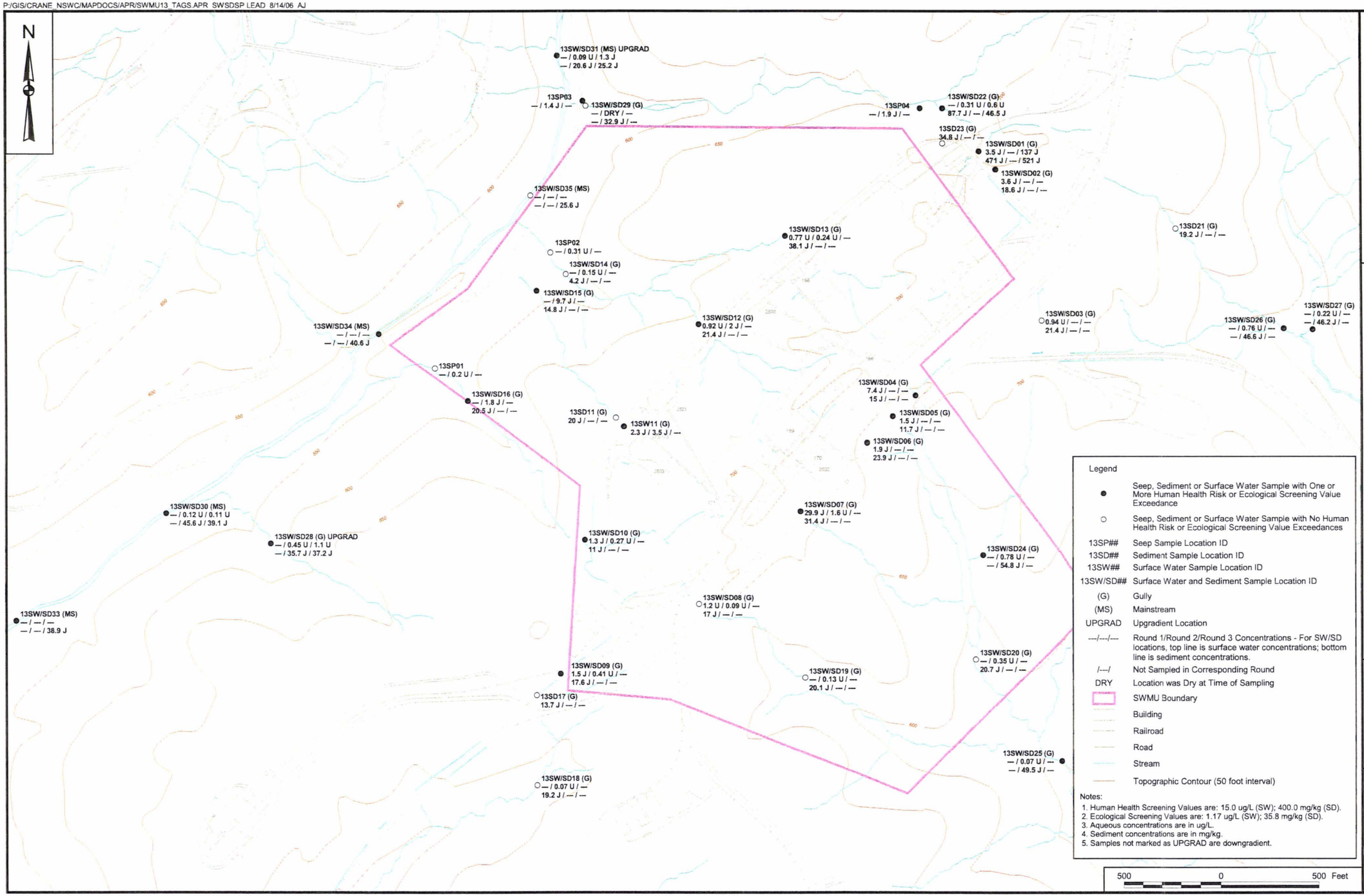


CONTRACT NO.
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 14

REV 0

LEAD CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP MANGANESE 8/14/06 AJ

N

13SW/SD31 (MS) UPGRAD
— / 2 U / 23
— / 1330 J / 1250 J

13SP03
— / 49.1 J / —
13SW/SD29 (G)
— / DRY / —
— / 2700 J / —

13SP04
— / 3910 J / —
13SW/SD22 (G)
— / 136 J / 9.4 U
4580 J / — / 2980 J

13SD23 (G)
4220 J / — / —
13SW/SD01 (G)
8.2 J / — / 63
204 J / — / 249 J
13SW/SD02 (G)
104 J / — / —
641 J / — / —

13SW/SD35 (MS)
— / — / —
— / — / 2610 J

13SW/SD13 (G)
107 J / 170 J / —
1760 J / — / —

13SD21 (G)
1440 J / — / —

13SP02
— / 15.6 J / —
13SW/SD14 (G)
— / 26.1 J / —
65.3 J / — / —
13SW/SD15 (G)
— / 516 J / —
247 J / — / —

13SW/SD34 (MS)
— / — / —
— / — / 1450 J

13SW/SD12 (G)
69.9 J / 292 J / —
6130 J / — / —

13SW/SD03 (G)
71.7 J / — / —
1580 J / — / —

13SW/SD26 (G)
— / 14.2 J / —
— / 3580 J / —

13SW/SD27 (G)
— / 28.1 J / —
— / 3040 J / —

13SP01
— / 5.8 J / —

13SW/SD16 (G)
— / 61.4 J / —
1790 J / — / —

13SW/SD04 (G)
66.8 J / — / —
302 J / — / —

13SD11 (G)
372 J / — / —

13SW11 (G)
126 J / 64 J / —

13SW/SD05 (G)
114 J / — / —
747 J / — / —

13SW/SD06 (G)
89.6 J / — / —
773 J / — / —

13SW/SD30 (MS)
— / 7.9 J / 5.3 U
— / 2140 J / 3960 J

13SW/SD28 (G) UPGRAD
— / 122 J / 60.1 J
— / 3240 J / 2570 J

13SW/SD10 (G)
231 J / 1900 J / —
67.5 J / — / —

13SW/SD07 (G)
195 J / 34.2 J / —
147 J / — / —

13SW/SD24 (G)
— / 111 J / —
— / 2220 J / —

13SW/SD33 (MS)
— / — / —
— / — / 1550 J

13SW/SD08 (G)
118 J / 3190 J / —
591 J / — / —

13SW/SD20 (G)
— / 41.4 J / —
819 J / — / —

13SW/SD09 (G)
25 J / 10.6 J / —
284 J / — / —

13SW/SD19 (G)
— / 26 J / —
2960 J / — / —

13SD17 (G)
724 J / — / —

13SW/SD25 (G)
— / 7.5 J / —
— / 4000 J / —

13SW/SD18 (G)
— / 19.5 J / —
1290 J / — / —

Legend

- Seep, Sediment or Surface Water Sample with One or More Human Health Risk or Ecological Screening Value Exceedance
- Seep, Sediment or Surface Water Sample with No Human Health Risk or Ecological Screening Value Exceedances
- 13SP## Seep Sample Location ID
- 13SD## Sediment Sample Location ID
- 13SW## Surface Water Sample Location ID
- 13SW/SD## Surface Water and Sediment Sample Location ID
- (G) Gully
- (MS) Mainstream
- UPGRAD Upgradient Location
- ---/---/--- Round 1/Round 2/Round 3 Concentrations - For SW/SD locations, top line is surface water concentrations; bottom line is sediment concentrations.
- /---/ Not Sampled in Corresponding Round
- DRY Location was Dry at Time of Sampling
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Notes:
1. Human Health Screening Values are: 88.0 ug/L (SW); 180.0 mg/kg (SD).
2. Ecological Screening Values are: not applicable (SW); not applicable (SD).
3. Aqueous concentrations are in ug/L.
4. Sediment concentrations are in mg/kg.
5. Samples not marked as UPGRAD are downgradient.

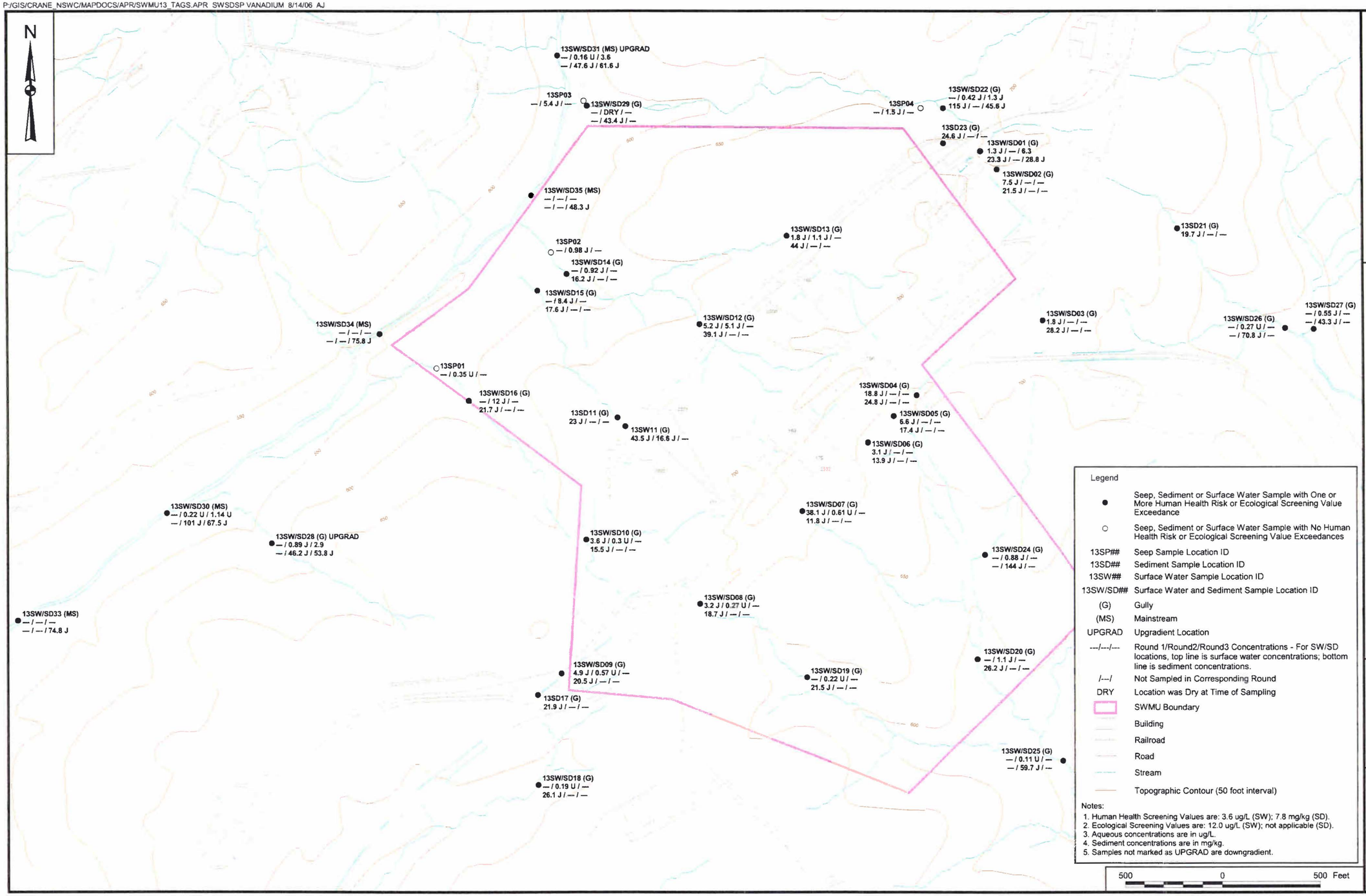
500 0 500 Feet

MANGANESE CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5 - 15
REV 0

DRAWN BY C. FOSTER DATE 2/18/05
CHECKED BY J. LUCAS DATE 8/14/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR SWSDSP VANADIUM 8/14/06 AJ



CONTRACT NO
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 16

REV 0

VANADIUM CONCENTRATIONS IN SURFACE WATER (ug/L), SEDIMENT (mg/kg) FOR GULLIES, MAINSTREAM AND SEEPS (ug/L)
ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

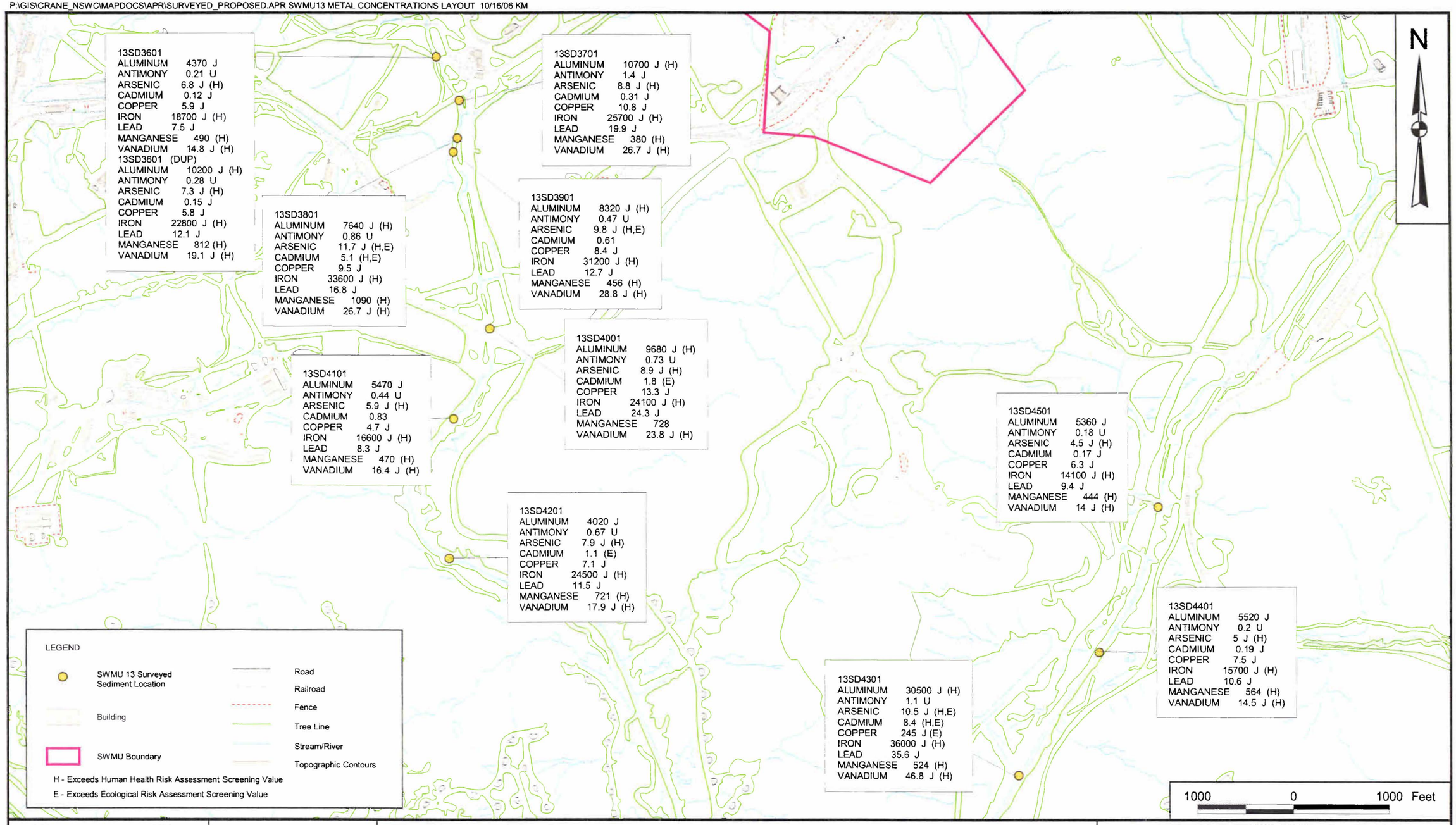
NAVFAC

DRAWN BY	DATE
C. FOSTER	2/18/05
CHECKED BY	DATE
J. LUCAS	8/14/06

COST/SCHED-AREA

SCALE
AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SURVEYED_PROPOSED.APR SWMU13 METAL CONCENTRATIONS LAYOUT 10/16/06 KM



DRAWN BY	DATE
K. MOORE	9/22/06
CHECKED BY	DATE
J. LUCAS	10/16/06
COST/SCHEDULE-AREA	
SCALE	AS NOTED

NAVFAC

METAL CONCENTRATIONS IN SEDIMENT (mg/kg) FOR ADDITIONAL
METAL DELINEATION/TOXICITY TESTING SAMPLES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO 0343
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	Figure 5-17
REV	0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SWMU 13 GROUNDWATER TAG LAYOUT 10/16/06 SS

N

0325
0393
0161
2171
2172
0165
0168
2502
2500
0166
2501
2167
0169
0170
2532
2503
0171
0172/0173
0174
2710

13TW003
RDX 160

13TW001
RDX 190

13TW002
RDX 10 J

13TW011
RDX 7.3

13TW004
RDX 1200

13TW005
RDX 100

13TW010
RDX 240

13TW006
RDX 120 J

13TW007
RDX 1.4 J

13TW009
RDX 120 J

13TW008
RDX 3.8 J

13TW012
RDX 150

Legend

- Monitoring Well
- Building
- SWMU Boundary
- Road
- Road
- Treeline
- Stream/River/Wetland
- Topographic Contours

Human health risk screening value is 0.61 ug/L.

Ecological risk screening values do not apply.

400 0 400 Feet

RDX CONCENTRATIONS IN GROUNDWATER
FROM SOIL OVERBURDEN TEMPORARY WELLS (ug/L)
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO.
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 18

REV 0

NAVFAC

DRAWN BY S. STROZ DATE 7/28/06

CHECKED BY J. LUCAS DATE 10/16/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR RDX_ORG 10/16/06 SS

N

13MWT07 (Puz)

	R-1	R-2	R-3
RDX	7.2 (H)	7.9 (H)	9.3 (H)
DNX	---	0.255 U	---
MNX	---	0.255 U	---
TNX	---	0.255 U	---

13MWT16 (Puz)

	R-1	R-2	R-3
RDX	10 (H)	16 (H)	18 (H)
DNX	---	5.8 J	---
MNX	---	3.6 J	---
TNX	---	0.31 J	---

13MWT43 (Puz)

	R-2	R-3
RDX	0.72 J (H)	0.27 U
DNX	0.24 U	---
MNX	0.24 U	---
TNX	0.24 U	---

13MWT05 (Puz)

	R-1	R-2	R-3
RDX	0.77 J (H)	1.4 (H)	0.85 (H)
DNX	---	0.31 J	---
MNX	---	0.263 U	---
TNX	---	0.263 U	---

13MWT02 (Puz)

	R-1	R-2	R-3
RDX	0.465 U	0.278 U	0.26 U
DNX	---	0.278 U	---
MNX	---	0.278 U	---
TNX	---	0.278 U	---

13MWT42 (Puz)

	R-2	R-3
RDX	41 (H)	140 J (H)
DNX	0.26 U	---
MNX	0.32 J	---
TNX	0.26 U	---

13MWT12 (Puz)

	R-1	R-2	R-3
RDX	150 (H)	140 (H)	160 (H)
DNX	---	0.5 J	---
MNX	---	0.68	---
TNX	---	0.26 U	---

13MWT04 (Puz)

	R-1	R-2	R-3
RDX	4.1 (H)	3.4 (H)	3.1 (H)
DNX	---	0.281 U	---
MNX	---	0.281 U	---
TNX	---	0.281 U	---

13MWT01 (Puz)

	R-1	R-2	R-3
RDX	0.44 U	0.35 J	0.3 J
DNX	---	0.263 U	---
MNX	---	0.263 U	---
TNX	---	0.263 U	---

13MWT17 (Puz)

	R-1	R-2	R-3
RDX	430 (H)	580 (H)	490 (H)
DNX	---	2.2 J	---
MNX	---	11	---
TNX	---	1.2	---

13MWT11 (Puz)

	R-1	R-2	R-3
RDX	560 (H)	520 (H)	490 (H)
DNX	---	0.258 U	---
MNX	---	1.2	---
TNX	---	0.258 U	---

13MWT08 (Puz)

	R-1	R-2	R-3
RDX	0.325 U	0.61 J	0.25 U
DNX	---	0.25 U	---
MNX	---	0.25 U	---
TNX	---	0.25 U	---

13MWT51 (V)

	R-3
RDX	250 (H)
DNX	---
MNX	---
TNX	---

13MWT03 (Puz)

	R-1	R-2	R-3
RDX	0.25 U	0.3 J	0.33 J
DNX	---	0.255 U	---
MNX	---	0.255 U	---
TNX	---	0.255 U	---

13MWT50 (V)

	R-3
RDX	0.27 U
DNX	---
MNX	---
TNX	---

13MWT10 (Puz)

	R-1	R-2	R-3
RDX	0.25 U	0.266 U	0.27 U
DNX	---	0.266 U	---
MNX	---	0.266 U	---
TNX	---	0.266 U	---

13MWT06 (Puz)

	R-1	R-2	R-3
RDX	2 (H)	1.7 (H)	1.9 J (H)
DNX	---	0.272 U	---
MNX	---	0.272 U	---
TNX	---	0.272 U	---

13MWT49 (V)

	R-3
RDX	32 (H)
DNX	---
MNX	---
TNX	---

13MWT39 (Puz)

	R-2	R-3
RDX	180 (H)	190 (H)
DNX	43 J	---
MNX	7.7	---
TNX	2.4	---

13MWT27 (Puz)

	R-2	R-3
RDX	32 (H)	74 (H)
DNX	0.253 U	---
MNX	0.253 U	---
TNX	0.253 U	---

13MWT09 (Puz)

	R-1	R-2	R-3
RDX	1100 (H)	1700 (H)	1500 (H)
DNX	---	4 J	---
MNX	---	7.1 J	---
TNX	---	1.5 J	---

13MWT48 (V)

	R-3
RDX	0.54 U
DNX	---
MNX	---
TNX	---

13MWT40 (Puz)

	R-2	R-3
RDX	140 (H)	230 (H)
DNX	0.9 J	---
MNX	3.3	---
TNX	0.26 U	---

13MWT15 (Puz)

	R-1	R-2	R-3
RDX	0.46 U	0.258 U	0.25 U
DNX	---	0.258 U	---
MNX	---	0.258 U	---
TNX	---	0.258 U	---

13MWT29 (Puz)

	R-2	R-3
RDX	3.8 (H)	10 (H)
DNX	0.25 U	---
MNX	0.25 U	---
TNX	0.25 U	---

13MWT18 (Puz)

	R-1	R-2	R-3
RDX	150 (H)	240 (H)	390 (H)
DNX	---	0.301 U	---
MNX	---	2.9	---
TNX	---	0.301 U	---

13MWT13 (Puz)

	R-1	R-2	R-3
RDX	12 (H)	20 (H)	17 (H)
DNX	---	0.258 U	---
MNX	---	0.258 U	---
TNX	---	0.258 U	---

13MWT37 (Puz)

	R-2	R-3
RDX	650 (H)	2100 (H)
DNX	1.5 J	---
MNX	5.2	---
TNX	0.73	---

13MWT20 (Puz)

	R-1	R-2	R-3
RDX	0.35 U	0.266 U	0.26 U
DNX	---	0.266 U	---
MNX	---	0.266 U	---
TNX	---	0.266 U	---

13MWT30 (Puz)

	R-2	R-3
RDX	1.1 J (H)	4 (H)
DNX	0.243 U	---
MNX	0.243 U	---
TNX	0.243 U	---

13MWT47 (Puz)

	R-2	R-3
RDX	0.26 U	0.24 U
DNX	0.26 U	---
MNX	0.26 U	---
TNX	0.26 U	---

13MWT21 (Puz)

	R-1	R-2	R-3
RDX	2700 (H)	7700 (H)	4000 (H)
DNX	---	50 J	---
MNX	---	9.3 J	---
TNX	---	1.4 J	---

13MWT34 (Puz)

	R-2	R-3
RDX	460 (H)	400 (H)
DNX	1	---
MNX	4.5	---
TNX	0.25 U	---

13MWT36 (Puz)

	R-2	R-3
RDX	0.27 J	6.1 (H)
DNX	0.269 U	---
MNX	0.269 U	---
TNX	0.269 UJ	---

13MWT14 (Puz)

	R-1	R-2	R-3
RDX	1.6 (H)	4.7 (H)	2 (H)
DNX	---	0.25 U	---
MNX	---	0.25 U	---
TNX	---	0.25 U	---

13MWT33 (Puz)

	R-2	R-3
RDX	4.3 (H)	4.2 (H)
DNX	0.25 U	---
MNX	0.25 U	---
TNX	0.25 U	---

13MWT22 (Puz)

	R-1	R-2	R-3
RDX	20 (H)	26 (H)	26 (H)
DNX	---	0.266 U	---
MNX	---	0.266 U	---
TNX	---	0.266 U	---

13MWT19 (Puz)

	R-1	R-2	R-3
RDX	5.9 (H)	5.4 (H)	5.9 (H)
DNX	---	0.26 U	---
MNX	---	0.26 U	---
TNX	---	0.26 U	---

13MWT25 (Puz)

	R-1	R-2	R-3
RDX	0.4	1.2 J (H)	1.6 (H)
DNX	---	0.25 U	---
MNX	---	0.25 U	---
TNX	---	0.25 U	---

13MWT23 (Puz)

	R-1	R-2	R-3
RDX	17 (H)	21 (H)	17 (H)
DNX	---	0.26 U	---
MNX	---	0.26 U	---
TNX	---	0.26 U	---

13MWT31 (Puz)

	R-2	R-3
RDX	9.3 (H)	22 (H)
DNX	0.291 U	---
MNX	0.291 U	---
TNX	0.291 U	---

13MWT26 (Puz)

	R-1	R-2	R-3
RDX	0.4 J	0.53 J	0.38 J
DNX	---	0.269 U	---
MNX	---	0.269 U	---
TNX	---	0.269 U	---

13MWT24 (Puz)

	R-1	R-2	R-3
RDX	7.3 (H)	9 (H)	8.7 (H)
DNX	---	0.24 U	---
MNX	---	0.35 J	---
TNX	---	0.24 U	---

13MWT32 (Puz)

	R-2	R-3
RDX	2.7 J (H)	2.3 (H)
DNX	0.266 U	---
MNX	0.266 U	---
TNX	0.266 U	---

Legend

- Monitoring Well
- 13MWT25 — Sample Location ID
- (Puz) — Pennsylvanian Upper Zone Well
- (V) — Valley Zone Well
- (H) — Exceeds Human Health Risk Screening Value
- R-# — Sample Round
- — — Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:

1. Human Health Screening Value is 0.61 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

400 0 400 Feet

RDX CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY ___ DATE ___
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DRAWING NO. FIGURE 5 - 19
REV 0

DRAWN BY C. FOSTER DATE 2/16/05
CHECKED BY J. LUCAS DATE 10/16/06
COST/SCHED-AREA
SCALE AS NOTED

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N

13MWT05 (Puz)

	R-1	R-2	R-3
TNT	0.155 U	0.263 UJ	0.26 U
2ADNT	0.155 U	0.263 UJ	0.26 U
4ADNT	0.155 U	0.263 U	0.26 U

13MWT02 (Puz)

	R-1	R-2	R-3
TNT	0.495 U	0.278 U	0.26 U
2ADNT	0.495 U	0.278 U	0.26 U
4ADNT	0.495 U	0.278 U	0.26 U

13MWT43 (Puz)

	R-2	R-3
TNT	0.24 U	0.27 U
2ADNT	0.24 U	0.27 U
4ADNT	0.24 U	0.27 U

13MWT07 (Puz)

	R-1	R-2	R-3
TNT	0.6 U	0.255 UJ	0.26 U
2ADNT	0.6 U	0.255 UJ	0.26 U
4ADNT	0.6 U	0.255 U	0.26 U

13MWT04 (Puz)

	R-1	R-2	R-3
TNT	0.26 U	0.281 U	0.27 U
2ADNT	0.26 U	0.281 U	0.27 U
4ADNT	0.26 U	0.281 U	0.27 U

13MWT11 (Puz)

	R-1	R-2	R-3
TNT	31 (H)	9.5 (H)	11 (H)
2ADNT	6 J (H)	4.4 J (H)	6.6 J (H)
4ADNT	19 (H)	9.8 (H)	14 (H)

13MWT01 (Puz)

	R-1	R-2	R-3
TNT	0.47 U	0.263 U	0.25 U
2ADNT	0.47 U	0.263 U	0.25 U
4ADNT	0.47 U	0.263 U	0.25 U

13MWT12 (Puz)

	R-1	R-2	R-3
TNT	1.8	1.6	2.2 (H)
2ADNT	3.7 J (H)	3.1 J (H)	4.4 J (H)
4ADNT	5.8 J (H)	4.8 (H)	6.7 (H)

13MWT08 (Puz)

	R-1	R-2	R-3
TNT	0.345 U	0.25 U	0.25 U
2ADNT	0.345 U	0.25 U	0.25 U
4ADNT	0.345 U	0.25 U	0.25 U

13MWT51 (V)

	R-3
TNT	0.27 U
2ADNT	0.39 J
4ADNT	0.27 U

13MWT16 (Puz)

	R-1	R-2	R-3
TNT	0.11 U	0.144 U	0.27 U
2ADNT	0.11 U	0.144 U	0.27 U
4ADNT	0.12 J	0.144 U	0.27 U

13MWT03 (Puz)

	R-1	R-2	R-3
TNT	0.265 U	0.255 U	0.26 U
2ADNT	0.265 U	0.255 U	0.26 U
4ADNT	0.265 U	0.255 U	0.26 U

13MWT50 (V)

	R-3
TNT	0.27 U
2ADNT	0.27 U
4ADNT	0.27 U

13MWT10 (Puz)

	R-1	R-2	R-3
TNT	0.265 U	0.266 U	0.27 U
2ADNT	0.265 U	0.266 U	0.27 U
4ADNT	0.265 U	0.266 U	0.27 U

13MWT42 (Puz)

	R-2	R-3
TNT	0.04 UJ	0.28 UJ
2ADNT	0.04 U	0.28 UJ
4ADNT	0.04 U	0.28 UJ

13MWT06 (Puz)

	R-1	R-2	R-3
TNT	0.19 U	0.272 U	0.26 UJ
2ADNT	0.19 U	0.272 U	0.26 UJ
4ADNT	0.19 U	0.272 U	0.26 UJ

13MWT49 (V)

	R-3
TNT	0.27 U
2ADNT	0.27 U
4ADNT	0.62

13MWT39 (Puz)

	R-2	R-3
TNT	0.04 UJ	0.27 U
2ADNT	0.42 J	0.28 J
4ADNT	0.56 J	0.5 J

13MWT27 (Puz)

	R-2	R-3
TNT	0.253 U	0.27 U
2ADNT	0.253 U	0.27 U
4ADNT	0.253 U	0.27 U

13MWT09 (Puz)

	R-1	R-2	R-3
TNT	19 (H)	25 (H)	24 (H)
2ADNT	8.6 J (H)	13 (H)	15 J (H)
4ADNT	18 (H)	18 (H)	19 (H)

13MWT29 (Puz)

	R-2	R-3
TNT	0.039 UJ	0.26 U
2ADNT	0.039 U	0.26 U
4ADNT	0.039 U	0.26 U

13MWT48 (V)

	R-3
TNT	0.275 U
2ADNT	0.275 U
4ADNT	0.275 U

13MWT17 (Puz)

	R-1	R-2	R-3
TNT	0.43 U	0.25 UJ	0.25 U
2ADNT	0.43 U	0.28 J	0.37 J
4ADNT	0.6 J	0.71	0.84 (H)

13MWT13 (Puz)

	R-1	R-2	R-3
TNT	0.37 U	0.258 U	0.24 U
2ADNT	0.37 U	0.258 U	0.24 U
4ADNT	0.37 U	0.258 U	0.24 U

13MWT40 (Puz)

	R-2	R-3
TNT	0.04 UJ	0.25 U
2ADNT	0.04 U	0.25 U
4ADNT	0.52 J	1.1 (H)

13MWT15 (Puz)

	R-1	R-2	R-3
TNT	0.485 U	0.258 U	0.25 U
2ADNT	0.485 U	0.258 U	0.25 U
4ADNT	0.485 U	0.258 U	0.25 U

13MWT47 (Puz)

	R-2	R-3
TNT	0.26 U	0.24 U
2ADNT	0.26 U	0.24 U
4ADNT	0.26 U	0.24 U

13MWT37 (Puz)

	R-2	R-3
TNT	0.04 UJ	0.24 U
2ADNT	0.04 U	0.24 U
4ADNT	0.04 U	0.5

13MWT18 (Puz)

	R-1	R-2	R-3
TNT	0.08 U	0.301 U	0.27 U
2ADNT	0.08 U	0.301 U	0.27 U
4ADNT	0.08 U	0.301 U	0.27 U

13MWT30 (Puz)

	R-2	R-3
TNT	0.243 U	0.26 U
2ADNT	0.243 U	0.26 U
4ADNT	0.243 U	0.26 U

13MWT21 (Puz)

	R-1	R-2	R-3
TNT	25 J (H)	69 J (H)	26 (H)
2ADNT	0.28 U	0.24 UJ	3.8 J (H)
4ADNT	0.28 U	0.24 U	2.9 J (H)

13MWT34 (Puz)

	R-2	R-3
TNT	0.25 U	0.24 U
2ADNT	0.25 U	0.24 U
4ADNT	0.29 J	0.26 J

13MWT14 (Puz)

	R-1	R-2	R-3
TNT	0.345 U	0.25 U	0.25 U
2ADNT	0.345 U	0.25 U	0.25 U
4ADNT	0.345 U	0.25 U	0.25 U

13MWT36 (Puz)

	R-2	R-3
TNT	0.269 U	0.27 U
2ADNT	0.269 U	0.27 U
4ADNT	0.269 U	0.27 U

13MWT20 (Puz)

	R-1	R-2	R-3
TNT	0.37 U	0.266 U	0.26 U
2ADNT	0.37 U	0.266 U	0.26 U
4ADNT	0.37 U	0.266 U	0.26 U

13MWT19 (Puz)

	R-1	R-2	R-3
TNT	0.55 U	0.26 U	0.26 U
2ADNT	0.55 U	0.26 U	0.26 U
4ADNT	0.55 U	0.26 U	0.26 U

13MWT22 (Puz)

	R-1	R-2	R-3
TNT	0.395 U	0.266 U	0.27 U
2ADNT	0.395 U	0.266 U	0.27 U
4ADNT	0.395 U	0.266 U	0.27 U

13MWT33 (Puz)

	R-2	R-3
TNT	0.25 U	0.29 U
2ADNT	0.25 U	0.29 U
4ADNT	0.25 U	0.29 U

13MWT23 (Puz)

	R-1	R-2	R-3
TNT	0.5 U	0.26 U	0.26 U
2ADNT	0.5 U	0.26 U	0.26 U
4ADNT	0.5 U	0.26 U	0.26 U

13MWT25 (Puz)

	R-1	R-2	R-3
TNT	0.145 U	0.25 UJ	0.27 U
2ADNT	0.145 U	0.25 UJ	0.27 U
4ADNT	0.145 U	0.25 U	0.27 U

13MWT31 (Puz)

	R-2	R-3
TNT	0.291 U	0.27 U
2ADNT	0.291 U	0.27 U
4ADNT	0.291 U	0.27 U

13MWT26 (Puz)

	R-1	R-2	R-3
TNT	0.19 U	0.269 U	0.26 U
2ADNT	0.19 U	0.269 U	0.26 U
4ADNT	0.19 U	0.269 U	0.26 U

13MWT32 (Puz)

	R-2	R-3
TNT	0.266 U	0.24 U
2ADNT	0.266 U	0.24 U
4ADNT	0.266 U	0.24 U

13MWT24 (Puz)

	R-1	R-2	R-3
TNT	0.65 U	0.24 U	0.27 U
2ADNT	0.65 U	0.24 U	0.27 U
4ADNT	0.65 U	0.24 U	0.27 U

Legend

- Monitoring Well
- 13MWT25 Sample Location ID
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- (H) Exceeds Human Health Risk Screening Value
- R-# Sample Round
- — Not Analyzed in Corresponding Round
- SWMU Boundary
- Buiiding
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:
1. Human Health Screening Value for TNT is 1.8 ug/L.
2. Human Health Screening Value for 2ADNT is 0.73 ug/L.
3. Human Health Screening Value for 4ADNT is 0.73 ug/L.
4. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

400 0 400 Feet

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DRAWING NO. FIGURE 5 - 20

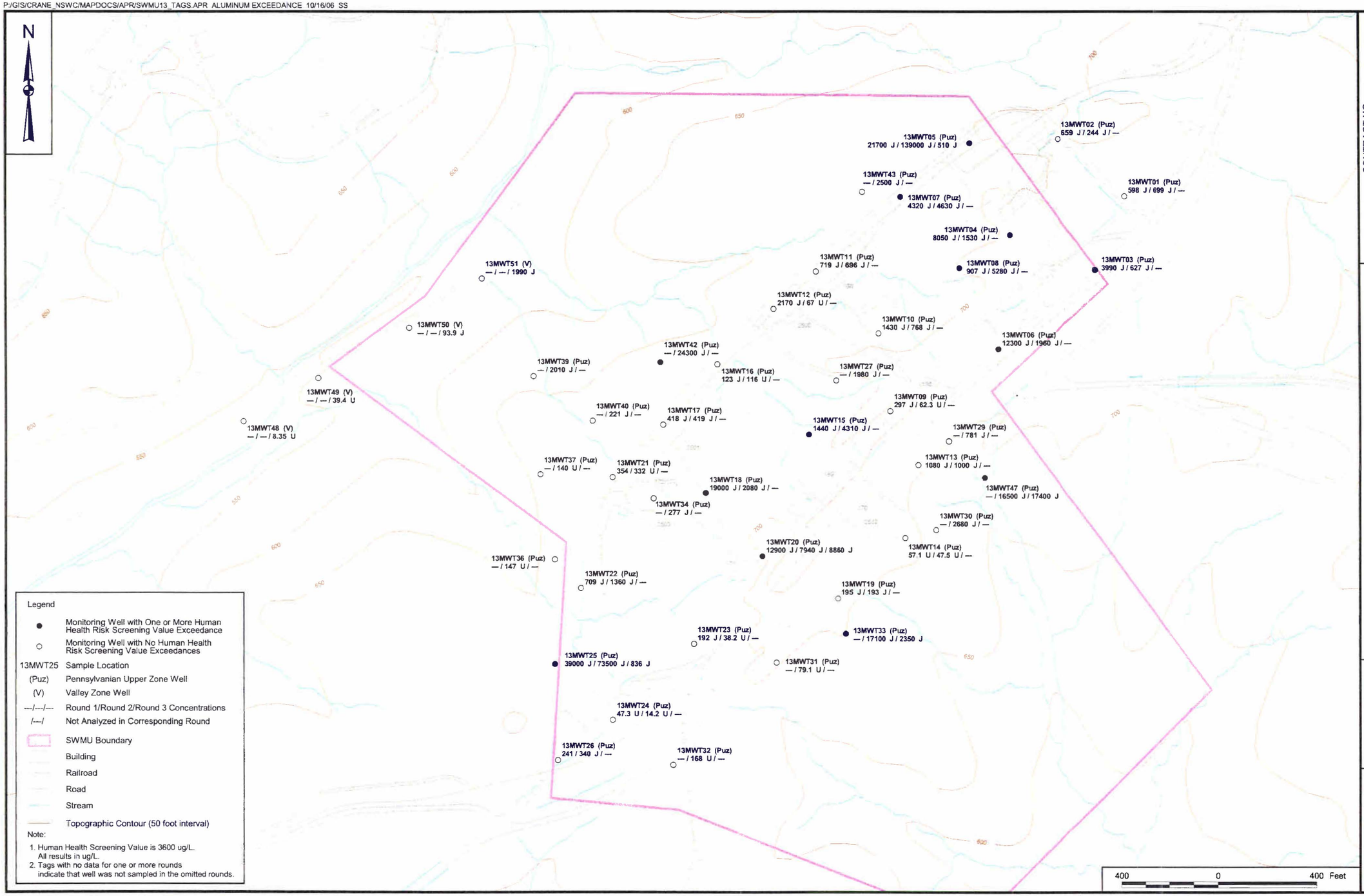
REV 0

2,4,6-TRINITROTOLUENE (TNT) CONCENTRATIONS (ug/L)
IN GROUNDWATER
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 2/16/05
CHECKED BY J. LUCAS DATE 10/16/06
COST/SCHED-AREA
SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR ALUMINUM EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- ---/---/--- Round 1/Round 2/Round 3 Concentrations
- /---/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:

1. Human Health Screening Value is 3600 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO.
CTO 0343

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APPROVED BY _____ DATE _____

DRAWING NO. FIGURE 5 - 21

REV 0

ALUMINUM CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

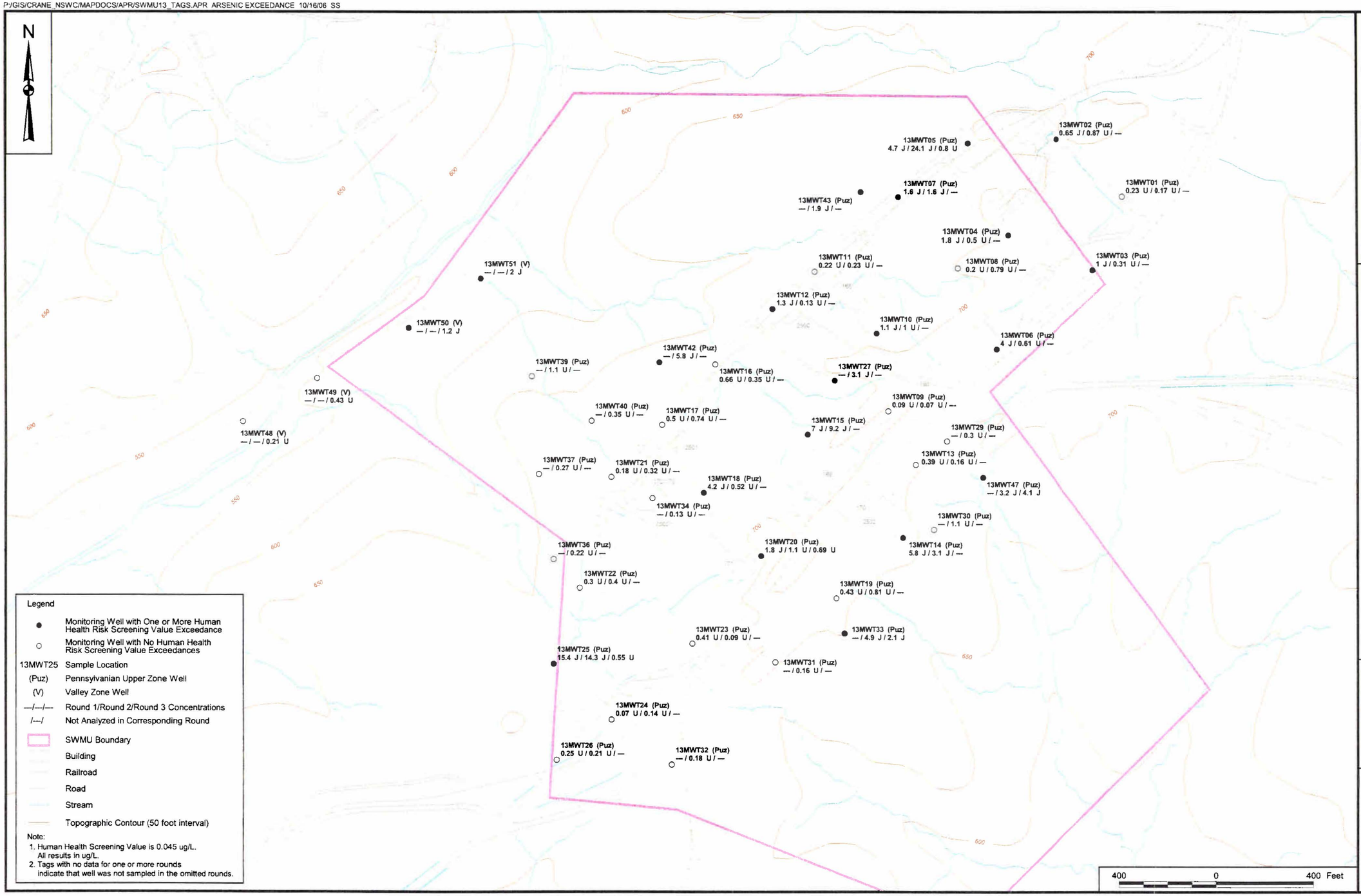
NAVFAC

DRAWN BY	DATE
C. FOSTER	2/16/05
CHECKED BY	DATE
J. LUCAS	10/16/06

COST/SCHED-AREA

SCALE
AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR ARSENIC EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- —/—/— Round 1/Round 2/Round 3 Concentrations
- /—/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:
1. Human Health Screening Value is 0.045 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. CTO 0343

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APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 22

REV 0

ARSENIC CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

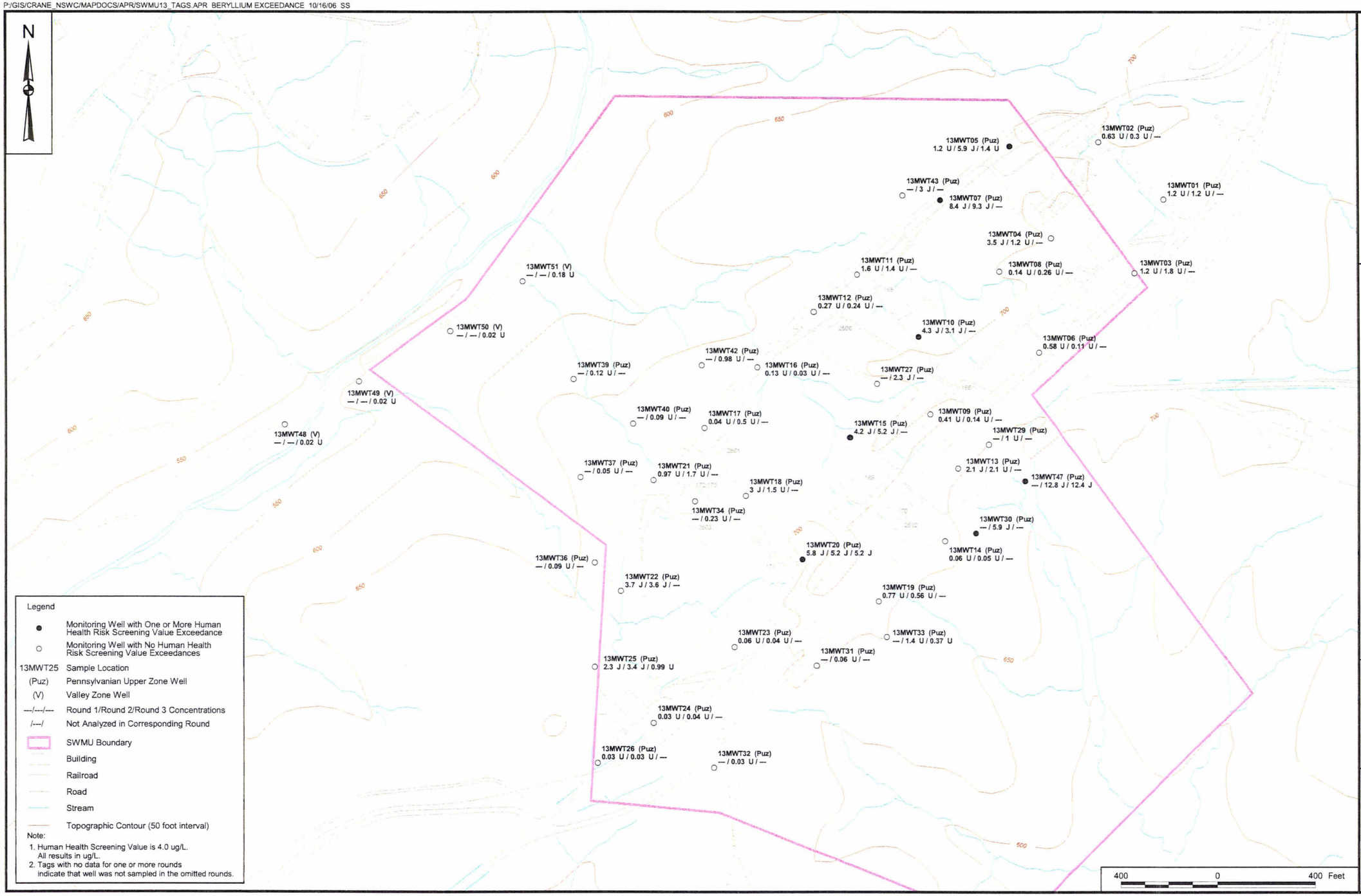
DRAWN BY A. JANOCHA DATE 2/15/05

CHECKED BY J. LUCAS DATE 10/16/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR BERYLLIUM EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- —/—/— Round 1/Round 2/Round 3 Concentrations
- /—/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:
1. Human Health Screening Value is 4.0 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. CTO 0343

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 23

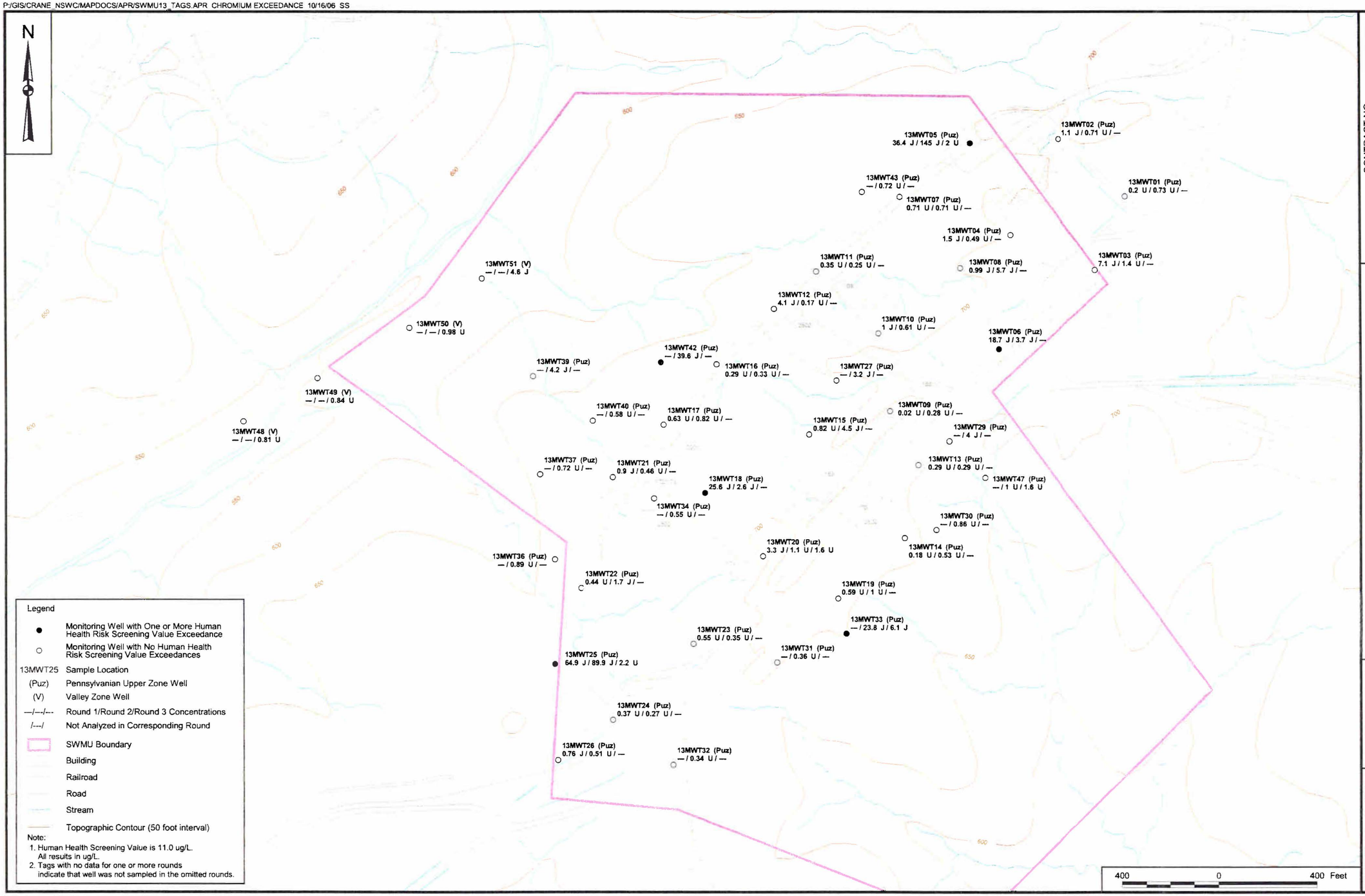
REV 0

BERYLLIUM CONCENTRATIONS IN GROUNDWATER (ug/L) ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA

NAVFAC

DRAWN BY	DATE
C. FOSTER	2/16/05
CHECKED BY	DATE
J. LUCAS	10/16/06
COST/SCHED-AREA	
SCALE	AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR CHROMIUM EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- —/—/— Round 1/Round 2/Round 3 Concentrations
- /—/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:
1. Human Health Screening Value is 11.0 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO.
CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 24

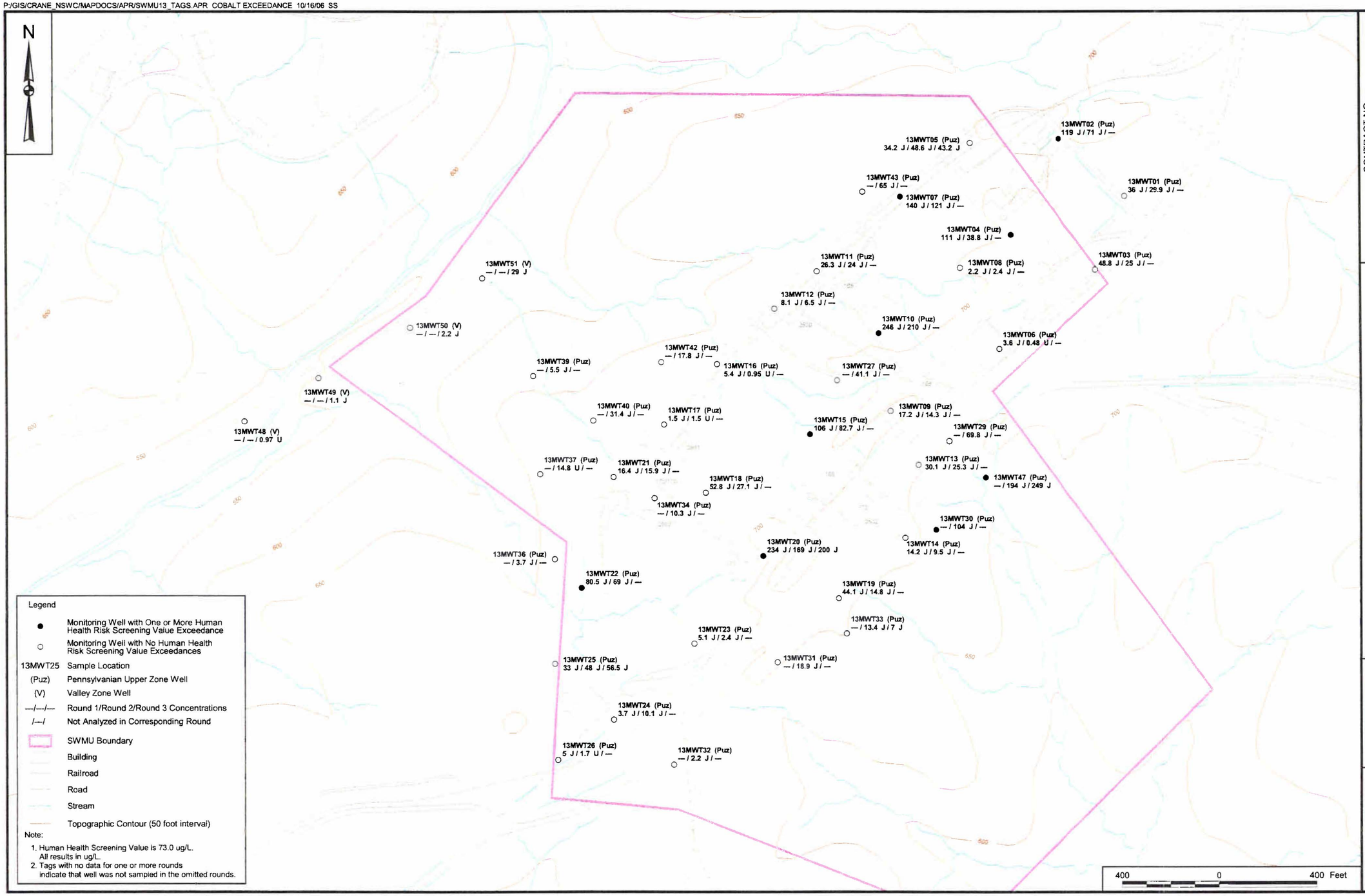
REV 0

CHROMIUM CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE
C. FOSTER	2/16/05
CHECKED BY	DATE
J. LUCAS	10/16/06
COST/SCHED-AREA	
SCALE	AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR COBALT EXCEEDANCE 10/16/06 SS



CONTRACT NO.
CTO 0343

APPROVED BY _____ DATE _____

APPROVED BY _____ DATE _____

DRAWING NO. FIGURE 5 - 25

REV 0

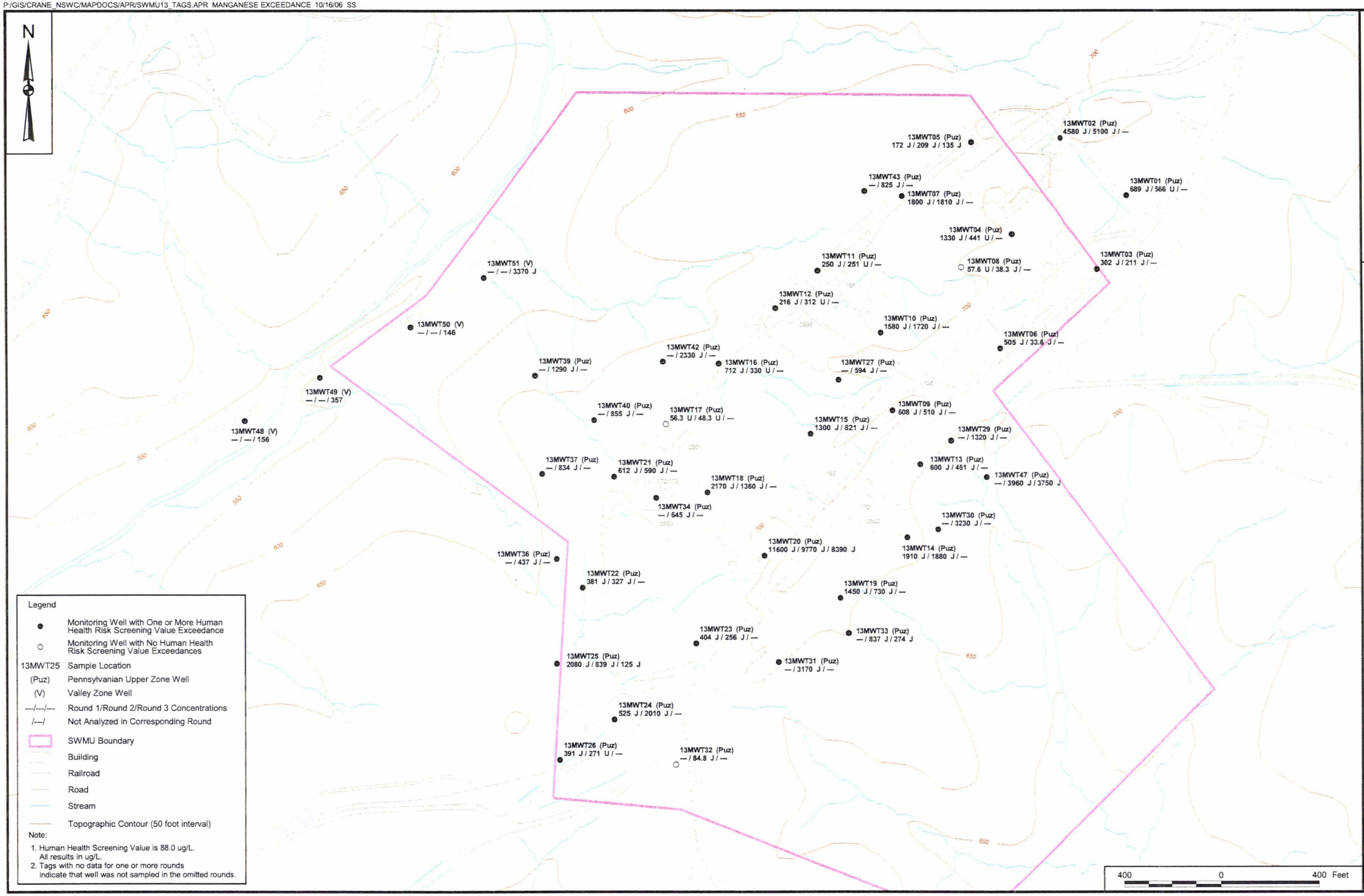
COBALT CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE
C. FOSTER	2/16/05
CHECKED BY	DATE
J. LUCAS	10/16/06
COST/SCHED-AREA	

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR MANGANESE EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- ---/---/--- Round 1/Round 2/Round 3 Concentrations
- /---/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:

1. Human Health Screening Value is 88.0 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

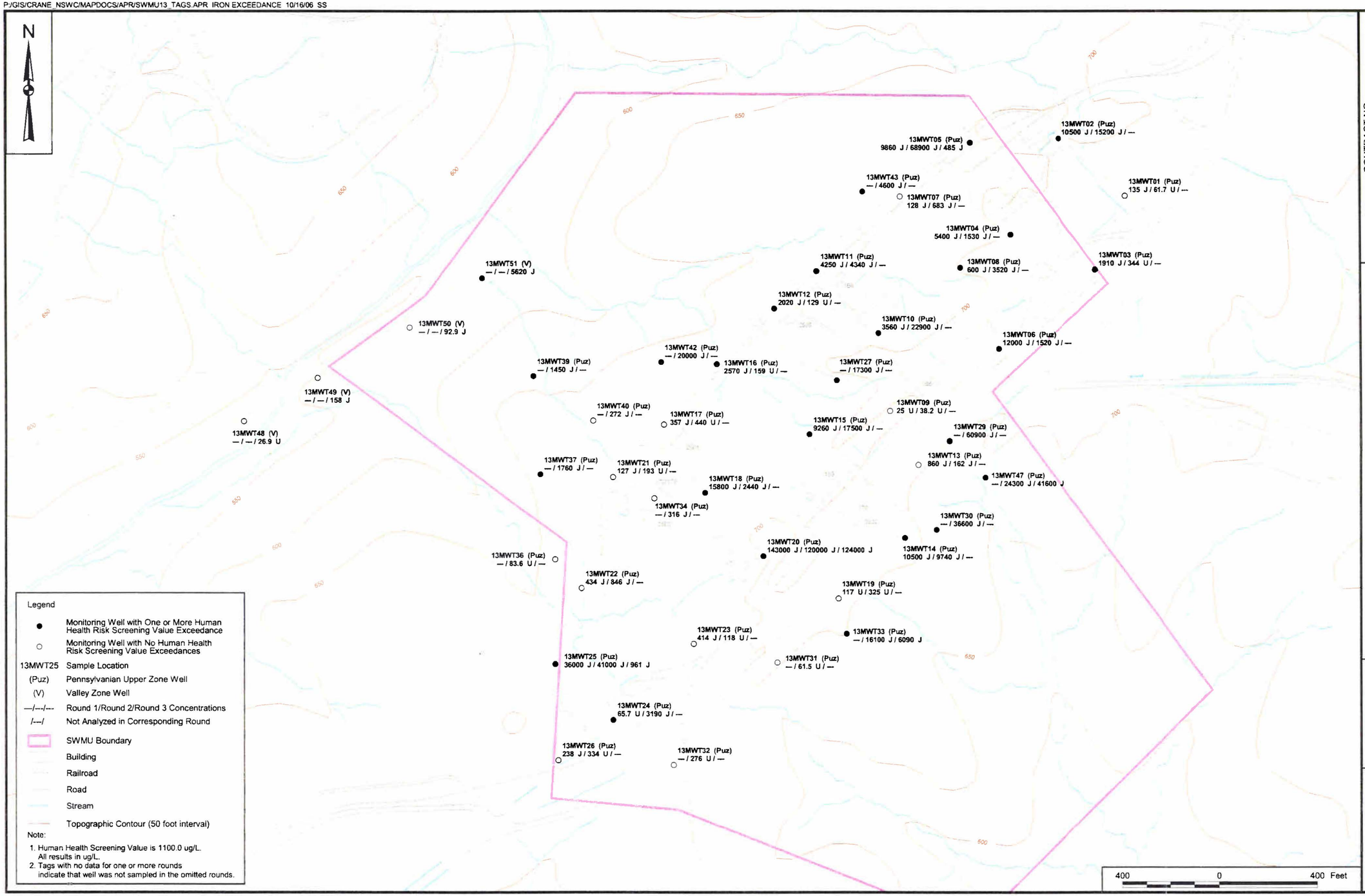
MANGANESE CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0343
APPROVED BY ____ DATE ____
APPROVED BY ____ DATE ____
DRAWING NO. FIGURE 5 - 26
REV 0

DRAWN BY C. FOSTER DATE 2/16/05
CHECKED BY J. LUCAS DATE 10/16/06
COST/SCHED-AREA
SCALE AS NOTED

NAVFAC

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR IRON EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- —/—/— Round 1/Round 2/Round 3 Concentrations
- /—/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:

1. Human Health Screening Value is 1100.0 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO.
CTO 0343

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 5 - 27

REV 0

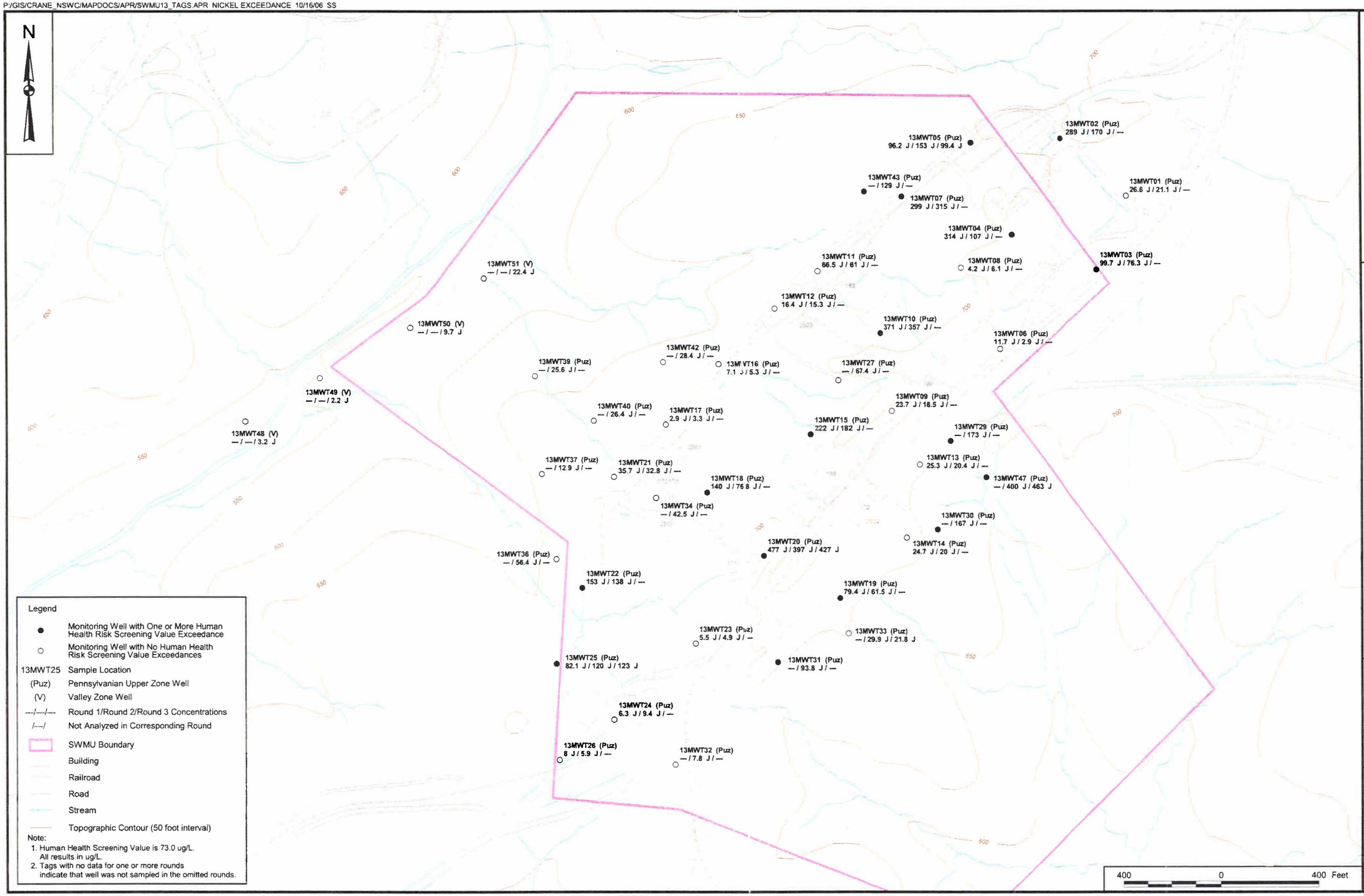
IRON CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY	DATE
C. FOSTER	2/16/05
CHECKED BY	DATE
J. LUCAS	10/16/06
COST/SCHED AREA	

SCALE: AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR NICKEL EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- ---/---/--- Round 1/Round 2/Round 3 Concentrations
- /---/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:
1. Human Health Screening Value is 73.0 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. CTO 0343

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 5 - 28

REV 0

NICKEL CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

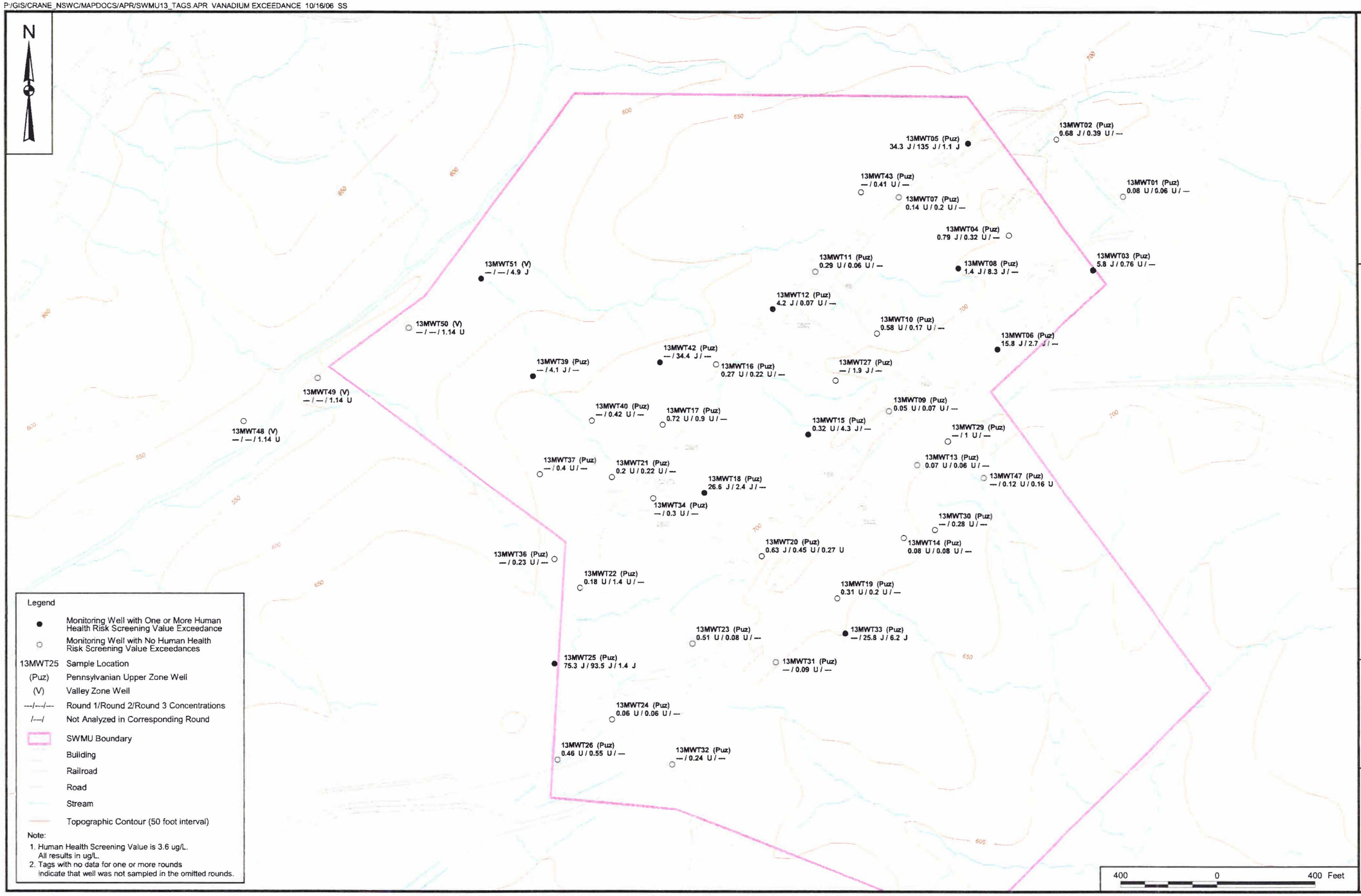
DRAWN BY C. FOSTER DATE 2/16/05

CHECKED BY J. LUCAS DATE 10/16/06

COST/SCHED-AREA

SCALE AS NOTED

P:/GIS/CRANE_NSWC/MAPDOCS/APR/SWMU13_TAGS.APR VANADIUM EXCEEDANCE 10/16/06 SS



Legend

- Monitoring Well with One or More Human Health Risk Screening Value Exceedance
- Monitoring Well with No Human Health Risk Screening Value Exceedances
- 13MWT25 Sample Location
- (Puz) Pennsylvanian Upper Zone Well
- (V) Valley Zone Well
- ---/---/--- Round 1/Round 2/Round 3 Concentrations
- /---/ Not Analyzed in Corresponding Round
- SWMU Boundary
- Building
- Railroad
- Road
- Stream
- Topographic Contour (50 foot interval)

Note:

1. Human Health Screening Value is 3.6 ug/L. All results in ug/L.
2. Tags with no data for one or more rounds indicate that well was not sampled in the omitted rounds.

CONTRACT NO. CTO 0343

APPROVED BY _____ DATE _____

APPROVED BY _____ DATE _____

DRAWING NO. FIGURE 5 - 29

REV 0

VANADIUM CONCENTRATIONS IN GROUNDWATER (ug/L)
ROUNDS 1 THROUGH 3 FOR UPPER ZONE AND VALLEY WELLS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 2/16/05

CHECKED BY J. LUCAS DATE 10/16/06

COST/SCHED-AREA

SCALE AS NOTED

6.0 FATE AND TRANSPORT / CONCEPTUAL MODEL

This section presents an overview of the movement of contaminants at SWMU 13 among the environmental media. The focus is placed on major contaminant groups (explosives, metals, inorganic nitrogen compounds, PAHs, and PCBs), which might be attributed to site operations and have been detected in environmental media at SWMU 13. The information presented in this section is to be used to:

- Provide information on the chemical and physical properties, which affect the mobility, migration, biodegradation, and persistence of the principal COPCs at SWMU 13.
- Assist in human health and ecological risks presented in Sections 7.0 and 8.0.
- Assist in risk management decisions.
- Assess whether movement of contaminants among environmental media will result in significant future changes to exposure point concentrations to receptors or significant exposure to receptors not currently exposed or at locations not currently exposed.
- Assess whether the potential exists for contaminant concentrations to decrease over time in various media.
- Present a conceptual site model which identifies contamination sources, contaminant migration pathways, and potential receptors.

6.1 PROPERTIES AFFECTING MOBILITY, ATTENUATION, AND PERSISTENCE

COPCs present at SWMU13 belong to five primary groups: energetic compounds, PAHs, PCBs, metals, and inorganic nitrogen compounds. Numerous COPCs identified in Sections 7 and 8 (e.g., dioxin congeners, several SVOCs, and several VOCs) were detected very infrequently and/or detected at low concentrations, and were determined not to pose a significant risk (please see Sections 7 and 8 for chemicals dismissed as COPCs); these chemicals are not discussed in Section 6. Section 6 concentrates on the COPCs that are considered to be the primary contaminants of concern. The primary chemical and biological factors which affect the mobility, migration, biodegradation, and persistence of these chemicals are solubility, adsorption/desorption, biodegradation, photolysis, and plant uptake. These processes and their effects on fate and transport will be discussed in this section.

6.1.1 Solubilities and Adsorption/Desorption Properties

Literature values and regulatory guidance values for solubilities, organic matter-water partition coefficients (K_{oc}), soil-water partition coefficients (K_d), and biodegradation rates are summarized in Tables 6-1 through 6-3. These values are based on field investigations, laboratory experiments, and theoretical calculations that are described in scientific literature. In most instances, the values found for each parameter for each chemical has an extremely wide range. Thus, the parameter values listed in Tables 6-1 through 6-3 may not be accurate or entirely applicable to the SWMU 13 setting, but they are useful for comparative purposes to rank COPCs against each other in terms of their relative mobilities and biodegradation potential.

As shown in Table 6-1, the PAHs and Aroclor-1248 have the lowest solubilities and generally have the highest affinities for sorbing to organic carbon and soil. Like the PAHs and Aroclor-1248, many of the metals also have high affinities for sorbing to soil (e.g., aluminum, beryllium, chromium, lead, and vanadium). For these COPCs, the concentrations dissolved in groundwater should be low and the rates of migration through surface water, soil, and groundwater systems should be very slow or insignificant.

The remaining metals (antimony, arsenic, cadmium, cobalt, copper, iron, manganese, nickel, and zinc), most of the energetic compounds, and ammonia have moderate affinities for sorption to soil and therefore can move through the environment more quickly than the COPCs listed above. However, their mobility and migration rates are still impeded by sorption and in some cases solubility constraints.

The COPCs with the lowest affinities for sorption (i.e., lowest K_{oc} and K_d values) are RDX, 2-amino-4,6-dinitrotoluene (2ADNT), 4-amino-2,6-dinitrotoluene (4ADNT), and nitrate. These compounds have the greatest mobilities and should migrate more quickly through soil, groundwater, and surface water systems. As shown in Section 5.0, RDX has in fact been detected in more media and more samples than any other COPC. Widespread detections of elevated nitrate concentrations have also occurred in groundwater and surface water samples.

The K_ds of the metals are intermediate to high in value and indicate that the metals should be relatively immobile. However, the natural soils and groundwater associated with the Pennsylvanian age rocks in southern Indiana are slightly to strongly acidic because:

- The Pennsylvanian shales, coals, and sandstone units typically contain pyrite, which forms sulfuric acid when oxidized.

- The near-surface rocks have undergone chemical and physical weathering through a very long period of geologic time, which has allowed the oxidation of pyrite and the leaching and removal of any carbonate minerals that may have once been present in the rocks; and

- The residual soils and near-surface rock units have been subjected to acid rain in recent decades.

Because of lower pH values in the soils, bedrock, and groundwater, the solubilities of most metals are generally higher than would be expected at near-neutral pH values. In addition, the K_d values of most of the metals are depressed. Therefore, the higher concentrations of metals causing screening level exceedances, as described in Section 5.0, may be due in large part to the lower pH values that are naturally prevalent.

Another factor that greatly affects the solubilities and mobilities of iron, manganese, chromium, and arsenic are their valence states. Each of these metals has more than one valence state which is stable in nature. The oxidation-reduction conditions of the soil, bedrock, groundwater, or surface water systems where these metals reside will control the valence states of the metals in each specific environment and location. Iron and manganese are much more soluble and mobile under reducing conditions, where the reduced forms of these metals (Fe^{+2}, Mn^{+2}) are most prevalent. Chromium is more soluble and mobile under oxidizing conditions (i.e., surface soils and surface waters), where the oxidized ionic species (Cr^{+6}) should be most prevalent.

Even though the PAHs, Aroclor-1248, and many of the metals have high affinities for adsorption to soil and sediment, they can still move through the environment away from a source area via erosion and sediment transport (i.e., surface water pathway) or via wind erosion and transport.

6.1.2 Biodegradation

As shown in Table 6-1, the degradation half-lives for the PAHs are on the order of 2 to 10 years. Aroclor-1248 is more resistant to degradation (i.e., more recalcitrant) and takes more than 50 years (estimated) for half of the mass to biodegrade. Metals do not degrade at all. Hence, it is probable that the total mass of these COPCs at SWMU 13 will remain relatively stable over time and will not decline as a result of degradation (chemical or biological).

Numerous laboratory studies and past site investigations at Department of Defense facilities have yielded information on the biodegradation of energetic compounds (see Table 6-3). TNT in soils, groundwater,

and surface water can degrade biotically or abiotically and can degrade under a fairly wide range of pH and Eh conditions (Price et al., 1997; Brannon et al., 1998; Talmage et al., 1999). The two most common degradation products of TNT found in soils and groundwater have been 2ADNT and 4ADNT (Li et al., 1981; Daun et al., 1998; Pennington et al., 1999a,b,c). These compounds subsequently degrade to diaminonitrotoluene compounds and other less reactive compounds. 2ADNT and 4ADNT have been found in surface and subsurface soils (Tables 3-5 and 3-7), gully waters (Table 3-10), perched groundwater in overburden soil (Table 3-32), and the uppermost groundwater in bedrock (Table 3-33) collected at SWMU 13. 2ADNT and 4ADNT have also been detected in one seep sample and one valley well location where TNT was not detected. Thus, there is ample evidence that microbial biodegradation of TNT is occurring in soils, the surface water, and the groundwater system, and the degradation products of TNT are more mobile than TNT itself.

Scientific studies have shown that HMX and RDX are also biodegraded in soils and groundwater (Tables 6-1 and 6-3). However, the half-lives of HMX and RDX are thought by most researchers to be relatively long (e.g., 20-40 years), especially in soils. DNX, MNX, and TNX are typically cited as the most prevalent daughter products of RDX biodegradation. These three degradation compounds have been detected at SWMU 13 in numerous gully water samples (Table 3-10), seep samples (Table 3-33), and shallow groundwater samples in the upper monitoring zone (Tables 3-24 and 3-32) and are collocated practically everywhere that RDX was detected. Low concentrations of MNX (0.28-0.31 µg/L) were also detected in two out of the five samples collected from the unnamed creek on the northwest side of SWMU 13. Thus, the products of RDX biodegradation appear to be present almost everywhere that RDX is present, albeit in lower concentrations.

HMX is the energetic compound detected at SWMU 13 that is theoretically most resistant to biodegradation. Although HMX degradation is most likely occurring at a slow rate at SWMU 13, there are no known compounds which can be identified at SWMU 13 which are explicitly attributable to HMX degradation.

6.1.3 Plant Uptake

Recent research by the United States Army Corps of Engineers (USACE) (May et al., 2003) suggests that plant uptake and phytoremediation may also be removing, degrading, and volatilizing RDX and TNT from the soils at the Ammunition Burning Grounds (SWMU 3) at NSWC Crane. Vegetation samples were collected from trees and shrubs located on the northwest side of the ridge containing SWMU 13. This location was chosen because RDX-contaminated groundwater was considered most likely to be present and being taken up by plants. Results of the leaf analyses showed a relatively high frequency

(>35 percent) of detections of RDX, MNX, HMX, and 2,6-dinitrotoluene in the 16 vegetation samples that were analyzed (see Tables 3-45 and 3-46). Thus, the trees and vegetation on the northwest side of the ridge appear to be taking up groundwater and energetic compounds as groundwater discharges to the hillside. The energetic compounds may be photolytically degraded in the leaves while the leaves are still on the trees (see Section 6.1.4).

Leaves will probably carry some RDX and HMX back down to the ground during autumn and winter months. However, most of the leaves falling to the ground (i.e., leaf litter in the forest) will decay in place and the RDX and HMX will either biodegrade during decay or will be returned to the soil column, where it could recycle back up into the vegetation. No data are available to quantify RDX and HMX degradation rates in the leaf litter or the underlying soil.

6.1.4 Abiotic Degradation

Organic chemicals can degrade abiotically. One means of abiotic degradation is hydrolysis, where the compound reacts with water to form two or more new compounds. "At neutral or acidic pH values, RDX does not hydrolyze to an appreciable extent in freshwater or seawater (Talmage et al., 1999)." Reported hydrolysis half-lives of 170 days to several years indicate that hydrolysis is not a significant degradation process for RDX in natural water (Sikka et al., 1980; Spanggord et al., 1980a). Hydrolysis of other organic contaminants at SWMU 13 are not known to be significant.

Photolysis can be a primary abiotic degradation mechanism in translucent surface water (e.g., ponds, creeks, drainage ditches, and streams). Photolysis is the decomposition of a compound into simpler units when the parent compound absorbs radiation (e.g., sunlight). Photolytic degradation rates are typically slowed by high turbidity and increasing depth of water. RDX absorbs ultraviolet light with wavelengths between 240 and 350 nm (Etnier, 1986) and undergoes rapid photolysis in water (Sikka et al., 1980; Spanggord et al., 1980b). Spanggord and others (1980b) measured half-lives for RDX of 13, 14, and 9 days in distilled water, Holsten River water (Tennessee), and pond water, respectively. The photolytic degradation rate of RDX in the three types of water were much higher than the degradation rate of HMX (Spanggord et al., 1980b). This was attributed to the fact that RDX has greater molar absorptivity. Nitrite, nitrate, and formaldehyde were identified as photolytic transformation products of RDX and HMX.

Just and Schnoor (2004) determined that RDX was photodegraded in reed canary grass leaves exposed to simulated sunlight. The primary degradation products were nitrous oxide and 4-nitro-2,4-diazabutanal. This is the first time that 4-nitro-2,4-diazabutanal has been measured in plant tissues following phytotransformation of RDX. These compounds, along with nitrite and formaldehyde, were also detected

in aqueous RDX systems exposed to the same simulated sunlight. Results showed that the initial products of RDX photodegradation in translucent plant tissues were similar to products formed from aqueous photolysis of RDX. The detection of similar RDX degradation products in both aqueous and plant-based systems suggests that RDX may be initially transformed by similar mechanisms in both systems. Direct photolysis of RDX via ultraviolet irradiation passing into the leaves is hypothesized by Just and Schnoor (2004) to be responsible for the observed transformations. In addition, membrane-bound "trap chlorophyll" in the chloroplasts may shuttle electrons to RDX as an indirect photolysis transformation mechanism.

TNT is another energetic compound that is susceptible to photolytic degradation. In laboratory studies (Spanggord et al., 1980b; Talmage et al., 1999), TNT photolyzed rapidly in natural water, with half-lives of 0.5-22 hours. In field studies, TNT declined within a short distance of discharge points. Because photolytic degradation decreases with the intensity of the irradiating light, this type of degradation is least likely or least rapid when dissolved in turbid water or in water bodies covered by tree canopy. At NSWC Crane many of the drainage channels are tree-covered. Hence, photolysis is expected to be retarded, except in areas where drainage channels receive ample sunlight.

Photolysis is not believed to be a potentially significant degradation mechanism for the other site-related organic contaminants.

6.2 CONCEPTUAL SITE MODEL

Figure 6-1 presents a schematic diagram of pathways that contaminants may take as migration routes from the site. Table 6-4 presents an overall summary of chemical analyses performed on the samples collected from SWMU 13. For each medium or subset of medium, the average and maximum COPC concentrations are presented. This summary is intended to present the overall picture of which chemicals are migrating, which ones are the most widespread, and which ones have the potential to migrate further.

6.2.1 Historical Operations and Releases

MFB was used for the preparation of nitrate and the production of large mines, depth charges, rocket heads, aerial bombs, and projectiles. TNT, Composition B, H-6, Tritonal, and Minol were used in mine filling operations. Constituents of these explosives are RDX, TNT, aluminum powder, ammonium nitrate, and wax. Fertilizers (ammonium nitrate) were also melted into bombs. In the past, explosives powders discharged from roof vents and accumulation on the roofs were washed down to the ground, resulting in the contamination of soils. Large quantities of TNT, Composition B, HBX-1, HBX-3, and H-6 were

reportedly collected in sumps at MFB (Halliburton NUS, 1992a). These sumps released explosives-contaminated water directly to surface drainage channels that flow into the Boggs Creek Watershed.

PCB oils were heated in the therminol boilers and then transported to the melt building where the oil was used as a heat-transfer medium in the melting of explosive mixtures. PCB oils are reported to have leaked or spilled from the boilers and conveyance system, thus contaminating soil.

Discharges of explosive powders through roof vents and discharges of explosives-contaminated waters no longer occurs, because SWMU 13 is no longer used for loading of bombs. Therefore, explosives and constituents of explosive formulations are no longer being released. The therminol boilers have been removed and discharges of PCBs are no longer occurring.

6.2.2 Soil Contamination

Explosives: For SWMU 13, the soils within the Mine Fill B fenced area are considered to be the source of all site-related contaminants. The soils at SWMU 13 were extensively contaminated with explosives, primarily RDX. In the late 1990s composting and reduction of energetic compounds in the soils was performed in an off-site bioremediation facility as an interim measure. The treated soils were replaced onto SWMU 13. All soils that were replaced met industrial RBTLs for explosives and many soils met residential RBTLs for explosives. There is evidence that residual explosives in replaced soils are continuing to degrade. Seven windrows of composited soil, which met industrial cleanup levels for HMX, RDX, and TNT, were re-sampled after 11 to 16 months had passed. The results showed that these explosives had continued to degrade and that the soils now met residential standards (see Section 4.6 of the IM Report for Mine Fill B). It is likely that explosives are continuing to degrade because the replaced soils still contain the treatment amendments (straw and chicken manure). Any degradation is likely to be taking place at a reduced rate as compared to degradation rates in composting facilities. Some soils that contained explosive compounds, which were in locations underlying support structures, were not remediated. The volume of contaminated soils that were not removed for composting is estimated to be much less than the volume of contaminated soil that was remediated.

PCBs and PAHs: Historical releases from the therminol boilers resulted in the contamination of surface soils with PCBs and PAHs. During the course of the remediation of explosive-contaminated soils at SWMU 13, soils containing PCBs were removed. Confirmation samples showed that remaining soils contained PCBs in excess of 10 mg/kg. During the RFI, PAHs and Aroclor-1248 were detected in soil samples collected from the top of the ridge. The highest concentrations have generally been detected in the surface soils (0-2 feet bgs). The PAHs in particular are found less frequently and at much lower

concentrations in the subsurface soils. Even the average concentration of Aroclor-1248 decreases rapidly with depth. The vertical extent of PCB contamination appears to be bounded by the soil samples collected and analyzed to date. However, data from soil borings 13SB45 and 13SB47 suggest that PCBs might have migrated approximately 350 feet southwest of Building 171 via a drainage swale.

PAHs have been detected at very low concentrations in gully sediments (usually less than 1.0 mg/kg), but have yet to be detected in the creek (i.e., mainstream) sediment samples. PAHs have also been detected in two out of five gully water samples, but at very low concentrations (all less than 1.0 µg/L). Thus, it appears that some PAHs are migrating via surface water runoff, but at very low concentrations. Based on the very high K_d values of PAHs, and the fact that their concentrations declined rapidly with depth in soil, it is very doubtful that PAHs migrated 25 feet downward through soil and rock to enter the upper groundwater system (i.e., Puz, Pathway B).

Metals: Seven metals analyzed during the interim measures soil composting activities were above background concentrations: arsenic, barium, chromium, lead, mercury, silver, and selenium. However, the average concentrations of these metals were within a factor of two of the basewide soil background concentrations (TtNUS, 2001), so whether or not these metals are elevated due to site activities is not clear. Lead, chromium, and silver are only slightly elevated above basewide background concentrations, but the concentration range is relatively small and the concentrations are evenly distributed across the site, suggesting that the observed concentrations of lead, chromium, and silver are natural.

Contaminant Migration: Residual explosive residues, metals, and PCBs (Aroclor-1248) still remain in the soil cover at SWMU 13. Thus, there still exists potential for COPCs to leach out of the soils and enter the surface water or groundwater transport systems. There is also potential for the soils to erode and be transported by surface runoff and affect surface waters and sediment in drainageways downhill from SWMU 13. Figure 6-1 presents a schematic diagram of pathways that contaminants may take as migration routes from the site. The contaminants originate in the overburden soil at SWMU 13 (Location A, Figure 6-1). The contaminants that are leached and/or eroded from the soils may enter the gullies that drain the site and transport surface water down the sideslopes of the ridge on which SWMU 13 is located (Pathway D).

The soils data shows that PCB and PAH concentrations decrease rapidly with depth in soils. This is consistent with the relatively high affinity of PCBs and PAHs for soil absorption. Therefore, PCBs and PAHs are not considered to be likely to migrate into the groundwater. The locations where the PCBs and PAHs are detected in soils are generally grass-covered. Therefore, the potential for erosion of PCB- or PAH-contaminated soils is low. The explosive compounds present in treated and untreated explosive-

contaminated soils will continue to migrate into groundwater. However, it is likely that the residuals in the treated soils are continuing to degrade. The locations where the treated soil was replaced are covered with grass. Therefore, the potential for erosion of explosive contaminated soils is considered low.

The average concentrations of arsenic, cadmium, chromium, and lead in the SWMU 13 soil samples are lower than the concentrations in either the gully sediments or the mainstream creek sediments. In addition, the maximum concentrations of cadmium and chromium are less than the maximums in the two sediment groups. The maximum lead concentration detected in soils (275 mg/kg) is less than the maximum concentration detected in gully sediments (521 mg/kg), but six times greater than the maximum detected in the creek sediments (45.6 mg/kg). When comparing gully sediment concentrations against the creek sediments, the average concentrations in the creek sediments are almost always greater than in the gullies (Table 6-1). Lead was the only metal for which the average concentration in the gully sediments was greater than in the creek, but the difference was less than a factor of two. Converse to the average concentrations, the maximum concentrations of arsenic, beryllium, chromium, cobalt, copper, manganese, nickel, vanadium, and zinc were greater in the gully sediments than in the creek sediments. Overall, the average and maximum concentrations of metals in the three groups of samples (soil, gully sediment, and mainstream creek sediments) are similar. It does not seem that there are enough differences in these populations to state that SWMU 13 soils are having an effect on the gully sediments or the creek sediments.

6.2.3 Groundwater Contamination

Aquifer System: Groundwater has been divided into four zones: perched groundwater (i.e., groundwater contained in overburden soil), Pennsylvanian bedrock - Upper Zone (Puz) groundwater, Pennsylvanian bedrock - Lower Zone (Plz) groundwater, and groundwater sampled in the creek valley (valley groundwater). Contaminants have been leaching and migrating downward and entering the perched groundwater and shallow groundwater flow system (Pathway B in Figure 6-1) probably since the beginning of SWMU 13 operations in the 1940s. The contaminants first leach down to the top of the bedrock surface and accumulate as perched groundwater at the base of the soil column. The perched groundwater likely travels short distances laterally to low spots on the bedrock surface and then infiltrates into bedrock.

The majority of groundwater in the shallow sandstone (Puz, Upper Pennsylvanian water-bearing zone) is moving northwestward. This sandstone intercepts the land surface (i.e., crops out) along the upper portions of the ridge. The groundwater in the Puz that reaches the outcrop area will theoretically travel in one of three pathways; the groundwater will either be taken up by vegetation and transpired (Pathway

B1), seep into gullies at the ground surface and join surface water in the gullies traveling downhill (Pathway B2), or will migrate down the side of the hill along the bedrock/soil interface which lies 1 to 3 feet bgs (Pathway B3), as diagrammed in Figure 6-1.

A small portion of the groundwater in the Puz is migrating downward through a shale and siltstone aquitard and enters the deeper groundwater flow system in the Lower Pennsylvanian water-bearing zone (Plz). This deeper groundwater (Pathway C) is flowing primarily northwest and southeast toward the nearest streams (Figures 4-11 and 4-12). However, the primary and secondary permeability of this water-bearing zone is less than the Puz and the groundwater flow velocities are consequently slower in the deeper groundwater system.

During storms and high flow events, most of the surface water flowing down the hillside (Pathway D) probably enters the creek (unnamed tributary of Boggs Creek) as overland flow in the drainageways (Pathway D1). As the surface water reaches the valley bottom, it slows down and some of the surface water will infiltrate into the soils and alluvial deposits (Pathway D2) and continue to flow toward the creek. This D2 groundwater mixes with the deep groundwater migrating from within the ridge (Pathway C); this mixing will likely occur in the valley bottom sediments.

Ultimately the creek, when flowing, will have water in it from several different sources: surface water from upvalley, surface water discharge from the gullies (D1), and groundwater emanating from the valley floor deposits. The creek is dry for a good portion of the year, but groundwater may still be traveling down the valley as underflow in the valley bottom deposits even when the creek bed is dry.

Explosives: In groundwater, the energetic compounds and degradation products are pervasive in the Puz, but are completely absent in the Plz except for a single detection of 2-nitrotoluene that was detected in well 13MWT41 and a single detection of 3-nitrotoluene that was detected in well 13MWT45 (Table 3-37). The almost complete absence of energetic compounds from the lower groundwater zone (Plz) is very strong evidence that the aquitard separating the Puz from the underlying Plz is an effective aquitard, and is causing nearly all of the shallow groundwater in the ridge top to flow laterally to the edge of the hillside. The concentrations of energetic compounds (averages and maxima) found in the Puz groundwaters are very similar to the concentrations detected in the gully surface waters, suggesting that the surface waters sampled in gullies between storm events are composed largely of groundwater seepage from the Puz (Pathway B2).

Groundwater in the valley bottom on the northwest side of SWMU 13 is also impacted with energetic compounds. Presumably, surface waters in the gullies are traveling down the hillside and a portion of the

surface water re-enters the groundwater when it reaches the valley sediments (Pathway D2, Figure 6-1). Wells 13MWT49 and 13MWT51 contain relatively high concentrations of RDX and HMX (Table 3-40).

Nitrogen compounds: Soils and sediment samples have not been analyzed for nitrate/nitrite and ammonia. These compounds are highly soluble in water (See Table 6-1). Analyses of surface waters, groundwaters, and seeps have shown that the gully waters and the uppermost (Puz) groundwater samples contain significant concentrations of nitrate and ammonia (Table 6-4). The concentrations detected in the seep samples, the deeper groundwaters (Plz), and the mainstream creek are low and in the range that would be expected naturally (nitrate-N <1.0 mg/L; ammonia-N <0.6 mg/l, Table 6-4). Even though nitrate and ammonia are relatively high in the gully waters, there is no detectable impact to the water in the mainstream creek. Thus, there does not seem to be any significant migration of nitrate or ammonia from SWMU 13 that reaches the mainstream creek or leaves the watershed.

Metals: The average and maximum concentrations of most metals were higher in the upper water-bearing zone (Puz). The exceptions were:

- Average aluminum was greater in the Plz.
- Average and maximum antimony and arsenic were greater in the Plz.
- Average chromium and vanadium concentrations were greater in the Plz.

Based on the information presented in Section 5.0 and Table 6-1, aluminum, beryllium, cadmium, cobalt, copper, iron, lead, manganese, nickel, and zinc are elevated in the Puz above all other groundwaters. Chromium and vanadium were also elevated in a few samples collected from the Puz. However, it is unclear whether the SWMU 13 activities were the source of these elevated metal concentrations or whether natural oxidation and leaching of the Pennsylvanian bedrock is the cause of the elevated concentrations.

Antimony and arsenic concentrations in the Plz are greater than detected in the Puz. This is evidence suggesting that the antimony and arsenic concentrations are natural and not derived from SWMU 13 activities.

6.2.4 Surface Water and Sediment Contamination

Surface water runoff and sediment drain off of the top of the SWMU 13 ridge along the northwest and the southeast sides of the ridge. The runoff flows in gullies down the sides of the ridge. In addition to surface water runoff, contaminated groundwater seeps into a few of the gullies at a slow rate. Therefore, the

waters in the gullies flowing down the ridge are a mixture of surface runoff and shallow groundwater seepage. The gullies running down the southeast side of the ridge have a relatively long distance (approximately one mile) to travel before reaching Turkey Creek. The gullies running down the northwest side of the ridge have to travel only about 1,200 feet before reaching the floor of the valley of an unnamed tributary of Boggs Creek. Some of the gully waters flow into the tributary creek (Pathway D1, Figure 6-1); however, some of the surface water also infiltrates into the alluvium (silt, sand, and gravel) and travels via subsurface to the creek (Pathway D2) or down the valley as groundwater underflow (i.e., groundwater that migrates in the alluvium parallel to the creek). Ultimately, the unnamed creek is the recipient of all surface water runoff, sediment, and groundwater originating from the northwestern side of SWMU 13.

Explosives: RDX was detected in surface water runoff at several locations along the southeast side of the ridge, but never above a concentration of 5.3 µg/L (Figure 5-3). Higher concentrations of RDX (up to 5,500 µg/L) were detected on the northwest side of the ridge; particularly at sampling locations 13SW/SD11 through 13SW/SD16 (Figure 5-3). These gully waters also contain RDX degradation products (DNX and MNX), HMX, and TNT. The unnamed tributary that receives the gully discharges has had detectable concentrations of RDX (1.3 – 9.9 µg/L), HMX (1.4 – 3.2 µg/L), and MNX (0.25 – 0.31 µg/L) at three different sampling stations along the unnamed creek. Thus, the discharges from SWMU 13 are having a measurable impact on the water quality of the receiving stream.

RDX and HMX were detected in gully sediments (maximum concentrations = 2.2 and 1.9 mg/kg, respectively, Table 6-1) at a few locations along the side of the ridge. However, discharges from the gullies, springs, and groundwater have not caused measurable concentrations of these explosives in the sediment of the receiving creek.

Nitrogen compounds: High concentrations of nitrate/nitrite-N and ammonia-N have been detected in the gulley waters on both the northwest and the southeast sides of the ridge. The highest concentration of nitrate/nitrite-N (200 mg/L) was detected at 13SW/SD24, located on the southeast side of the ridge. The highest concentration of ammonia-N (3.4 mg/L) was detected at 13SW/SD11, located on the southwest side of SWMU 13. The average concentrations of these two analytes were much lower in the gully waters (see Table 6-4), indicating that high concentrations of the nitrogen compounds are not pervasive around MFB.

Ammonia-N was not detectable in the unnamed creek and nitrate/nitrite-N was less than 0.3 mg/L, so the surface and subsurface discharges entering the creek from SWMU 13 are having a minimal impact on the creek water quality.

Metals: The maximum and mean concentrations of all metals, except manganese, in the gully surface waters were greater than either the seep samples or the creek samples (Table 6-1). This suggests that the water coming down the hillside in the gullies is contributing metals to the creek. Note that some portion of the water flowing down the gullies is derived from shallow groundwater emanating from the Puz (Pathway C2, Figure 6-1), so the levels of metals detected in the gully waters can not be attributed solely to runoff from SWMU 13. As an example, the highest concentrations of aluminum, copper, iron, and manganese were consistently detected at 13SW/SD15, which is located on the lower portion of the SWMU 13 ridge on the northwest side. Because the gulley water was sampled at a lower elevation, the water in this gulley is likely affected by groundwater seepage into the gulley higher up the hillside.

Dissolved and particulate metals are moving down the hillside in the gullies and reaching the unnamed creek. However, metals in the creek water are either not detectable or were detected at very low concentrations (Table 6-1). Hence, there is no evidence that the gullies or groundwater are having a measurable impact on metals in the creek water.

The average metal concentrations in the unnamed creek sediments are usually higher than average concentrations in the gully sediments (Table 6-1). However, the maximum metal concentrations in the gully sediments were typically higher than sediments sampled from the creek. Thus, the discharge of sediment from the gullies does not appear to be having a measurable impact on the creek sediments.

6.2.5 Summary of Conceptual Site Model

Figure 6-1 is a schematic diagram of the conceptual flow and transport model for SWMU 13. Past operations at the site resulted in the release of explosives residue (e.g., TNT, RDX, HMX, ammonium nitrate) to soils surrounding certain buildings (e.g., 166 and 177) located within the SWMU fenced area. PCB oil was heated in two therminol boilers located on the southeast side of the MFB and used as a heat transfer medium in the process of melting and loading of munitions. Oils reportedly leaked from the boilers and the conveyance system, thereby contaminating soils with PCBs. Releases are no longer actively occurring at SWMU 13, because operations have changed and/or control measures have been instituted to eliminate releases. The following is a summary of the conceptualized aspects of contaminant migration, fate, and persistence at SWMU 13:

- Explosives, primarily RDX, and to lesser extent HMX, TNT degradation products, and ammonium nitrate were released to soils.

- Interim remedial actions have greatly reduced explosive compound concentrations in large areas, such that most soils now meet residential or industrial standards.

- Residual explosives in soils are continuing to degrade.

- The upper zone of groundwater has been contaminated with explosives, primarily RDX, and to a lesser extent HMX, TNT degradation products, and ammonium nitrate.

- Nearly all of the groundwater in the uppermost bedrock (i.e., the Puz) is flowing laterally toward the upper slopes of the ridge. Some of this groundwater seeps into the gullies on the side of the ridge and some of the contaminated groundwater is taken up by trees and other vegetation and transpired. Thus, natural phytoremediation is playing a part in controlling and reducing the rate of contaminants reaching the base of the ridge and entering the tributary stream.

- Explosives (RDX and TNT) in groundwater are degrading as evidenced by the presence of degradation products.

- Some of the explosives contaminants (mainly RDX and HMX) are reaching the unnamed intermittent stream on the northwest side of the site, which is a tributary of Boggs Creek.

- Only a trace of contaminants (<0.5 µg/L of 2-nitrotoluene and 3-nitrotoluene) have reached the deeper groundwater monitoring wells (e.g., 60-100 feet bgs). The siltstone and shale layers between the upper and lower water-bearing zones are an effective aquitard and prevent most of the shallow groundwater and contaminants from reaching the deeper portion of the ridge.

- Some shallow groundwater in the sediments in the valley located northeast of the ridge is contaminated with RDX and nitrate. This contamination is derived from contaminated surface water running down the gullies and infiltrating into the valley bottom.

- Contaminated groundwater in the valley bottom is either flowing into the tributary stream or is flowing southwest down the valley as groundwater underflow. No groundwater from SWMU 13 is flowing under the stream beneath the adjacent ridge.

- Contaminants continue to leach from the surface and near-surface soils and migrate downhill in steep gullies on the northwestern and southeastern sides of the ridge. The largest concentrations of explosives were detected in the gullies leading down the northwest side of the ridge.

- Concentrations of several metals (e.g., iron, manganese, cobalt, lead, and zinc), are elevated in the uppermost groundwater monitoring zone. The source(s) for the metals in the shallow groundwater are unclear, because the only metal directly attributable to site operations was aluminum. Metals appear to be leaching, in large part, directly from the bedrock (i.e., a natural source).

- PCBs, released from the therminol boilers have contaminated surface and near subsurface soils. Aroclor 1248 concentrations were less than0.3 mg/kg in all soil samples collected from 4 feet bgs or greater in depth.

- It is possible that some PCBs have migrated as surface water or adsorbed onto sediments in the drainage swale that leads southwest from 13SB14. PCBs have been detected in subsurface soils at a depth of 4 to 6 feet bgs below the swale (i.e., 13SB45 and 13SB47).

- PAHs are present in site soils, gully sediments, and gully waters in low concentrations. It is believed that PAHs are not reaching nor will they reach the unnamed tributary stream or shallow groundwater.

TABLE 6-1

CHEMICAL AND DEGRADATION CHARACTERISTICS OF SITE CONTAMINANTS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical	Solubility (mg/L)	K_{oc} (L/kg)	K_d (L/kg)	Biodegradation Half-Life (years)
Energetic Compounds				
HMX	5.0 [4], 6.6 [7], 2,556 [1]	631 [7], 1,853 [1]	0.505 - 14.8 [10]	39 [6]
RDX	38.4 [7], 42.0 [4], 59.7 [1]	7.6 - 251 [7], 195.4 [1]	0.1 - 7.8 [8]	0.88 - 36 [9]
DNX	N/A	N/A	N/A	N/A
MNX	N/A	N/A	N/A	N/A
2,4,6-trinitrotoluene	130 [1,4]	1,585 [7], 1,834 [1]	0.08 - 22.2 [8]	0.1 - 10.7 [9]
2-amino-4,6-dinitrotoluene	1,223 [1], 2,800 [4,7]	100.5 [1]	4 [7]	< 0.05 [9]
4-amino-2,6-dinitrotoluene	1,223 [1], 2,800 [4,7]	100.5 [1]	4 [7]	< 0.05 [9]
PAHs				
benzo(a)anthracene	0.0094 [1,2]	231,000 [1], 398,000 [2]	185 - 318 [10]	3.73 [5]
benzo(a)pyrene	0.00162 [1,2]	787,000 [1], 1,020,000 [2]	630 - 816 [10]	2.9 [5]
benzo(b)fluoranthene	0.0015 [1,2]	803,000 [1] - 1,230,000 [2]	642 - 984 [10]	3.34 [5]
fluoranthene	0.206 [1,2]	49,096 [1], 107,000 [2]	39.3 - 85.6 [10]	2.41 [5]
pyrene	0.135 [1,2]	67,992 [1], 105,000 [2]	54.4 - 84.0 [10]	10.4 [5]
PCBs				
Aroclor-1248	0.05316 [1]	43,900 [1]	35.12 [10]	> 50
Metals				
aluminum	59400 [1]	NA	1500 [1]	0
antimony	23000 [1]	NA	45 [1,3]	0
arsenic	34700 [1]	NA	29 [1,2], 200 [3]	0
beryllium	149000 [1]	NA	650 [3], 790 [1,2]	0
cadmium	123000 [1]	NA	6.4 [3], 75 [1,2]	0
chromium, total	12000 [1]	NA	850 [1,3]	0
cobalt	87500 [1]	NA	45 [1]	0
copper	421000 [1]	NA	35 [1]	0
iron	624000 [1]	NA	25 [1]	0
lead	9581 [1]	NA	900 [1]	0
manganese	87200 [1]	NA	65 [1]	0
nickel	422000 [1]	NA	65 [1,2], 150 [3]	0
vanadium	86400 [1]	NA	1000 [1,3]	0
zinc	344000 [1]	NA	38 [3], 62 [1,2]	0
Nitrogen Compounds				
ammonia-N	3740 [1]	NA	NA	N/A
nitrate/nitrite-N	90900 [1]	NA	NA	N/A

N/A = Not Available
NA = Not Applicable
mg/L - milligrams per liter
L/kg - Liters per kilogram

References:

1 Oak Ridge National Laboratory (2005)
2 U.S. EPA (2002, Tables C-1 and C-4, pH = 6.8)
3 Baes and Sharp (1983) and Baes et al. (1984)
4 U.S.EPA (2005)
5 Howard et al. (1991)
6 Tomkins (2000)
7 Talmage et al. (1999)
8 Table 6-2
9 Table 6-3
10 K_d calculated by multiplying K_{oc} times f_{oc} value of 0.0008 (average measurement of two SWMU 13 soil samples)

TABLE 6-2

PARTITION COEFFICIENTS OF ENERGETIC COMPOUNDS
SWMU 13 – MINE FILL B
NSWC CRANE
CRANE, INDIANA

Compound	Kd [1] (L/kg)	Reference
RDX	0.21 - 0.33 (0.30)	Pennington et al., 1999c
	0.80 - 4.15 (2.67)	Sikka et al., 1980
	1.4, 4.2 (2.8)	Spanggord et al., 1980b
	0.2 - 7.8 (4.05)	Hale et al., 1979
	(2.17)	Layton et al., 1987
	0.101, 0.284 (0.19)	AMEC, 2001
	1.57, 1.59 (1.58)	Xue, Iskandar, and Selim, 1995
	0.12 - 2.37 (0.89)	Ainsworth et al., 1993
	0.95, 0.97 (0.96)	Singh et al., 1998
	0.2 - 7.8	Townsend and Meyers, 1996
	6.38	Sheremata et al., 2001
	0.29	Price et al., 2000
	0.42	May et al., 2003
TNT	2.0 - 11.0 (4.0)	Pennington and Patrick, 1990
	5.5 - 22.2 (14.6)	Sikka et al., 1980
	5.5 - 19.3	Spanggord et al., 1980a
	1.1, 2.5 (1.8)	AMEC, 2001
	0.08 - 0.33 (0.23)	Pennington et al., 1999c
	2.58	May et al., 2003
2ADNT	3.7, 4.9 (4.3)	Pennington and Patrick, 1990
	2.42	May et al., 2003
4ADNT	2.42	May et al., 2003

1 Individual values or range of values listed in column; average value shown in parentheses.
L/kg - Liters per kilogram

TABLE 6-3

BIODEGRADATION CHARACTERISTICS OF ENERGETIC COMPOUNDS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Compound	Half-Life[(1)] (years)	Reference
RDX	36 0.88 - 10.7+ (10.6)	DuBois and Baytos, 1991 Pennington et al., 1999c
TNT	1.0 0.1 0.88 - 10.7+ (4.1) 1.11	DuBois and Baytos, 1991 Cataldo et al., 1989 Pennington et al., 1999c May et al., 2003
2ADNT	< 0.05 < 0.05	Funk et al., 1993 Alvarez et al., 1995
4ADNT	-	-

1 Individual values or range of values listed in column; average value shown in parenthese

TABLE 6-4

GENERAL LEVELS OF CONTAMINANT CONCENTRATIONS IN EACH MEDIA
SWMU 13- MINE FILL B
NSWC CRANE
CRANE, INDIANA

Contaminant	mg/kg						ug/L											
	Soil [1]		Gully Sediment		Mainstream Sediment		Gully Surface Water		Seep Water		Mainstream Surface Water		Puz Groundwater		Plz Groundwater		Valley Groundwater	
	mean	maximum	mean	maximum	mean	maximum	mean	maximum	mean	maximum	mean	maximum	mean	maximum	mean	maximum	mean	maximum
Explosive Compounds																		
HMX	19.97	5,390	0.213	1.9	ND	ND	41.3	730	7.31	20	2.01	3.2	35.7	640	ND	ND	37	120
RDX	3.60	290	0.231	2.2	ND	ND	276	5,500	25	77	5.23	9.9	264	7,700	ND	ND	70.7	250
TNT	1.07	57	ND	ND	ND	ND	0.48	6.8	ND	ND	ND	ND	2.44	69	ND	ND	ND	ND
SVOCs																		
benzo(a)anthracene	0.052	1.1	0.132	0.330	NA	NA	0.099	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	0.048	1.0	0.160	0.390	NA	NA	0.265	0.27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	0.054	1.1	0.190	0.460	NA	NA	0.390	0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	0.087	1.8	0.363	0.860	NA	NA	0.361	0.96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	0.113	2.4	0.482	1.300	NA	NA	0.261	0.65	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																		
Arochlor-1248	11.0	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (total)																		
aluminum	13,465	58,500	8,944	18,500	12,320	13,700	2,329	19,100	875	2,670	ND	ND	6,737	139,000	9,514	29,800	527	1,990
antimony	NA	NA	0.575	2.3	2.58	4.7	ND	ND	ND	ND	ND	ND	ND	ND	2.82	6.70	ND	ND
arsenic	7.67	64.7	15.0	58.2	40.6	56.9	2.38	35.7	0.774	1.3	ND	ND	1.94	24.1	11.2	24.5	0.88	2.0
beryllium	NA	NA	1.25	4.3	3.02	3.7	ND	ND	ND	ND	ND	ND	1.82	12.8	ND	ND	ND	ND
cadmium	0.454	1.7	0.868	4.1	12.4	17.1	0.105	1.3	ND	ND	ND	ND	0.267	2.7	ND	ND	ND	ND
chromium	18.2	95.8	44.4	228	123	192	3.34	20.5	1.37	4	0.55	0.68	7.26	145	14.9	38.7	1.48	4.6
cobalt	NA	NA	25.2	107	24.6	29.9	1.79	9.4	1.74	5.8	ND	ND	51.2	249	3.31	11.2	8.2	29
copper	NA	NA	16.5	52.1	17.5	18.4	5.65	27.1	2.58	3.6	1.35	1.4	6.97	89.5	3.49	10.9	0.91	1.4
iron	NA	NA	48,890	195,000	208,720	299,000	2,142	16,200	777	2,070	105	175	13,261	143,000	6,574	23,700	1,471	5,620
lead	18.1	275	59	521	38.0	45.6	6.42	137	0.889	1.9	ND	ND	5.36	54.3	3.96	12	0.736	2.8
manganese	NA	NA	1,683	6,130	2,342	3,960	244	3,190	995	3,910	5.28	7.9	1,396	11,600	154	495	1,007	3,370
nickel	NA	NA	24.6	83.9	42.3	47.8	4.5	22	3.73	8.7	0.458	0.45	108	477	11.2	34	9.38	22.4
vanadium	NA	NA	34.9	144	73.5	101	5.92	43.5	2.01	5.4	ND	ND	6.96	135	15.8	33.9	1.65	4.9
zinc	NA	NA	107	541	161	195	28.6	269	ND	ND	ND	ND	150	1,220	20.2	77.6	ND	ND
Miscellaneous																		
ammonia-N	NA	NA	NA	NA	NA	NA	180	3,400	6.88	20	ND	ND	297	3,400	349	560	NA	NA
nitrate/nitrite-N	NA	NA	NA	NA	NA	NA	7,650	200,000	163	580	116	280	2,460	92,000	195	660	NA	NA

NA = Not Analyzed
ND = Not Detected
mg/kg - milligrams per kilogram
µg/L - micrograms per liter

(1) - Statistics for explosives and metals computed for analytical data collected prior to RFI and represent soils left in place and composted during the 1999 - 2002 remediation effort. Statistics for SVOCs and Aroclor-1248 were calculated using analytical data collected during the RFI (i.e., after remediation).

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LEGEND:

PATHWAY DISCRIPTIONS:

A – CONTAMINANT SOURCE AREAS (OVERBURDEN SOIL AND SUMPS)

B – SHALLOW GROUNDWATER SYSTEM

B1 – GROUNDWATER TAKEN UP BY VEGETATION AND TRANSPIRED

B2 – GROUNDWATER SEEPS INTO GULLIES AT THE SURFACE AND JOINS SURFACE WATERS

B3 – MIGRATION ALONG BEDROCK/SOIL INTERFACE (1–3" bgs) AND NEAR–SURFACE FRACTURES

C – DEEP GROUNDWATER

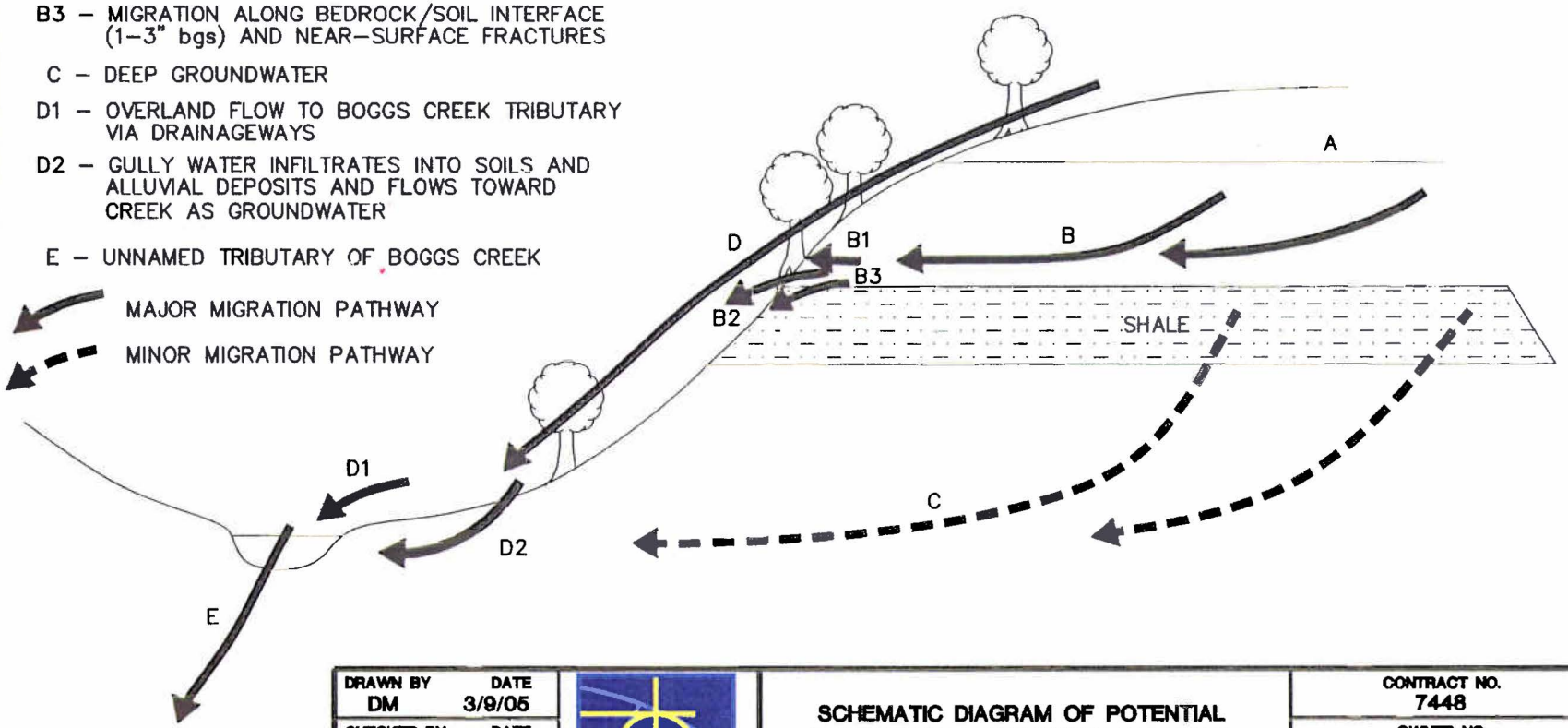
D1 – OVERLAND FLOW TO BOGGS CREEK TRIBUTARY VIA DRAINAGEWAYS

D2 – GULLY WATER INFILTRATES INTO SOILS AND ALLUVIAL DEPOSITS AND FLOWS TOWARD CREEK AS GROUNDWATER

E – UNNAMED TRIBUTARY OF BOGGS CREEK

MAJOR MIGRATION PATHWAY

MINOR MIGRATION PATHWAY



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REVISED BY:	DATE:
SCALE: AS NOTED	

NAVFAC

SCHEMATIC DIAGRAM OF POTENTIAL CONTAMINANT MIGRATION PATHWAYS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 6-1	REV. 0

FORM CADD NO. SDIV-AH.DWG - REV 1 - 9/10/98

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-94-D-0888

Rev. 0
04/07

Resource Conservation and Recovery Act Facility Investigation Report

for

Mine Fill B (SWMU 13)

Volume II of II
Sections 7 and 8 and Appendices

Naval Surface Warfare Center
Crane
Crane, Indiana

Contract Task Order 0343

April 2007

NAVFAC Naval Facilities Engineering Command
Midwest
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Building 1A, Code EV
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7.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the HHRA for MFB (SWMU 13) at NSWC Crane. The objective of the HHRA is to determine whether detected concentrations of chemicals within the study areas pose a significant threat to potential human receptors under current and/or future land use. The potential risks to human receptors will be estimated based on the assumption that no actions are taken to control contaminant releases.

7.1 INTRODUCTION

The following current U.S. EPA, the State of Indiana Department of Environmental Management (IDEM), and United States Navy risk assessment guidance documents were used to develop the framework for the baseline HHRA:

- Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part A) (U.S. EPA, 1989).

- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (U.S. EPA, 1991).

- Distribution of Preliminary Review Draft: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure (U.S. EPA, 1993a).

- Soil Screening Guidance: Technical Background Document (U.S. EPA, 1996).

- Exposure Factors Handbook. Office of Health and Environmental Assessment (U.S. EPA, 1997a).

- Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (U.S. EPA, 2001a).

- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final Guidance (U.S. EPA, 2004a).

- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. (U.S. EPA 2002a).

- Navy Final Policy on the Use of Background Chemical Levels (Navy, 2004).

- Conducting Human Health Risk Assessments under the Environmental Restoration Program (Navy, 2001).

- Risk Integrated System of Closure. User's Guide and Technical Resource Guidance Document (IDEM, 2004).

This HHRA was prepared using essentially the same methodology that was used to prepare the HHRAs for SWMUs 4, 5, 9, and 10 (TtNUS, 2003c) and SWMU 3 (TtNUS, 2003d).

A HHRA consists of five components: data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Sections 7.2 through 7.6 contain detailed discussions of the five components of the HHRA. A schematic diagram of the general risk assessment process is provided as Figure 7-1.

Three major aspects of chemical contamination and environmental fate and transport must be considered to evaluate potential risks: (1) contaminants with toxic characteristics must be found in environmental media and must be released by either natural processes or by human action; (2) potential exposure points must exist; and (3) human receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure. If any one of these factors is absent for a site, the exposure route is regarded as incomplete, and no potential risks are considered to exist for human receptors.

7.2 DATA EVALUATION

Data evaluation, the first component of a baseline HHRA, is a medium-specific task involving the compilation and evaluation of analytical data. The main objective of the data evaluation is to develop a medium-specific list of COPCs that will be used to quantitatively determine potential human health risks for site media.

7.2.1 Data Usability

Data from samples collected for the field investigations was used to assess risks to potential human receptors. A data quality report is included in Section 3.0 that provides information on precision, accuracy, representativeness, completeness, and comparability of the analytical data.

Fixed-based analytical results only for the Target Analyte Lists for the field investigation were used in the quantitative risk evaluation. Typically, unfiltered results for groundwater and surface water are used to assess risks associated with these media. Field measurements and data regarded as unreliable (i.e., qualified as "R" during the data validation process) were not used in the quantitative risk assessment. The elimination of data qualified “R” may result in data gaps which may increase the uncertainty in the risk assessment. However, as shown in Section 3.2, the chemicals qualified “R” are not constituents of concern at SWMU 13. Therefore, it is unlikely that risks have been underestimated by the removal of the unreliable data from the data sets.

A discussion of the historical data for SWMU 13 is provided in Section 1.3. Historical data from samples collected in 1999, 2000, and 2001 were used in conjunction with the data obtained from the investigation conducted in 2003/2004 in the quantitative risk analysis. The data provides a description of post-remediation conditions at SWMU 13 for explosives, metals and VOCs. The historical data were validated and all of the historical data were used in the risk assessment. A data quality discussion of the historical data is provided in Section 6.0 of the IMR (TT, 2002)

7.2.2 Selection of Chemicals of Potential Concern

The selection of COPCs is a qualitative screening process used to limit the number of chemicals and exposure routes quantitatively evaluated in the baseline HHRA to those site-related constituents that dominate overall potential risks. Screening by risk-based concentrations was used to focus the risk assessment on meaningful chemicals and exposure routes.

In general, a chemical was selected as a COPC and retained for further quantitative risk evaluation if the maximum concentration detected in a sampled medium exceeds a conservative screening level(s). Chemicals eliminated from further evaluation during this evaluation are assumed to present minimal risks to potential human receptors.

7.2.2.1 Derivation of Screening Criteria

Several types of screening levels were used to identify COPCs for SWMU 13. Screening concentrations based on IDEM Risk Integrated System Closure (RISC) default closure levels (IDEM, 2004) and U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) (U.S. EPA, 2004) were used, as well as other U.S. EPA criteria. The IDEM default closure levels for soil include risk based direct contact criteria, soil attenuation capacity, soil saturation concentrations, and migration from soil to groundwater criteria. The IDEM default closure levels for groundwater are based on U.S. EPA maximum contaminant levels

(MCLs), if available. If not, the default closure level is the lower of the risked based criteria and solubility limit. The IDEM risk based default closure levels correspond to systemic Hazard Quotient (HQ) of 0.1 (for non-carcinogens) or an incremental lifetime cancer risk (ILCR) of 1×10^{-5} (for carcinogens).

The risk-based U.S. EPA Region 9 screening concentrations correspond to a HQ of 0.1 (for non-carcinogens) or an ILCR of 1×10^{-6} (for carcinogens). It should be noted that the U.S. EPA Region 9 PRGs for non-carcinogens are based on a Hazardous Index (HI) of 1. The Region 9 PRG values for non-carcinogens were multiplied by 0.1 to account for potential cumulative effects of several chemicals affecting the same target area or producing the same adverse non-carcinogenic health effect. The screening levels to be used for each medium in the risk assessments are briefly discussed below.

Soil

Screening concentrations based on the following criteria were used to select COPCs for surface and subsurface soil:

- IDEM residential default closure levels for direct contact (IDEM, 2004)
- U.S. EPA Region 9 PRGs for Residential Soil (U.S. EPA, 2004).
- U.S. EPA generic soil screening levels (SSLs) for the inhalation of volatiles and fugitive dusts calculated online at http://risk.lsd.ornl.gov/calc_start.shtml based on methodology from the U.S. EPA's Soil Screening Guidance (U.S. EPA, 1996).

If the maximum concentration of a constituent exceeded screening levels based on any of these criteria, the chemical was selected as a COPC for soil and carried through to the quantitative risk assessment.

The comparison of site soil data to U.S. EPA generic SSLs for transfers from soil to air was used to identify whether a quantitative analysis of the inhalation of particulates or vapors from the soil exposure pathway was warranted. If the maximum soil concentration of a chemical exceeded the SSL, a quantitative evaluation of potential risks from inhalation was performed. Otherwise, the risks associated with the inhalation pathway are considered insignificant, and this exposure pathway is eliminated from further evaluation.

Soil Screening Levels for the Protection of Groundwater

Comparisons of chemical concentrations in soil with SSLs for the protection of groundwater were used to indicate the potential for a chemical in soil to adversely impact groundwater. The SSL comparisons were not used to select COPCs for quantitative risk evaluation. Chemicals with maximum concentrations that exceeded the migration to groundwater SSLs are presented and discussed in Sections 7.2.3.1, 7.2.3.2, and 7.2.3.3. The following criteria were used for the SSL comparisons:

- U.S. EPA generic SSLs for migration to groundwater calculated online at http://risk.lsd.ornl.gov/calc_start.shtml based on methodology from the U.S. EPA's Soil Screening Guidance (U.S. EPA, 1996).

- IDEM residential default closure levels for migration of chemicals from soil to groundwater (IDEM, 2004)

Because of the different exposure scenarios for potential human receptors, COPCs were identified for surface and subsurface soil. Surface soil was defined as soil collected from 0 to 2 feet below ground surface (bgs). Subsurface soil was defined as soil collected from depths greater than 2 feet bgs.

Sediment

No specific screening levels exist for human exposure to sediment. COPCs for sediment were selected by comparing detected site concentrations to screening levels based on the following:

- IDEM residential default closure levels for direct contact (IDEM, 2004)
- U.S. EPA Region 9 PRGs for residential soil (U.S. EPA, 2004)

A chemical detected in sediments was selected as a COPC for sediments if the maximum detected concentration exceeded screening levels based on these criteria. The use of soil screening criteria for sediment COPC identification is regarded as a conservative approach because exposure to sediment is expected to be less than exposure to soil. U.S. EPA generic SSLs for transfers from soil to air and for migration to groundwater are not considered to be appropriate for sediment screening because of the high moisture content associated with sediment matrices.

Groundwater/Surface Water

The same screening levels were used to select COPCs for groundwater and surface water. The following criteria were used as the basis of the screening criteria:

- IDEM residential default closure levels for groundwater (IDEM, 2004)
- U.S. EPA Region 9 PRGs for tap water (U.S. EPA, 2004)
- U.S. EPA MCLs (U.S. EPA, 2004b)

If the maximum concentration of a constituent exceeded any screening levels based on these criteria, the chemical was selected as a COPC and carried through the quantitative risk assessment.

Risk-based COPC screening levels for tap water ingestion, which are based on daily, residential exposure assumptions, were used to select COPCs for groundwater and surface water. In general, the use of tap water screening levels is regarded as a highly conservative approach to COPC selection at SWMU 13 because groundwater at the site is not used as a potable drinking water source. Potential human exposure to the surface water in intermittent ditches, streams, and ponds located within SWMU 13 is expected to be limited to incidental exposures such as that which occurs during trespassing, which is anticipated to be significantly less than the daily exposure assumed for the tap water ingestion scenario.

Federal Ambient Water Quality Criteria (AWQCs) were not used to select COPCs for surface water. AWQCs applicable to the protection of human health assuming routine consumption of water were not used because the conservative IDEM residential closure levels for residential groundwater, U.S. EPA Region 9 PRGs for tap water, and the U.S. EPA MCLs were used to select COPCs for groundwater and surface water. In addition, the surface water bodies present within and downgradient of the sites do not support game fish populations because of their size and intermittent nature.

Lead as a COPC

Limited criteria are available to evaluate the potential risks associated with lead. There are no risk-based concentrations for this chemical because the U.S. EPA has not derived toxicity values (i.e., cancer slope factors, reference doses) for lead. However, recommended screening levels are available for lead in soil that are used to indicate the need for response activities.

Guidance from both the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) and the Office of Solid Waste and Emergency Response (OSWER) recommend 400 mg/kg as the lowest screening level

for lead-contaminated soil in a residential setting where children are frequently present (U.S. EPA, 1994a). The IDEM default closure level for residential exposures to soil is also 400 mg/kg. OPPTS identifies 2,000 to 5,000 mg/kg as an appropriate range for areas where contact with soil by children in a residential setting is less frequent. A value of 400 mg/kg was used as the screening level for soil and sediment in the HHRA for SWMU 13.

The IDEM default closure level and Safe Drinking Water Act Action Level of 15 µg/L was used as the screening level for lead in groundwater and surface water.

Essential Nutrients and Chemicals without Toxicity Criteria

The essential nutrients calcium, magnesium, potassium, and sodium were not identified as COPCs because these inorganic chemicals are naturally abundant in environmental matrices and are only toxic at high doses. In addition, because of the lack of toxicity criteria, risk-based COPC screening levels are not available for some chemicals (e.g., 2-methylnaphthalene, benzo(g,h,i)perylene, phenanthrene, diamino-nitrotoluenes, DNX, MNX, and TNX). Appropriate surrogates were selected for some of these chemicals based on similar chemical structures. Pyrene was used as the surrogate for benzo(g,h,i)perylene and phenanthrene and naphthalene was used as the surrogate for 2-methylnaphthalene Suitable surrogate compounds could not be determined for diamino-nitrotoluenes, DNX, MNX, and TNX. The uncertainty associated with the omission of these chemicals from the quantitative risk assessment is discussed in the uncertainty section of the risk assessment.

Determination of Site-Related Chemicals (Background Evaluation)

The evaluation of chemical concentrations detected in SWMU 13 media in relation to background levels follows guidance presented in the U.S. EPA's Role of Background in the CERCLA Cleanup Program (U.S. EPA, 2002b). This guidance document recommends that chemicals which exceed risk-based screening concentrations be evaluated in the quantitative risk assessment. Therefore, if the maximum concentration of any chemical exceeded screening levels, the chemical was selected as a COPC and risks were calculated for that chemical and are presented in Section 7.5. Site-specific background issues are discussed in the risk characterization section (Section 7.5). This discussion includes comparisons of concentrations of chemicals detected in SWMU 13 media (if appropriate) with basewide background data for soil (see Section 5.2.4) and site-specific background data for surface water and sediment (Note that no background or upgradient data are available for groundwater).

Frequency of Detection

Chemicals were eliminated from the COPC list if detected at a frequency of less than 5 percent in a medium. A frequency screen was conducted only when there were 20 or more samples in the medium of concern. The decision to eliminate a chemical because of low detection frequency was also based on site history (i.e., whether there a reason to believe that a chemical may be related to past site activities) and the magnitude of the concentration (i.e., whether the concentration of a chemical indicates a potential hotspot area). Note that no chemicals were eliminated as COPCs on the basis of frequency of detection.

7.2.2.2 Decision Rules for Establishing COPCs

The following decision rules were used to select initial lists of COPCs for SWMU 13:

- A chemical detected in groundwater, soil, surface water, or sediment was selected as a COPC if any detected chemical concentration exceeded the screening levels described in Section 7.2.2.1.

- If a chemical was not detected in any of the samples in a particular medium, but detection limits exceeded the risk-based screening levels, the chemical was not selected as a COPC but is qualitatively discussed in the uncertainty analysis section.

7.2.3 COPCs Selected for HHRA

COPCs at SWMU 13 were selected for surface soil, subsurface soil, groundwater, surface water, and sediment using the risk-based COPC screening levels described in Section 7.2.2.1. A discussion of the chemicals identified as COPCs and the rationale for COPC selection are provided in the following subsections. COPC selection tables for each medium are presented in Tables 7-1 through 7-11. Chemicals retained as COPCs for SWMU 13 are presented in Table 7-12. The Risk Assessment Guidance for Superfund (RAGS) Part D tables for COPC selection is included in Appendix I.

7.2.3.1 Surface Soil (0 to 2 feet)

This section discusses the COPC selection for chemicals detected in surface soil samples collected during the field investigations conducted in 2003/2004. Two (2) VOCs, 16 SVOCs, 1 PCB (Aroclor-1248), and dioxins/furans were detected in surface soil samples collected in the areas near Buildings 166 and 171. The RFI samples were not analyzed for energetics or inorganics (analyses for these constituents were conducted during the bioremediation program. The maximum detected surface soil concentrations were compared to screening levels based on the U.S. EPA Region 9 PRGs for residential land use and

IDEM residential default closure levels for direct contact. The following chemicals were retained as COPCs for surface soil at SWMU 13:

- Dioxins/Furans
- PAHs - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene
- Aroclor-1248

The COPC selection for direct contact with surface soil is presented in Table 7-1

A comparison of the maximum detected surface soil concentrations to U.S. EPA SSLs for chemical migration from soil to air is presented in Table 7-2. Concentrations reported for all chemicals were less than the U.S. EPA SSLs for soil to air; therefore, exposures through inhalation of fugitive dust emissions from surface soil were not evaluated quantitatively in the HHRA.

The maximum detected surface soil concentrations were also compared to U.S. EPA SSLs for chemical migration from soil to groundwater and IDEM residential default closure levels for migration to groundwater in Table 7-2. The following chemicals were detected in surface soil at maximum concentrations that exceeded the screening levels for migration from soil to groundwater:

- Dioxins/Furans
- PAHs - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene
- Aroclor-1248

Note that the migration to groundwater comparisons presented in Table 7-2 were not used to select COPCs but to indicate the potential for chemicals in soil to impact groundwater. None of the chemicals listed above are considered to be mobile in soil as evidenced by the fact that they have not been detected in groundwater samples collected at SWMU 13. Also note that the PAHs shown above exceeded U.S. EPA migration to groundwater SSLs but the maximum concentrations of the PAHs were less than (often an order of magnitude less than) the IDEM Closure Levels for migration to groundwater shown in Table 7-2.

7.2.3.2 Subsurface Soil (Greater then 2 feet)

This section discusses the COPC selection for chemicals detected in subsurface soil samples collected during the field investigations conducted in 2003/2004. Five (5) VOCs, seven SVOCs, one PCB, one herbicide (pentachlorophenol), and dioxins/furans were detected in the subsurface soil samples collected in the areas near Buildings 166 and 171. The RFI subsurface soil samples were not analyzed for energetics or inorganics because sampling and analysis for these constituents were conducted during the bioremediation program. The maximum detected surface soil concentrations were compared to screening levels based on U.S. EPA Region 9 PRGs for residential land use and IDEM residential default closure levels for direct contact. The following chemicals were retained as COPCs for surface soil at SWMU 13:

- Dioxins/Furans
- Aroclor-1248

The COPC selection for direct contact with subsurface soil is presented in Table 7-3

A comparison of the maximum detected subsurface soil concentrations to U.S. EPA SSLs for chemical migration from soil to air is presented in Table 7-4. Concentrations reported for all chemicals were less than the U.S. EPA SSLs for soil to air; therefore, exposures through inhalation of fugitive dust emissions from subsurface soil were not evaluated quantitatively in the HHRA.

The maximum detected subsurface soil concentrations were also compared to U.S. EPA SSLs for chemical migration from soil to groundwater and IDEM residential default closure levels for migration to groundwater in Table 7-4. The following chemicals were detected in subsurface soil at maximum concentrations that exceeded the COPC screening levels for migration from soil to groundwater:

- Dioxins/Furans
- 3&4-methylphenol
- Aroclor-1248

The migration to groundwater comparisons presented in Table 7-4 were not used to select COPCs but to indicate the potential for chemicals in soil to impact groundwater. Of the chemicals listed above, dioxins/furans and Aroclor-1248 are not considered to be mobile in soil and have not been detected in groundwater samples collected at SWMU 13. 3&4-Methylphenol is considered to be a more environmentally mobile chemical but neither 3&4-methylphenol or any other phenols were detected in

SWMU 13 groundwater samples. Also the maximum concentration of 3&4-methylphenol in subsurface soils was less than the IDEM Closure Level for the protection of groundwater.

7.2.3.3 Historical and Bioremediated Soil (Surface and Subsurface)

Soil data (generally 0 – 3 feet bgs) collected during the SWMU 13 remediation program conducted by MK and TT and reported in the IMR (TT, 2002) were also used to select COPCs. The COPC selection process for the historical data is presented in Table 7-5. The data summarized in Table 7-5 are expected to portray current site conditions (i.e., after remediation) in the six building areas investigated during the remediation program. The IMR indicated that explosives, nine metals (aluminum, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), and six VOCs (acetone, methyl ethyl ketone, methylene chloride, methyl isobutyl ketone, toluene, and xylenes) were COCs for SWMU 13. Pre-remediation and post-remediation samples were analyzed for these constituents only. IMR Appendix E (ICS analytical results), IMR Appendix H (PES results), and IMR Table 4-2 (bioremediated soil analytical results) were used as the sources of the historical data. Samples from areas known to be excavated were removed from the data set prior to COPC analysis. The sample frequencies shown in Table 7-5 represent the sums of ICS, PES, and bioremediated samples. A more detailed discussion on the use of the historical data is presented in Section 7.3.3.

The following chemicals were retained as COPCs for surface and subsurface based on the historical sample results:

- Energetics - 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, and RDX
- Metals - aluminum, arsenic, barium, and mercury

Aluminum, barium, and mercury were selected as COPCs in surface/subsurface soil because the maximum detected concentrations exceeded the screening levels (set at an HI of 0.1). However, they did not exceed the U.S. EPA Region 9 PRGs for soil or IDEM default closure levels for direct contact with soil.

The comparison of the maximum detected soil concentrations to U.S. EPA SSLs for chemical migration from soil to air presented in Table 7-6 indicates that concentrations for all chemicals were less than the U.S. EPA SSLs for soil to air; therefore, exposures through inhalation of fugitive dust emissions from soil in the six building areas investigated in the bioremediation program were not evaluated quantitatively in the HHRA.

The maximum detected surface soil concentrations were also compared to U.S. EPA SSLs for chemical migration from soil to groundwater and IDEM residential default closure levels for migration to groundwater in Table 7-6. The following chemicals were detected in surface soil at maximum concentrations that exceeded the COPC screening levels for migration from soil to groundwater:

- VOCs - acetone and methylene chloride
- Metals - aluminum, arsenic, barium, cadmium, chromium, lead, mercury, and selenium

The migration to groundwater comparisons presented in Table 7-6 were not used to select COPC, but were used to indicate the potential for chemicals in soil to impact groundwater. Acetone and methylene chloride are considered to be very mobile in soil and may leach to groundwater. However, both of these chemicals are common laboratory contaminants which were detected in laboratory blanks (TT, 2002) and they have not been detected in groundwater samples collected at SWMU 13.

Since metals are naturally occurring, it is often difficult to assess the impact of metal migration on groundwater. In the case of SWMU 13, this is more difficult because of the lack of background data for groundwater. In addition, metals generally are not likely to leach to groundwater under normal environmental conditions (in a dissolved phase), but are more likely to be transported on particulate matter. Of the metals that exceeded the soil-to-groundwater SSLs, only aluminum is known to have been used in processes and operations at SWMU 13. Barium, cadmium, chromium, and lead are listed as potential hazardous wastes at SWMU 13 in the Phase I RFI (Halliburton NUS, 1992) because of their presence in grit blast residue. However, cadmium was detected in only 2 of 82 groundwater samples and the distribution of barium, chromium, and lead in soil and groundwater across SWMU 13 is relatively uniform indicating that they are most likely representative of background concentrations (Section 5.2.4). Of the other metals listed above, silver was not detected in any groundwater samples and selenium was detected in only 5 of 82 samples. In addition, as discussed in Section 5.2.4, the concentrations of the metals detected in soil are either within basewide background levels or are slightly elevated above background (i.e., average concentrations are within a factor of two of the average Crane background concentrations). An additional factor to consider in the fact that turbidity in the groundwater samples (see Section 7.2.3.4) appears to have affected the analysis of some metals (e.g., aluminum, barium, chromium, and lead). The available evidence indicates that, even though the maximum concentrations of most metals exceeded the soil-to-groundwater SSLs, the groundwater at SWMU 13 has not been impacted by leaching of these metals from soil.

Migration to groundwater criteria are currently not available for several of the major explosive site contaminants (i.e., RDX, HMX and the amino-dinitrotoluenes). However, these compounds as well as other explosives were detected in surface soil, subsurface soil, and groundwater at concentrations that exceeded screening criteria indicating that groundwater has been impacted by explosives migrating from soil.

7.2.3.4 Groundwater

The groundwater data set consists of analytical results for Rounds 1, 2, and 3 groundwater samples (filtered and unfiltered) collected from the upper and lower aquifer in 2003 and 2004. Data from all three sampling rounds were included in the data set because there was not a significant difference in constituent concentrations between the three rounds. One (1) VOC, 17 energetics, 24 total metals, ammonia, and nitrate/nitrite-N were detected in groundwater samples. The comparison of the maximum detected groundwater concentrations to screening levels based on the U.S. EPA Region 9 PRGs for ingestion of tap water, U.S. EPA MCLs, and IDEM groundwater default closure levels is presented in Table 7-7. The following chemicals were retained as COPCs for groundwater at SWMU 13:

- Energetics – 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 2-nitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, and RDX

- Inorganics(unfiltered) – aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, iron, lead, lithium, manganese, nickel, vanadium, zinc, and nitrite/nitrate-N

- Inorganics(filtered) – aluminum, antimony, arsenic, barium, beryllium, cobalt, iron, lead, lithium, manganese, nickel, and vanadium

1,3-Dinitrobenzene, 2,6-dinitrotoluene, HMX, barium, cadmium, and cobalt were selected as COPCs because the maximum detected concentrations exceeded the screening levels (set at an HI of 0.1). However, they do not exceed the U.S. EPA Region 9 PRGs and IDEM default closure levels for tap water. The maximum concentrations of barium and cadmium were also less than U.S. EPA MCLs. Elevated concentrations for some metals in groundwater appear to have been caused by particulate matter in the samples. For example, the maximum concentration of aluminum (139,000 µg/L) was detected in unfiltered sample 13GWT0502. However, aluminum was not detected in the associated filtered sample (13GWT0502-F) collected at the same time and location. The uncertainty associated with turbidity in the samples on the calculated risks is discussed in the risk characterization section (Section

7.5). Note that, of the metals identified as COPCs, only aluminum (as aluminum powder) is known to have used in SWMU 13 operations.

7.2.3.5 Surface Water

As discussed in Sections 2.5.2, 3.1, and 5.3, surface water (and sediment) samples were collected from intermittent streams, drainage ditches, surface run-off locations, and sumps throughout SWMU 13. The surface water samples have been classified as either gully or mainstream samples. Gully samples are samples that were collected on the steeper hillsides and generally represent drainage channels that are typically dry, except for storm events. Mainstream samples were collected in streams with more frequent occurrences of flowing water where the chance of finding water and true, water-covered sediments was higher than in the gullies. This classification has been retained for risk assessment purposes because of the differences in environmental conditions and analytical results for the gully and mainstream samples. Therefore, COPCs for mainstream surface water and gully surface water are listed separately in Tables 7-8 and 7-9, respectively. Filtered samples were also collected from the surface water locations. A comparison of the filtered and unfiltered sample results showed noticeable differences in the concentrations of some metals (e.g., aluminum and lead) indicating that turbidity in the samples may have caused concentrations for total metals to be elevated. In addition, the concentrations of some PAHs (e.g., benzo(a)pyrene and indeno(1,2,3-cd)pyrene) were close to or exceeded published water solubility levels (IDEM, 2004) indicating that these compounds were probably present on particulate matter and that the concentrations were due to turbidity in the samples.

<u>COPC Selection for Mainstream Surface Water</u>

Three (3) energetics, 11 metals, and nitrate/nitrite-N were detected in mainstream surface water samples.

The following chemicals were retained as COPCs for mainstream surface water:

- RDX
- Barium (filtered only, there were no exceedances in the unfiltered samples)

<u>COPC Selection for Gully Surface Water</u>

Nine (9) PAHs, 10 energetics, 1 herbicide (pentachlorophenol), 22 metals, ammonia, and nitrate/nitrite-N were detected in gully surface water samples.

The following chemicals were retained as COPCs for gully surface water:

- PAHs - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene

- Energetics – 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, and RDX

- Inorganics(unfiltered) – aluminum, arsenic, chromium, iron, lead, manganese, vanadium, and nitrite/nitrate-N

- Inorganics(filtered) – arsenic, iron, manganese, vanadium

These constituents were identified as COPCs in surface water because the maximum concentrations exceeded one or more of the human health screening levels (i.e., U.S. EPA Region 9 risk-based screening concentrations, federal MCLs or secondary maximum contaminant levels (SMCLs), and IDEM residential default closure levels for groundwater), and concentrations in the upgradient samples. Barium was selected as a COPC in mainstream surface water because the maximum detected concentration exceeded the screening level (set at an HI of 0.1). However, it did not exceed the U.S. EPA Region 9 PRG, IDEM default closure level for tap water, or the U.S. EPA MCL for barium. TNT, HMX, and chromium were selected as COPCs for gully surface water because the maximum detected concentrations exceeded the screening levels (set at an HI of 0.1). However, they do not exceed the U.S. EPA Region 9 PRGs and IDEM default closure levels for tap water. The maximum concentration of chromium was also less than U.S. EPA MCL. In addition, of the metals identified as COPCs, only aluminum (as aluminum powder) is known to have used in SWMU 13 operations.

Note that the use of these criteria for surface water assumes that the surface water is used as a drinking source (i.e., potential receptors ingest 2 liters of water per day/350 days per year). Drinking water criteria were used because surface water criteria for human health are currently not available. The use of these criteria for screening and risk assessment is conservative because it is unlikely that the water in the surface water at SWMU 13 would ever be used as a source of drinking water. Upgradient surface water samples were also collected during the RFI. Comparisons of surface water concentrations with concentrations in the upgradient samples are presented in Tables 7-8 and 7-9 and discussed in Section 7.5.

7.2.3.6 Sediment

As with surface water, COPCs for sediment were selected for mainstream and gully samples. Tables 7-10 and 7-11 summarize the COPC selection process for mainstream and gully sediment, respectively.

COPC Selection for Mainstream Sediment

Mainstream sediment samples were analyzed for energetics and metals only. Twenty-two (22) metals were detected in mainstream sediment samples.

The following chemicals were retained as COPCs for mainstream sediment:

- Inorganics – aluminum, antimony, arsenic, cadmium, iron, manganese, and vanadium

COPC Selection for Gully Sediment

Eighteen (18) SVOCs, 2 energetics, 1 herbicide (pentachlorophenol), and 25 metals were detected in gully sediment samples.

The following chemicals were retained as COPCs for gully sediment:

- PAHs - benzo(a)pyrene and dibenzo(a,h)anthracene
- Inorganics – aluminum, arsenic, barium, cadmium, chromium, iron, lead, manganese, and vanadium

These constituents were identified as COPCs in sediment because maximum concentrations exceeded screening levels based on the U.S. EPA Region 9 risk-based screening levels for residential soil and IDEM residential default closure levels for direct contact. Aluminum, antimony, and cadmium were selected as COPCs in mainstream sediment because the maximum detected concentrations exceeded the screening level (set at an HI of 0.1). However, they did not exceed the U.S. EPA Region 9 PRGs for soil. Aluminum, barium, and cadmium were selected as COPCs in gully sediment because the maximum detected concentrations exceeded the screening level (set at an HI of 0.1). However, they did not exceed the U.S. EPA Region 9 PRGs for soil.

The use of the U.S. EPA Region 9 and IDEM risk-based concentrations for soil to evaluate COPC concentrations in sediment is conservative because these criteria were established assuming residential land use scenarios (e.g., routine daily contact with soils). However, it is anticipated that a human receptor would be exposed to the sediments in gullies and streams of the site on a less frequent basis than is

assumed for a typical residential exposure to soil. Consequently, the use of soil criteria for screening and risk estimation is likely to overestimate potential risks from exposure to sediment. Comparisons of gully and mainstream sediment concentrations with concentrations in the upgradient samples are presented Tables 7-10 and 7-11.

7.2.4 Summary

Table 7-12 summarizes the chemicals retained as COPCs for soil, groundwater, surface water, and sediment at the SWMU 13. RAGS Part D tables for COPC selection are included in Appendix I.

7.3 EXPOSURE ASSESSMENT

This portion of the risk assessment defines and evaluates, quantitatively or qualitatively, the type and magnitude of human exposure to the chemicals present at or migrating from a site. The exposure assessment is designed to depict the physical setting of the site, to identify potentially exposed populations and applicable exposure pathways, to calculate concentrations of COPCs to which receptors might be exposed, and to estimate chemical intakes under the identified exposure scenarios.

Actual or potential exposures at SWMU 13 were determined based on the most likely pathways of contaminant release and transport, as well as human activity patterns. A complete exposure pathway has three components: a source of chemicals that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for a human receptor.

7.3.1 Conceptual Site Model

This section discusses the conceptual site model (CSM) for SWMU 13. A CSM facilitates consistent and comprehensive evaluation of the potential risks to human health by creating a framework for identifying the pathways by which human receptors may come in contact with environmental media contaminated by site activities. A CSM depicts the relationships among the following elements, which are necessary for defining complete exposure pathways:

- Site sources of contamination
- Contaminant release mechanisms and transport/migration pathways
- Exposure routes
- Potential receptors

Section 6.2 presented a detailed CSM for SWMU 13. This section summarizes the CSM as it applies to the HHRA. Figure 7-2 illustrates the CSM for SWMU 13.

The elements of the CSM (contaminant source, release mechanisms, transport/migration pathways, exposure routes, and potential receptors) establish the manner and degree to which a potential receptor may be exposed to chemicals present at the site. The degree of risk incurred by a potential receptor varies according to the means of exposure, the duration of exposure, and the specific chemical to which the receptor is exposed. An exposure, however long in duration, does not necessarily result in an "unacceptable" health or environmental risk, although risks generally increase with increased frequency and/or duration of exposure.

The elements of the CSM, including how they pertain to SWMU 13 are discussed below. Sources of contamination, contaminant release mechanisms, transport and migration pathways, exposure routes, and potential receptors are defined. Table 7-13 provides a site-specific summary of the potential receptors evaluated for SWMU 13. A summary of the exposure routes addressed quantitatively for each human receptor is also provided in Table 7-13.

Site Sources of Environmental Contamination

Based on historical site data and sampling, the following parameters are among the site-related chemical contaminants known to be present or potentially present in environmental media at SWMU 13:

- Explosives (e.g., TNT, HMX, and RDX) and their degradation products (e.g., 2-amino-4,6-dinitrotoluene)
- Metals (e.g., aluminum)
- PCBs (from PCB oils leaked from therminol boilers)

Potential Contaminant Release Mechanisms and Transport/Migration Pathways

Based on available historical information for SWMU 13, releases of potentially hazardous constituents to environmental media have occurred as a result of historical site operations in the Mine Field B area. Media of concern at Mine Fill B have historically included soil, air, surface water, and groundwater (Halliburton NUS, 1992). Soil was considered a major pathway because explosive powders and particulates were washed from the rooftops of the process buildings onto nearby soil. Air was considered a migration pathway because particulates had been released from building ventilation systems. However, air is no longer considered a major pathway because a particulate abatement system was installed in

1973. Surface water was considered a migration pathway because explosive powders and particulates from the rooftops of the process buildings were also deposited onto nearby drainageways. In addition, explosive-contaminated wastewater was collected in sumps and released to the surface drainage system that mainly drains to the northwest. This drainage enters an intermittent flowing tributary of Boggs Creek, which flows in a general southward direction and exits the southern boundary of NSWC Division, discharging to the East Fork of the White River. Surface drainage also flows southeast of Mine Fill B and enters intermittent drainageways that flow into Turkey Creek (located approximately 1 mile from Mine Fill B). Turkey Creek flows south-southeastward and merges with Boggs Creek. It is also known that PCB-containing oils leaked from therminol boilers (removed in 1989) located near Buildings 166 and 171, contaminating the surrounding soil. Based on the historical information, plausible contaminant release and migration mechanisms for SWMU 13 include the following:

- Transport of surface soil contaminants to the subsurface soils and groundwater (and from one aquifer to another) via infiltration, percolation, and migration within the groundwater aquifer.

- Overland runoff of surface waters, sediments, and surface soil from SWMU 13 via ditches and culverts to intermittent drainageways on the northwestern and southeastern borders of the Mine Fill, eventually flowing into Turkey Creek and Boggs Creek.

- Migration of contaminants in groundwater (i.e., lateral migration) to potential receptor locations downgradient of SWMU 13 source areas and beyond the NSWC Crane boundary.

- Migration of fugitive dusts and VOCs from surface soils and subsurface soils (if construction and excavation activities occur).

A more detailed conceptual site model analysis is presented in Section 6.0.

Potential Current and Future Receptors of Concern and Exposure Pathways

NSWC Crane is an active naval base and will remain active for the foreseeable future. SWMU 13 is an active facility, and operations at this facility are expected to continue in the foreseeable future. However, for purposes of completeness, the baseline risk assessment considered receptor exposure under residential, industrial, and recreational land use scenarios. Based on current and potential future land use, the following potential receptors may be exposed to contaminated environmental media within the study area:

- **Maintenance Workers** – A plausible receptor under current and future land use. This includes adult military or civilian personnel assigned duties on an infrequent basis within the study areas (e.g., groundskeeping activities, storm sewer and drainage maintenance). This receptor could be exposed to soils (incidental ingestion; dermal contact), surface water (dermal contact), sediments (incidental ingestion; dermal contact), and air (inhalation). Direct contact with groundwater or subsurface soils is not anticipated for this receptor.

- **Occupational Worker** – A plausible receptor under current and future land use. This includes adult military or civilian personnel assigned to routine daily work tasks. This receptor could be exposed to soil (incidental ingestion; dermal contact) and air (inhalation). In addition, it was conservatively assumed that the occupational worker may be exposed to groundwater (ingestion; dermal contact). (It should be noted that a public water supply is not currently available within the study areas.) It is anticipated that this receptor would not be routinely exposed to subsurface soils, surface waters, or sediments. This receptor is expected to be exposed on a more frequent basis than the maintenance or construction worker.

- **Trespassers** – A plausible receptor under current or future land use. Although access to the base is controlled, once inside the base, access to the study area is not limited by any physical constraints. In addition, hunting activities are permitted at the base. Because the study area is relatively remote and surrounded by forested areas, hunters (particularly adolescents) may trespass within the study area. This receptor may be exposed to potentially contaminated soil (incidental ingestion; dermal contact), air (inhalation), and surface water (incidental ingestion; dermal contact) and sediments (incidental ingestion; dermal contact) in the intermittent streams. However, exposure to surface water is likely to be limited in some areas because of the intermittent nature of the surface water in swales and drainage ditches. Also potential exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming. Direct contact with groundwater or subsurface soils is not anticipated for this receptor.

- **Construction Workers** – A plausible receptor under future land use. No construction activities are currently planned for the study area. Additionally, the shallow depth to groundwater in some sections of the study areas would likely preclude excavation and construction. However, excavation and construction are plausible in other sections of the study areas. Consequently, this receptor could be exposed to surface and subsurface soils (to an estimated maximum depth of 10 feet bgs) (incidental ingestion; dermal contact), groundwater (dermal contact), and air (inhalation). Routine exposure to surface water and sediments is not expected for the construction worker. It should be noted that significant exposures by a construction worker to groundwater are unlikely because if a construction

worker were to have prolonged contact with groundwater, he/she would most likely wear protective clothing such as rubber boots and/or hip waders, which would limit receptor exposure. In addition, most excavation activities would utilize construction equipment such as a back hoe, which would limit a construction worker's exposure. Also, if significant groundwater was encountered during an excavation of a trench or foundation, groundwater would most likely be pumped out of the excavation so that the construction activities could be completed.

- **Recreational Users** – A plausible receptor under future land use. If NSWC Crane were to close, the most likely scenario is that the property would be converted to a park. A recreational user may be exposed to potentially contaminated soil (incidental ingestion; dermal contact), air (inhalation), surface water (incidental ingestion; dermal contact), and sediments (incidental ingestion; dermal contact). Exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming. In addition, it was conservatively assumed that the recreational user may be exposed to groundwater (ingestion; dermal contact) while cleaning up (e.g., washing hands, face, and legs) after visiting the hypothetical park. (A public water supply is not currently available within the study area.) NSWC Crane is not expected to close because principal base operations, the demilitarization of munitions, are critical to the support of the United States Naval fleet.

- **On-Base Residents** – An unlikely receptor under future land use. Although this scenario is highly unlikely, a future residential scenario is typically evaluated in a risk assessment for decision-making purposes. For example, the need for deed restrictions at a site may be eliminated prior to site closure if minimal risks are estimated for residential receptors. It is assumed that a hypothetical resident may be exposed to soils (incidental ingestion; dermal contract), groundwater (ingestion, dermal contact), surface water (ingestion; dermal contact), air (inhalation), and sediment (incidental ingestion; dermal contact). Potential exposures to surface water will be limited to wading because the streams at the sites are not deep enough for swimming.

Details regarding the assumed receptor characteristics (e.g., intake rate, frequency, duration of exposure) are defined in Section 7.3.4.

7.3.2 Central Tendency Exposure vs. Reasonable Maximum Exposure

Traditionally, exposures evaluated in the HHRA were based on the concept of a reasonable maximum exposure (RME) only, which is defined as "the maximum exposure that is reasonably expected to occur at a site" (U.S. EPA, 1989). However, subsequent risk assessment guidance (U.S. EPA, 1992) indicates the need to address an average case or central tendency exposure (CTE).

To provide a full characterization of potential exposure, both RME and CTE scenarios were evaluated in the HHRA for SWMU 13. The available guidance (U.S. EPA, 1993a) concerning the evaluation of CTE is limited and at times vague. Therefore, professional judgment was exercised when defining CTE conditions for a particular receptor at a site.

7.3.3 Exposure Point Concentrations

The exposure point concentration (EPC), which is calculated for COPCs only, is an estimate of the chemical concentration within an exposure unit (EU) likely to be contacted over time by a receptor and is used to estimate exposure intakes. An exposure unit is defined as the area typically encountered/traversed by a receptor under a particular land use scenario. For example, a residential lot size of ¼ acre to 2 acres is often used for the evaluation of a hypothetical future resident. However, the size of an EU is typically based on the distribution of the chemical concentrations in a medium as well as on presumed receptor activity patterns.

The following EUs were considered in the risk assessment for SWMU 13.

- Soil – The IMR (TT, 2002) designated six areas as potentially impacted by historical operations at SWMU 13. These included the areas around Buildings 165, 166, 167/168/2500, 171, 172/173/2501, and 174. As indicated in the IMR, ICS were collected in 1998 and 1999 and analyzed for explosives, the eight RCRA metals plus aluminum, and six VOCs (see Table 1-1). As a result of the ICS, the areas around Building 166, 167/168/2500, 171, and 172/173/2501 were excavated because of elevated concentrations of explosives, mainly RDX. The excavated areas were subsequently backfilled with bioremediated soil which met either residential or industrial cleanup goals. The areas around Buildings 165 and 174 did not require remediation because explosive concentrations were less than cleanup goals. The six areas listed above were designated as EUs for SWMU 13 and were considered for quantitative risk evaluation.

- Soil samples were collected in two areas near Buildings 166 and 171 in the 2003/2004 RFI to evaluate the nature and extent of PCB contamination. These samples were also analyzed for dioxins, herbicides, semivolatile organic chemicals, volatile organic chemicals, and pesticides. Data from these two areas were included in the quantitative risk evaluation of Buildings 166 and 171. The 2003/2004 RFI samples were not collected in the same locations as the historical samples.

- Surface water and sediment – Two EUs were defined for evaluating risks from surface water and sediment, mainstream and gullies. Mainstream and gullies were evaluated as distinct EUs because of differences in location and because of considerable differences in analytical results. As stated previously, gully samples are samples that were collected on the steeper hillsides and generally represent drainage channels that are typically dry, except for storm events. Mainstream samples were collected in streams with more frequent occurrences of flowing water where the chance of finding water and true, water-covered sediments was higher than in the gullies. The gully samples were collected at locations near and around the building areas and are more likely to be impacted by contamination from these areas. Mainstream samples were collected from a stream at the bottom of the hill on the western side of the site. It is possible that surface water from gullies on this side of the site could impact mainstream surface water.

- Groundwater – Groundwater was treated as one EU for risk assessment purposes.

The following guidelines were used to calculate the EPCs for the EUs defined above:

- If a soil, surface water, or sediment data set for an EU contained fewer than 10 samples, the EPC for the RME and CTE cases was defined as the maximum detected concentration.

- If a surface water or sediment data set for an EU contained 10 or more samples, the 95-percent upper confidence limit (UCL) on the arithmetic mean, which was based on the distribution of the data set, was selected as the EPC for the RME and CTE case. EPCs were calculated following U.S. EPA's Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (U.S. EPA, 2002c) using the U.S. EPA's ProUCL guidance (Singh, A., et al., 2004).

- The EPCs for groundwater were the arithmetic averages of wells in the highly concentrated area of the explosive (mainly RDX) plume. This area was judged to be the area on the ridge encompassing Buildings 166, 167/168/2500, 171, and 172/173/2501 based on RDX concentrations. The following locations were used to calculate the average groundwater EPCs: 13MWT-09, -11, -12, -13, -15, -16, -17,-18, -20, -21, -27, - 29, and -34. There is some uncertainty associated with using RDX concentrations to define the highly concentrated area of the plume because of the possibility that elevated concentrations of other chemicals (e.g., metals) may be omitted. This uncertainty is discussed in Section 7.6.

- EPCs for soil data sets containing more than 10 samples were calculated using several different approaches. Different methods were used to calculate the EPCs because the soil conditions and

data sets in areas where remediation had occurred (represented by historical data) are different from areas investigated in the RFI in 2003/2004. The methodologies used to calculate soil EPCs are as follows:

- For samples collected in the two areas investigated in the 2003/2004 RFI, the EPCs for surface/subsurface soil were the 95 percent UCLs calculated as described above.

- For historical samples reported in the IMR, EPCs were calculated using a weighted average approach. A weighted average approach was used for the historical data because the concentrations reported for the historical samples represent different volumes of material left in place after remediation. Another reason that a weighted average approach was selected was that the concentrations of the bioremediated soil, which constitutes a large portion of the soil volume, are averages of windrow data calculated in the IMR. Often materials from different windrows were placed in the same excavated grid area. Therefore, windrow data represented by average concentrations were mixed with other windrows in the same excavated grid. The materials in the remediated areas consist of the following:

  1. Soil in areas (grids) which did not need to be excavated because ICS concentrations were less than residential or industrial cleanup goals (The residential and industrial cleanup goals for RDX used in the IMR were 4 mg/kg and 17 mg/kg, respectively).

  2. Bioremediated soil which was backfilled into excavated areas. The bioremediated soil was placed in the excavated areas only if explosive concentrations in the bioremediated soil met cleanup goals. Since the grids were usually excavated to a depth of 3 feet, the backfilled bioremediated soil could be classified as either surface or subsurface soil. Note that the concentrations of explosives in the bioremediated soil presented in the IMR and used in the EPC calculations are <u>averages</u> of samples collected in the compost windrows where the soils were treated.

  3. Soil remaining in areas that were excavated, which are represented by PES results. PES were collected from the sidewalls and bottoms of the excavated grid areas. The IMR does not specify the depth of the sidewall samples and, therefore, the sidewall samples could be interpreted as either surface or subsurface soil.

  4. Soil in a few grids that could not be completely excavated because of obstructions such as water mains, the bottom of the grid was on rock, or because the soil provided support for

electrical lines. The concentrations of explosives in these soils exceeded cleanup goals. Data from the IMR indicates that these areas were excavated as much as possible and backfilled with bioremediated soil. The residual contaminant concentrations in these grids are represented by a mixture of ICS, PES, and bioremediated soil analytical results.

Discussions with TT (by E-mail) and an examination of the grid information presented in Figures 1-5 through 1-12 indicated that the volume of soil left in place (because the soil did not exceed remediation goals) and the volume of backfilled bioremediated soil constitute most of the soil volume in the six building areas evaluated in the IMR (Items 1 and 2 listed above). The amount of soil in the sides and bottoms of the excavated grids (Item 3) constitute a smaller volume of material, and the amount of soil in the few grid areas that could not be completely excavated (Item 4) constitute a very small amount of material.

Based on this analysis, the following weighting scheme was devised to estimate EPCs for soil in the six areas: concentrations in non-excavated areas and backfilled areas (Items 1 and 2) are assumed to represent 90 percent of the soil volume, concentrations in the excavated areas (Item 3) constitute 9 percent of the total soil volume, and residual concentrations in the grids that could not be excavated (Item 4) were assumed to constitute 1 percent of the total soil volume. The assumption of 1 percent is considered conservative because the volume of soil that could not be excavated is likely to be much less than the total soil volume.

The following example demonstrates the EPC calculation using weighted averages.

Example Calculation – RDX at Building 171

- Average of RDX in unexcavated and backfilled grids = 2.25 mg/kg (90% of volume)
- Average of RDX remaining in excavated grids = 2.16 mg/kg (9 % of volume)
- Average of RDX in grids that could not be completely excavated = 167 mg/kg (1% of volume)

$$\text{Weighted average} = (0.9 \times 2.25) + (0.09 \times 2.16) + (0.01 \times 167) = 3.89 \text{ mg/kg}$$

This value was used as the EPC for calculating risks from RDX in surface/subsurface soil at Building 171. Data values less than sample-specific detection limits were substituted with one-half the detection limit.

Table 7-12 summarizes the EPCs used in this HHRA. RAGS Part D Tables for the EPCs are presented in Appendix I.

7.3.4 Chemical Intake Estimation

The methodologies and techniques used to estimate exposure intakes are presented in this section. Intakes for the identified potential receptor groups were calculated using current U.S. EPA risk assessment guidance (e.g., U.S. EPA, 1991, 1997a, and 2004a) and presented in the risk assessment spreadsheets. All quantitative risk assessment results are presented in RAGS Part D format tables (Appendix I).

Non-carcinogenic intakes were estimated using the concept of an average annual exposure. Carcinogenic intakes were calculated as an incremental lifetime exposure, which assumed a life expectancy of 70 years. Assumptions regarding exposure are presented in Tables 7-14 and 7-15 for the RME and CTE scenarios, respectively. The majority of the exposure assumptions that were used to estimate chemical intakes were based on default assumptions described in the standard U.S. EPA guidance and are summarized in Tables 7-14 and 7-15. The following paragraphs discuss the non-default receptor-specific exposure assumptions that were used in the risk assessment.

7.3.4.1 Dermal Contact with Soil/Sediment

Direct physical contact with soil and sediment may result in the dermal absorption of chemicals. Exposures associated with the dermal route are estimated in the following manner (U.S. EPA, 2004a):

$$Intake_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where:

$Intake_{si}$	=	amount of chemical "i" absorbed during contact with soil/sediment (mg/kg/day)
C_{si}	=	concentration of chemical "i" in soil/sediment (mg/kg)
SA	=	skin surface area available for contact (cm^2/day)
AF	=	skin adherence factor (mg/cm^2)
ABS	=	absorption factor (dimensionless)
CF	=	conversion factor (1×10^{-6} kg/mg)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)

AT = averaging time (days);
for non-carcinogens, AT = ED x 365 days/year;
for carcinogens, AT = 70 years x 365 days/year

Exposed surface areas of body available for dermal contact are determined on a receptor-specific basis because they correspond with assumed human activities and clothing worn during exposure events. Current guidance documents (U.S. EPA, 1997a and 2004a) were used to develop the default assumptions concerning the amount of skin surface area available for contact for a receptor. To maintain consistency from project to project, input parameters previously used for other NSWC Crane risk assessments (e.g., TtNUS, 2003c, 2003d) were reviewed when developing the exposed surface areas. The rationales used to select the skin areas were as follows:

- For construction workers, maintenance workers, and occupational workers exposed to surface soil or sediment, the surface area available for soil contact was assumed to be the head, hands, and forearms. The skin surface area is 3,300 squared centimeters (cm^2) for the CTE and RME scenarios. These values represent the 50th-percentile areas for the head, hands, and forearms (U.S. EPA, 2004a).

- For adolescent trespassers, 25 percent of the total body surface area for an adolescent (aged 6 to 16) was assumed to be available for surface soil and/or sediment contact. The RME value (3,820 cm^2) was derived from the 95th-percentile surface area data, and the CTE value (3,100 cm^2) was derived from the 50th-percentile data, as provided in Table 6-6 of the Exposure Factors Handbook (U.S. EPA, 1997a).

- For adult recreational users assumed to be exposed to soil/sediment, the exposed surface area available for contact was the sum of the head, arms, hands, lower legs, and feet of an adult male. This skin surface area is 9,070 cm^2 for the RME and CTE scenarios. This value represents the 50th-percentile areas for the arms, hands, lower legs, and feet (U.S. EPA, 1997a). For a small child recreational user (0 to 6 years old), it was assumed that 50 percent of the body surface area was exposed to surface soil and sediment (i.e., 3,300 cm^2). This value represents the 50th-percentile areas presented in Table 6-6 of the Exposure Factors Handbook (U.S. EPA, 1997a).

- For adult residents exposed to surface soil/sediment, the exposed surface area available for contact will be the U.S. EPA recommended value of 5,700 cm^2 for the RME and CTE scenarios (U.S. EPA 2004a). This value assumes that the adult resident is wearing a short-sleeved shirt, shorts, and shoes; therefore, the exposed skin surface is limited to the head, hands, forearms, and lower legs.

For a child resident, the recommended value of 2,800 cm^2 was used as the exposed skin surface area for the RME and CTE scenarios (U.S. EPA, 2004a). This value assumes that the child resident is wearing a short-sleeved shirt, shorts, and no shoes; therefore, the exposed skin surface area is limited to the head, hands, forearms, lower legs, and feet.

The following values of soil adherence factors provided in RAGS Part E (U.S. EPA, 2004a) were used to evaluate risks from exposure to soil and sediment:

- Construction workers - 0.3 mg/cm^2 for the RME and 0.1 mg/cm^2 for the CTE. These values are the 95th-percentile and geometric mean values for construction workers, respectively (U.S. EPA, 2004a and 2002a).

- Maintenance workers and occupational workers - 0.2 mg/cm^2 for the RME and 0.02 mg/cm^2 for the CTE (U.S. EPA, 2004a).

- Adolescent trespassers, child recreational users, and child residents - 0.2 mg/cm^2 for the RME and 0.04 mg/cm^2 for the CTE. These values are the 95th-percentile and geometric mean values presented for soccer players (teens) playing in moist conditions (U.S. EPA, 2004a).

- Adult recreational users and adult residents - 0.07 mg/cm^2 for the RME and 0.01 mg/cm^2 for the CTE (U.S. EPA, 2004a).

For the constituents identified as COPCs in soil, the following absorption factors were used (U.S. EPA, 2004a):

- PAHs - 0.13
- PCBs – 0.14
- Dioxins/furans - 0.03
- Arsenic - 0.03
- Cadmium - 0.001
- Semivolatile organics - 0.1

- Energetics

  TNT – 0.032

  2-amino-4,6-dinitrotoluene – 0.006

  4-amino-2,6-dinitrotoluene – 0.009

  HMX – 0.006

  RDX – 0.015

As indicated in RAGS Part E, absorption factors for other metals have not been developed due to insufficient data to support a default value. Therefore, risks from dermal absorption of metals (other than arsenic and cadmium) from soil were not quantified in this risk assessment. The uncertainty associated with the omission of these constituents is discussed in the uncertainty analysis.

7.3.4.2 Incidental Ingestion of Soil and Sediment

Incidental ingestion of soil (and sediment) by potential receptors coincides with dermal exposure. Exposures associated with incidental ingestion were estimated in the following manner (U.S. EPA, 1989):

$$Intake_{si} = \frac{(C_{si})(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:

$Intake_{si}$	=	intake of contaminant "i" from soil or sediment (mg/kg/day)
C_{si}	=	concentration of contaminant "i" in soil or sediment (mg/kg)
IR_s	=	ingestion rate (mg/day)
FI	=	fraction ingested from contaminated source (dimensionless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
CF	=	conversion factor (1×10^{-6} kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days); for non-carcinogens, AT = ED x 365 days/year; for carcinogens, AT = 70 years x 365 days/year

The same exposure frequencies and durations used in the estimation of dermal intakes were used to estimate exposure via incidental ingestion for each respective receptor. Default values of 1.0 were used for the fraction of soil ingested from the source for both the RME and CTE scenarios. Sediment ingestion rates were the same as those assumed for soil ingestion except that, for recreational users, the fraction ingested is assumed to be 0.5 for both the RME and CTE scenarios.

7.3.4.3 Dermal Contact with Groundwater and Surface Water

The same equation was used to estimate intakes for dermal contact with groundwater and surface water. Direct contact with groundwater at SWMU 13 is limited to exposure that would occur under residential, recreational, typical industrial (occupational), and construction scenarios. Hypothetical future on-base residential receptors were assumed to use groundwater for domestic purposes (i.e., bathing, showering, dish washing) that can result in dermal exposure. Short-term dermal exposure was assumed to occur for the construction worker during excavation activities and for the hypothetical recreational user or occupational worker receptors that may occasionally use restroom facilities (supplied by groundwater pumped from the underlying aquifer) while working or recreating. (It should be noted that neither restroom facilities nor groundwater supply wells exist at SWMU 13 at this time). Dermal contact with surface water may also occur while receptors are involved in certain activities such as landscaping (maintenance worker), trespassing, or recreational sports (e.g., hiking, wading, etc.).

The following equation was used to assess exposures resulting from dermal contact with water (U.S. EPA, 2004a):

$$DAD_{wi} = \frac{(DA_{event})(EV)(ED)(EF)(A)}{(BW)(AT)}$$

where:

DAD_{wi}	=	dermally absorbed dose of chemical "i" from water (mg/kg/day)
DA_{event}	=	absorbed dose per event (mg/cm^2-event)
EV	=	event frequency (events/day)
ED	=	exposure duration (year)
EF	=	exposure frequency (days/year)
A	=	skin surface area available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days); for noncarcinogens, AT = ED x 365 days/year; for carcinogens, AT = 70 years x 365 days/year

Groundwater exposure for hypothetical future on-base residential receptors using the groundwater as a domestic water supply was assumed to occur on a daily basis. Exposure to groundwater for construction workers, recreational users, or typical occupational workers and exposure to surface water for maintenance workers, trespassers, and recreational users were also assumed to occur each day the receptor visits the study area. Dermal intakes for residents while showering or bathing assumed total

body exposure. For construction workers, trespassers, occupational workers, maintenance workers, and recreational users, the exposed surface area of the body available for contact was based on assumed activities and was similar to the assumptions outlined for dermal contact with soil and sediment. Tables 7-14 and 7-15 summarize recommendations for exposure parameters that will be evaluated in the baseline risk assessments.

The absorbed dose per event (DA_{event}) was estimated using a non-steady-state approach for organic compounds and a traditional steady-state approach for inorganics. For organics, the following equations apply:

$$\text{If } t_{event} < t^{*}, \text{ then : } DA_{event} = (2)(K_p)(FA)(C_{wi})(CF)\left(\sqrt{\frac{6\,\tau\,t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^{*}, \text{ then : } DA_{event} = (K_p)(FA)(C_w)(CF)\left(\frac{t_{event}}{1+B} + 2\,\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

where:

t_{event}	=	duration of event (hour/event)
t^{*}	=	time it takes to reach steady-state conditions (hour)
K_p	=	permeability coefficient from water through skin (cm/hour)
FA	=	Chemical-specific fraction absorbed (dimensionless)
C_{wi}	=	concentration of chemical "i" in water (mg/L)
τ	=	lag time (hour)
π	=	Pi (dimensionless; equal to 3.1416)
CF	=	conversion factor (0.001 L/cm^3)
B	=	Dimensionless ratio of the permeability of the stratum corneum relative to the permeability across the viable epidermis.

Values for the chemical-specific parameters (t^{*}, K_p, τ, FA, and B) were obtained from RAGS Part E the current dermal guidance (U.S. EPA, 2004a) and are presented in the risk calculation tables in Appendix I. If no published values were available for a particular compound, they were calculated using equations provided in the cited guidance.

The following non-steady-state equation will be used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)(C_{wi})(t_{event})$$

In general, the recommended default value of 0.001 was used for the dermal permeability of inorganic constituents. For most metals, dermal absorption is not a significant pathway because penetration through the skin is minimal.

7.3.4.4 Direct Ingestion of Groundwater and Incidental Ingestion of Surface Water

Residents may be exposed to groundwater via direct ingestion. In addition, maintenance workers, trespassers, recreational users, and residents may incidentally ingest surface water while at the site. Intakes associated with ingestion of water were evaluated using the following general equation (U.S. EPA, 1989a):

$$Intake_{wi} = \frac{(C_{wi})(IR_w)(EF)(ED)}{(BW)(AT)}$$

where:

$Intake_{wi}$	=	intake of chemical "i" from water (mg/kg/day)
C_{wi}	=	concentration of chemical "i" in water (mg/L)
IR_w	=	ingestion rate for groundwater (L/day)
IR_w	=	ingestion rate for surface water (L/day) = (CR)(ET)
CR	=	contact rate for surface water (L/hour)
ET	=	exposure time for surface water (hour/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days); for non-carcinogens, AT = ED x 365 days/year; for carcinogens, AT = 70 years x 365 days/year

The same exposure times, frequencies, and durations used to assess dermal exposure to water were used to estimate intakes for ingestion of water for each respective receptor.

7.3.4.5 Summary of Exposure Parameters

A summary of the exposure input parameters for all exposure pathways are presented in Tables 7-13 and 7-14 for the identified potential receptor groups at SWMU 13. In general, standard default parameters (e.g., U.S. EPA, 1991; Exposure Factors Handbook, U.S. EPA 1997a), which combine mid-range and upper-end exposure factors, are used to assess RME conditions. CTE was assessed primarily by the use

of mid-range exposure factors presented in current risk assessment guidance (U.S. EPA, 1989 and 1993a).

7.3.5 Exposure to Lead

Lead was selected as a COPC for groundwater, surface water, and sediment. The equations and methodology presented in the previous section cannot be used to evaluate exposure to lead because of the absence of published dose-response parameters. Exposure to lead was assessed using the following models:

- The latest version of U.S. EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for lead, (U.S. EPA, 2002d). This model is typically used to evaluate lead exposure assuming a residential land use scenario.

- The U.S. EPA's Technical Review Workgroup (TRW) Model for Lead (U.S. EPA, 2003a). This model is typically used to evaluate lead exposure assuming a non-residential land use scenario.

The IEUBK Model for lead (U.S. EPA, 2002d) is designed to estimate blood levels of lead in children (under 7 years of age) based on either default or site-specific input values for air, drinking water, diet, dust, and soil exposure. Studies indicate that infants and young children are extremely susceptible to adverse effects from exposure to lead. Considerable behavioral and developmental impairments have been noted in children with elevated blood-lead levels. The threshold for toxic effects from this chemical is believed to be in the range of 10 to 15 micrograms per deciliter (µg/dL). Blood-lead levels greater than 10 µg/dL are considered to be a "concern."

For SWMU 13, the IEUBK Model for lead was used to address exposure to lead in children when detected groundwater or surface water concentrations exceed the 15 µg/L Federal Action Level promulgated under the Safe Drinking Water Act and when detected soil or sediment concentrations exceed the OSWER soil screening level of 400 mg/kg for residential land use (U.S. EPA, 1994b). Average chemical concentrations, as well as default parameters for some input parameters, were used in the evaluation. Estimated blood-lead levels and probability density histograms are presented as support documentation for this analysis in Appendix I.

Non-residential adult exposure to lead in soil was evaluated using U.S. EPA's TRW Model for lead (U.S. EPA, 2003a). In this model, adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood-lead concentration in the developing

fetuses of adult women. The adult lead model generates a spreadsheet for each exposure scenario that is evaluated (i.e., industrial, recreational). The output of the spreadsheet is the probability that the blood-lead concentrations in the fetus exceeds 10 µg/L. The probability that the fetal blood-lead level will exceed 10 µg/L was calculated in accordance with the following U.S. EPA guidelines:

- Use of the TRW Interim Adult Lead Methodology in Risk Assessment (U.S. EPA, 1999).
- Frequently Asked Questions (FAQs) on the Adult Lead Model (U.S. EPA, 2004c).

No models are currently available to evaluate the periodic exposure of adolescent trespassers to lead. Therefore, the results of the IEUBK Model for children were used to qualitatively assess exposure of this receptor because the potential adverse effects from exposure to lead are expected to be of a lesser magnitude for adolescent trespassers than for children.

7.4 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to identify the potential health hazards and adverse effects in exposed populations. Quantitative estimates of the relationship between the magnitude and type of exposures and the severity or probability of human health effects are defined for the identified COPCs. Quantitative toxicity values determined during this component of the risk assessments were integrated with outputs of the exposure assessments to characterize the potential for the occurrence of adverse health effects for each receptor group.

The toxicity value used to evaluate non-carcinogenic health effects is the reference dose (RfD); carcinogenic effects are quantified using the cancer slope factor (CSF).

7.4.1 Toxicity Criteria

RfDs and CSFs used in the HHRA for SWMU 13 were obtained from the following primary literature sources (U.S. EPA 2003b):

- Integrated Risk Information System (IRIS) (U.S. EPA, 2005).

- U.S. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs) – The Office of Research and Development/National Center for Environmental Assessment (NCEA) Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by U.S. EPA's Superfund program.

- Other Toxicity Values – These sources include but are not limited to California Environmental Protection Agency (Cal EPA) toxicity values, the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs), and the Annual Health Effects Assessment Summary Tables (HEAST) (U.S. EPA, 1997b).

Although RfDs and CSFs can be found in several toxicological sources, U.S. EPA's IRIS on-line database is the preferred source of toxicity values. This database is continuously updated and values presented have been verified by U.S. EPA. The U.S. EPA Region 9 PRG Tables and Region 3 Risk-Based Concentration (RBC) Tables were also used as a source of toxicity criteria when these criteria were not available from the aforementioned references. The RfDs and CSFs for the constituents selected as COPCs for SWMU 13 are presented in Tables 7-16 and 7-17, respectively. Note that since no VOCs were selected as COPCs and because concentrations of all detected chemicals were less SSLs for migration from soil to air, only oral RfDs and CSFs are presented in these tables.

7.4.1.1 Toxicity Criteria for Dermal Exposure

RfDs and CSFs found in literature are typically expressed as administered doses; therefore, these values are considered inappropriate for estimating the risks associated with dermal routes of exposure. Oral dose-response parameters based on administered doses must be adjusted to absorbed doses before the evaluation of estimated dermal exposure intakes is made.

The adjustment from administered to absorbed dose was made using chemical-specific absorption efficiencies published in available guidance [i.e., U.S. EPA, 2004a (the primary reference), IRIS, ATSDR toxicological profiles, etc.] and the following equations:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

$$CSF_{dermal} = (CSF_{oral}) \; / \; (ABS_{GI})$$

where: ABS_{GI} = absorption efficiency in the gastrointestinal tract.

Absorption efficiencies used in the risk assessments reflect U.S. EPA's current dermal assessment guidance (U.S. EPA, 2004a).

7.4.1.2 Toxicity Criteria for Carcinogenic Effects of PAHs

Limited toxicity values are available to evaluate the carcinogenic effects from exposure to PAHs. The most extensively studied PAH is benzo(a)pyrene, which is classified by U.S. EPA as a probable human carcinogen. Although CSFs are available for benzo(a)pyrene, insufficient data are available to calculate CSFs for other carcinogenic PAHs. Toxic effects for these chemicals were evaluated using the concept of estimated orders of potential potency, which relate the potency of the other potentially carcinogenic PAHs to the potency of benzo(a)pyrene, as presented in current U.S. EPA guidance (U.S. EPA, 1993b). The equivalent oral and inhalation CSFs for these chemicals were derived by multiplying the CSFs for benzo(a)pyrene by the orders of potential potency.

7.4.1.3 Toxicity Criteria for Carcinogenic Effects of Dioxins/Furans

Similar to the concept of estimated orders of potential potency for PAHs, chlorinated dibenzo-p-dioxins (CDDs) and -dibenzofurans (CDFs) were evaluated using Toxicity Equivalence Factors (TEFs) that relate the toxicity of other CDDs/CDFs to the toxicity of 2,3,7,7-tetrachlorodibenzo-p-dioxin (TCDD) (WHO, 1998 and U.S. EPA, 1989b). The U.S. EPA and others have developed TEFs for other dioxins and furans from structure-activity relationships and available toxicological information. An equivalent oral CSF for these chemicals may be derived by multiplying the CSF for 2,3,7,7-TCDD by the TEF. However, the TEFs are more typically used to derive a toxicity equivalent concentration (TEQ) representing all the significant dioxin and furans in a sample. An EPC based on the TEQs for a dataset is then evaluated using the CSF for 2,3,7,7-TCDD.

7.4.1.4 Toxicity Criteria for Chromium

Toxicity criteria are available for different forms of chromium, which is considered to be more toxic in the hexavalent state. Because there is no evidence to support the conclusion that hexavalent chromium is present at the sites, speciation analyses was not completed for SWMU 13. However, risks associated with this chemical were assessed by conservatively assuming that 100 percent of the reported total chromium result is attributable to hexavalent chromium.

7.4.1.5 Toxicity Criteria for Nitrate/Nitrite

Results for nitrate and nitrite in groundwater and surface water were reported as nitrate/nitrite-N by the laboratory. However the RfDs for these two species are considerably different. The RfD for nitrate is 1.6 mg/kg/day and the RfD for nitrite is 0.1 mg/kg/day (U.S. EPA, 2005). Therefore, nitrite is considered to be approximately 15 times more toxic than nitrate. The RfD values used in the risk assessment

calculations were based on the expected water chemistry of the two species. Surface water is exposed to the air, is generally well mixed, and is more likely to be an oxidizing environment. This environment favors the predominance of nitrate. Therefore, nitrate/nitrite-N in surface water was evaluated in the risk assessment as if it were nitrate. Groundwater could be an oxidizing or reducing environment depending on conditions in the aquifer. Since nitrate/nitrite-N in groundwater might exist as either species, it is conservatively assumed to be predominantly nitrite for risk assessment purposes.

7.5 RISK CHARACTERIZATION

This section provides a characterization of the potential human health risks associated with the potential exposures to COPCs at SWMU 13. Section 7.5.1 outlines the methods used to quantitatively estimate the type and magnitude of potential risks for human receptors. A summary of the risk characterization for the SWMU 13 is provided in Section 7.5.2.

7.5.1 Quantitative Analysis

Quantitative estimates of risk were calculated according to risk assessment methods outlined in U.S. EPA guidance (U.S. EPA, 1989a). Lifetime cancer risks are expressed in the form of dimensionless probabilities, referred to as ILCRs, based on CSFs. Non-carcinogenic risk estimates are presented in the form of HQs determined through a comparison of intakes with published RfDs.

ILCR estimates were generated for each COPC using estimated exposure intakes and published CSFs, as follows:

$$\text{ILCR} = (\text{Estimated Exposure Intake})(\text{CSF})$$

If the above equation resulted in an ILCR greater than 0.01, the following equation was used:

$$\text{ILCR} = 1-[\exp(-\text{Estimated Exposure Intake})(\text{CSF})]$$

An ILCR of 1×10^{-6} indicates that the exposed receptor has a one-in-one-million chance of developing cancer under the defined exposure scenario. Alternatively, such a risk may be interpreted as representing one additional case of cancer in an exposed population of one million persons.

As mentioned previously, non-carcinogenic risks were assessed using the concepts of HQs and HIs. The HQ for a COPC is the ratio of the estimated intake to the RfD, as follows:

HQ = (Estimated Exposure Intake) / (RfD)

An HI was generated by summing the individual HQs for all COPCs. The HI is not a mathematical prediction of the severity of toxic effects and therefore is not a true "risk"; it is simply a numerical indicator of the possibility of the occurrence of non-carcinogenic (threshold) effects.

7.5.1.1 Comparison of Quantitative Risk Estimates to Benchmarks

To interpret the quantitative risks and to aid risk managers in determining the need for remediation at a site, quantitative risk estimates were compared to typical benchmarks. Calculated ILCRs were interpreted using the U.S. EPA's "target range" (1×10^{-6} to 1×10^{-4}), and HIs will be evaluated using a value of 1.0.

U.S. EPA has defined the range of 1×10^{-6} to 1×10^{-4} as the ILCR "target range" for most hazardous waste facilities addressed under CERCLA and RCRA. IDEM has defined the same range for the non-default evaluation under their RISC program. Individual or cumulative ILCRs greater than 1×10^{-4} will typically not be considered as protective of human health, and ILCRs less than 1×10^{-6} will typically be regarded as protective. Risk management decisions are necessary when the ILCR is within the 1×10^{-4} to 1×10^{-6} cancer risk range.

An HI exceeding unity (1.0) indicates that there may be potential non-carcinogenic health risks associated with exposure. If an HI exceeds unity, a segregation of target organ effects associated with exposure to COPCs was performed. Only those chemicals that affect the same target organ(s) or exhibit similar critical effect(s) were regarded as truly additive. Consequently, it may be possible for a cumulative HI to exceed 1.0, but no adverse health effects are anticipated if the COPCs do not affect the same target organ or exhibit the same critical effect.

7.5.2 Results of the Risk Characterization

This section contains a summary of the results of the risk characterization for the SWMU 13. Quantitative risk estimates for potential human receptors are developed for those chemicals identified as COPCs. Uncertainties associated with the risk estimates are discussed in Section 7.6. The methodology used to calculate the risks presented in this section is provided in Sections 7.3 and 7.4. Potential cancer risks and HIs were calculated for current/future maintenance workers, occupational workers, adolescent trespassers and future construction workers, child recreational users, adult recreational users, and on-site residents under the RME and CTE scenarios and are summarized in Tables 7-18 and 7-19, respectively.

The risks for soils are presented for the areas around Buildings 166 and 171 and for surface and combined surface/subsurface soil. Risks were calculated for the areas around Buildings 166 and 171 because these areas contained higher residual concentrations of explosives and metals than the other four building areas and because PCBs were detected in both areas. It was not considered necessary to calculate risks for building areas 165, 167/168/2500, 172/173/2501, and 174 because the concentrations of explosives and metals in these areas were lower or comparable to the concentrations around Buildings 166 and 171 and the calculated risks for explosives and metals at Buildings 166 and 171 were less than U.S. EPA goals. Risks for surface soil are presented because exposure to surface soil is the most likely soil exposure route for most receptors. Risks for combined surface/subsurface soil are presented in Tables 7-18 and 7-19 to account for the fact that subsurface soil might be brought to the surface in a future excavation project and mixed with surface soil. As shown in the tables, risks for exposure to surface soil are generally greater than risks to combined surface/subsurface soil. Sample calculations are presented in Appendix I, and the results of the risk assessment in RAGS Part D format are included in Appendix I.

7.5.2.1 Non-carcinogenic Risks – RME

Cumulative HIs for construction workers, maintenance workers, adult recreational users, and adolescent trespassers under the RME scenario were less than unity (1.0), indicating that no toxic effects are anticipated for these receptors under the defined exposure conditions. Cumulative HIs for occupational workers, child recreational users, future adult residents, and future child resident exceeded unity.

The cumulative groundwater HI for the occupational worker assumed to ingest one liter of groundwater per workday was 5.4. The major contributor to this HI was RDX (HI = 2.1). HIs for occupational exposure to all other media were less than unity.

The elevated HIs for the child recreational user were due to exposure to groundwater and gully surface water. The cumulative groundwater HI for the child recreational user assumed to ingest one liter of groundwater 52 days per year was 5.2. The major contributor to this HI was RDX by ingestion (HI = 2.1). The child recreational HI for exposure to gully surface water (HI = 1.5) also exceeded unity. Ingestion of RDX in gully surface water (HI = 1.3) accounted for most of this HI. HIs for recreational exposure to other media were less than unity.

Elevated HIs for future adult and child residents were mainly due to exposure to groundwater. RDX in groundwater was that major contributor to the total HI (adult HI = 6.1, child HI = 21). Other contributors to the groundwater HIs were TNT (child HI = 1.3), 4-amino-2,6-dinitrotoluene (child HI = 1.7), iron (adult HI =

2, child HI =7), lithium (adult HI = 1.2, child HI= 4.1, manganese (adult HI = 2.2, child HI = 7.4), and nitrate/nitrite (as nitrite) (adult HI = 1.8, child HI = 6.5). The HI for child exposure to RDX in gully surface water was 1.3. HIs for exposure to soil and sediment were less than unity on a target organ basis.

7.5.2.2 Carcinogenic Risks - RME

Cumulative ILCRs for the construction worker, maintenance worker, and adolescent trespasser were within the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$. Total ILCRs for the occupational worker, total recreational user (child + adult), and total residential ILCR (child + adult) exceeded the target risk range.

The primary contributors to the elevated ILCRs (i.e., ILCRs greater than 10^{-4}) were Aroclor-1248 in soil (in the areas near Buildings 166 and 171), PAHs in gully surface water, and RDX in groundwater.

For occupational workers, exposure to Aroclor-1248 in soil accounts for approximately 45 percent for the total ILCR and ingestion of RDX in groundwater accounts for approximately than 50 percent of the total ILCR. Specifically, risks for occupational exposure to surface and surface/subsurface soil in the area near Building 166 were $6.3x10^{-5}$ and $3.7x10^{-5}$, respectively. Risks for surface and surface/subsurface soil in the area near Building 171 were $2.2x10^{-4}$ and $1.2x10^{-4}$, respectively. The occupational risk from exposure to RDX in groundwater was $2.6x10^{-4}$.

For recreational users, exposure to Aroclor-1248 in soil accounts for approximately 20 percent of the total ILCRs, exposure to PAHs in gully surface water accounts for as much as 50 percent of the recreational user risks, and ingestion of RDX in groundwater accounts for approximately 30 percent of the recreational user risks. The total recreational risk (adult + child) from exposure to PAHs in gully surface water was $2.0x10^{-4}$. ILCRs for the recreational user assumed to be exposed to surface and surface/subsurface soil in the area near Building 166 were $2.4x10^{-5}$ and $1.4x10^{-5}$, respectively. Risks for surface and surface/subsurface soil in the area near Building 171 were $8.4x10^{-5}$ and $4.4x10^{-5}$, respectively. The total recreational risk (adult + child) from exposure to RDX in groundwater was $1.1x10^{-4}$.

For hypothetical future residents, exposure to Aroclor-1248 in soil accounts for approximately 30 percent of the total ILCR, exposure to gully surface water accounts for approximately 8 percent, and ingestion of RDX in groundwater accounts for approximately 55 percent of the total ILCR. For the hypothetical future resident, ILCRs for surface and surface/subsurface soil in the area near Building 166 were $2.1x10^{-4}$ and $1.3x10^{-4}$, respectively. Risks for surface and surface/subsurface soil in the area near Building 171 were $7.5x10^{-4}$ and $3.9x10^{-4}$, respectively. The ILCR from residential exposure to RDX in groundwater was $1.3x0^{-3}$. The total residential risk from exposure to PAHs in gully surface water was $2.0x10^{-4}$.

Minor contributors to the total residential ILCRs were PAHs in soil (ILCRs between 10^{-5} and 10^{-4}), arsenic in soil, sediment, and groundwater (ILCRs between 10^{-5} and 10^{-4}), and TNT in groundwater (ILCRs slightly greater than 10^{-6}). Risks for dioxins/furans in soil slightly exceeded $1x10^{-6}$ and accounted for less than 1 percent of the total ILCR.

The HIs and ILCRs calculated for exposure to soil, groundwater, surface water, and sediment at SWMU 13 are subject to the following significant sources of uncertainty:

1) The ILCRs for recreational users and future residents exposed to PAHs in gully surface water exceed $1x10^{-4}$, but are likely to be greatly overestimated for the following reasons:

   - As discussed in Section 7.2.3.5, the concentrations of some PAHs (e.g., benzo(a)pyrene and indeno(1,2,3-cd)pyrene) were close to or exceeded published water solubility levels (IDEM, 2004) indicating that these compounds were probably present on particulate matter in the samples, that the PAHs were not present in the dissolved phase, and that the detected concentrations were due to turbidity in the samples.

   - The ILCRs presented in RAGS-Part D tables in Appendix I indicate that the risks for dermal contact were three to four orders of magnitude greater than risks by ingestion. The dermal risks were calculated using a U.S. EPA model presented in RAGS-Part E (U.S. EPA, 2004a) which, according to the guidance, tends to overestimate intakes and risk for some chemicals (e.g., PAHs, PCBs, and dioxins). Appendices A and B of RAGS-Part E discuss the uncertainties in the permeability coefficients for these chemicals and the limitations of the dermal absorption model when evaluating chemicals, such as the PAHs. In addition, studies have shown that PAHs in aqueous solutions do not penetrate the skin. For this reason, TtNUS was instructed by U.S. EPA Region 4 via e-mail not to evaluate risks for dermal contact with PAHs in water. Based on the studies discussed in the e-mail, the uncertainty associated with the aqueous dermal pathway is “greater than a billion fold”. A copy of the e-mail and a summary memorandum regarding the estimation of dermal permeability coefficient for PAHs are provided in Appendix I.4.

   - Exposure to the surface water in gullies is not always a complete exposure pathway. The gullies are often dry and, based on the experiences of field personnel during the RFI, surface water is present in the gullies usually only after rain events. Therefore, exposure to gully surface water is often not possible.

2) The HIs and ILCRs for groundwater were based on exposure to average concentrations of COPCs in the most highly contaminated area of the plume. The use of the arithmetic average for the EPC is recommended by U.S. EPA Regions 1 and 4 (U.S. EPA, 2000). The plume area used for averaging was selected based on concentrations of explosives, especially RDX (see Section 7.3.3). This area also included maximum concentrations of some metals (e.g., iron, manganese, lithium, and nickel). Using the most contaminated part of the plume may result in overestimation of risks for explosives and several metals. However, the maximum concentrations of some metals were outside this plume area (e.g., aluminum, chromium, barium, and vanadium at location 13MWT05) and risks could be underestimated for these metals. An examination of the analytical results for the filtered sample associated with this sample shows that aluminum, chromium, and vanadium were not detected in the filtered sample and the concentration of barium was 30 times lower than the unfiltered sample. Therefore, the elevated concentrations of these metals in the unfiltered sample are likely due to turbidity in the sample. The comparisons of filtered and maximum unfiltered results at other locations outside the selected plume area were similar to those observed for the results from 13MWT05 (i.e., concentrations in the filtered samples were much lower than in the unfiltered samples). The uncertainty associated with the EPCs for groundwater is further discussed in Section 7.6.2.

3) No background or upgradient groundwater data are currently not available for the facility. It is therefore difficult to determine whether concentrations in groundwater are within naturally occurring levels or are indicative of site-related contamination. Therefore, risks from exposure to metals in groundwater (e.g., lithium, iron, and manganese) may be overestimated. Note that aluminum (as aluminum powder) is the only metal known to have been used in SWMU 13 operations.

4) Even though risks for future residents from exposure to arsenic in groundwater were slightly greater than 1.0×10^{-5}, the average concentration of arsenic (detected in 32 of 82 groundwater samples) was 2.67 µg/L which is less than the U.S. EPA MCL (10 µg/L) and the IDEM default closure level of 50 µg/L. In addition, arsenic was not used in processes and operations at SWMU 13, as indicated in the Phase I RFI (Halliburton NUS, 1992a).

5) As discussed in Section 7.4.1.5, the reported nitrate/nitrite concentrations in the groundwater were evaluated as if nitrites were the predominant nitrogen compound present. The RfD for nitrite is approximately 15 times lower than the RfD for nitrate indicating that nitrite is the more toxic chemical. The HI calculated for ingestion of nitrate/nitrite in groundwater based on the RfD for nitrite was 6.5 for the future child resident. However, if the RfD for nitrate had been used, the HI would be 0.4. Thus, the risks from exposure to nitrate/nitrite in groundwater may be overestimated if nitrite is not the predominant nitrogen compound in the groundwater.

6) Groundwater is not currently used at the site nor is it expected to be used in the future.

7.5.2.3 Non-carcinogenic Risks – CTE

For risks calculated using CTE assumptions (Table 7-19), HIs for construction workers, maintenance workers, adult recreational users, and adolescent trespassers were less than unity (1.0), indicating that no toxic effects are anticipated for these receptors under the defined exposure conditions. Cumulative HIs for occupational workers, child recreational users, future adult residents, and future child residents exceeded unity.

The cumulative groundwater HI for the occupational worker assumed to ingest one liter of groundwater per workday was 4.7. The major contributor to this HI was RDX (HI = 1.9). HIs for occupational exposure to all other media were less than unity.

The cumulative groundwater HI for the child recreational user is 2.6. The major contributor to this HI was RDX by ingestion of groundwater (HI = 1.1).

Elevated CTE HIs for future adult and child residents were mainly due to exposure to groundwater. RDX in groundwater was the major contributor to the total HI (adult HI = 2.9, child HI = 6.3). Other contributors to the groundwater HIs were iron (child HI= 2.1), lithium (child HI= 1.2), manganese (child HI= 2.2), and nitrate/nitrite (as nitrite) (child HI= 1.9). HIs for CT exposure to soil, surface water, and sediment were less than unity for all receptors.

7.5.2.4 Carcinogenic Risks - CTE

Cumulative ILCRs for the construction worker, maintenance worker, adolescent trespasser, and total recreational user (child + adult) were within the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$, for the CTE scenarios. Cumulative ILCRs for the occupational worker and total residential ILCR exceeded the target risk range.

The primary contributors to the total ILCRs for occupational workers were RDX in groundwater (ILCR = $8.1x10^{-5}$) which accounts for approximately 70 percent of the total ILCR and Aroclor-1248 in soil, which accounts for approximately 20 percent of the total ILCR.

The primary contributors to the total CTE ILCR for hypothetical future residents are RDX in groundwater (ILCR = $1.5x10^{-4}$) which accounts for almost 65 percent of the total ILCR and Aroclor-1248 in soil (ILCR = $6.5x10^{-5}$), which accounts for about 20 percent of the total ILCR.

Minor contributors (risks between $1x10^{-6}$ to $1x10^{-5}$) to the total ILCRs for the CTE are PAHs in soil and gully surface water and arsenic in soil and groundwater. RDX is also a minor contributor to the gully surface water ILCR.

7.5.2.5 Risks from Lead

Lead was identified as a COPC for groundwater and gully surface water because the maximum detected concentrations (54.3 µg/L in groundwater and 137 µg/L in gully surface water) exceeded the U.S. EPA Safe Drinking Water Act (SDWA) action level (15 µg/L). Lead was also identified as a COPC in gully sediment because the maximum concentration exceeded the 400 mg/kg OSWER SSL for residential land use.

As discussed in Section 7.3.5, the methodology used to calculate the risks presented in Sections 7.5.2.1 through 7.5.2.4 cannot be used to evaluate exposure to lead because of the absence of published dose-response parameters. Exposure to lead was assessed using the U.S. EPA's IEUBK Model for lead, (U.S. EPA, 2002d) and the U.S. EPA's TRW Model for Lead (U.S. EPA, 2003a). The IEUBK model is typically used to evaluate lead exposure assuming a residential land use scenario and the TRW model is used to evaluate lead exposure for non-residential land use scenarios.

The blood-lead concentration of a receptor is considered a key indicator of the potential for adverse health effects. The IEUBK and TRW models calculate the probability of a receptor's blood-lead level exceeding 10 µg/dL. The U.S. EPA goal is to limit the childhood risk of exceeding a 10 µg/dL blood-lead concentration to five percent.

Child Lead Model (IEUBK) Results

Current U.S. EPA guidance recommends using the average concentration to evaluate exposure to lead. Therefore, the highest weighted average lead concentration in soil (29 mg/kg), the average concentration in groundwater (4.5 µg/L), and model default values for other model parameters were used in the IEUBK and TRW model analyses. The results of the IEUBK model evaluation for soil and groundwater indicate that the estimated geometric mean blood-lead level for a child resident is 1.6 µg/dL. This blood-lead level is less than the established level of concern (10 µg/dL). Approximately 1.9 percent of children are

expected to experience blood-lead levels greater than 10 µg/dL. This estimate is less than U.S. EPA's goal of limiting exposure to lead so that no more than five percent of the exposed children have an estimated blood-lead level greater than the established level of concern (i.e., 10 µg/dL). No models are currently available to evaluate the periodic exposure of children to lead in surface water and sediment. However, if the average concentrations of lead in surface water and sediment were evaluated in the IEUBK model, the predicted blood lead levels and probabilities of exceeding the blood lead levels would be acceptable. This evaluation is conservative because the IEUBK model assumes daily residential exposure to lead in soil and drinking water as opposed to the periodic exposure expected for surface water and sediment.

No models are currently available to evaluate the periodic exposure of adolescent trespassers to lead in environmental media. Therefore, the results of the IEUBK Model for children were used to qualitatively assess exposure of this receptor. Since the risks for a small child assumed to be exposed to lead on a daily basis were found to be acceptable, it can be assumed that the risks to an older child exposed to the same media periodically are also acceptable. Evaluating the trespasser using the IEUBK model is considered to be a conservative approach because potential adverse effects from exposure to lead are expected to be of a lesser magnitude for adolescent trespassers than for residential children.

The results of the IEUBK model analysis indicate that blood-lead levels of children and adolescent trespassers exposed to lead in soil and groundwater at SWMU 13 are less than 10 µg/dL. The results of the IEUBK model are presented in Appendix I.

Adult Lead Model Results

The central estimate blood-lead levels for construction workers exposed to the average concentration of lead (29) in soil ranged from 1.5 µg/dL to 1.7 µg/dL. This range is less than the established level of concern (10 µg/dL). The central estimate of blood-lead concentrations for fetuses carried by construction workers exposed to surface soil ranged from 4.7 µg/dL to 6.1 µg/dL. These levels are also less than the benchmark level of lead in fetal blood (10 µg/dL of blood). The probabilities that receptor blood-lead levels would be greater than 10 µg/dL of blood ranged from 0.4 to 1.3 percent. These estimates do not exceed the U.S. EPA's goal of limiting exposure to lead so that no more than five percent of the exposed receptors have an estimated blood-lead level greater than the established level of concern (i.e., 10 µg/dL).

The central estimate blood-lead levels predicted for the adult recreational user and maintenance worker exposed to the average lead concentration in gully sediment (59 mg/kg) and to fetuses carried by these

receptors were also less than the level of concern. Blood-lead levels predicted for adult recreational users and maintenance workers exposed to sediments ranged from 1.5 µg/dL to 1.7 µg/dL. The central estimate of blood-lead concentrations for fetuses carried by recreational users and maintenance workers exposed to surface soil were also less than the level of concern The probability of a recreational user bearing a child with fetal blood levels exceeding 10 µg/dL ranged from 0.4 to 1.3 percent and the probability of a maintenance worker bearing a child with fetal blood levels exceeding 10 µg/dL ranged from 0.4 to 1.2 percent. The probability ranges for these receptors are less than the U.S. EPA goal of 5 percent.

In summary, results of the TRW adult lead model indicate that predicted blood levels for potential construction workers, maintenance workers, and adult recreational users and their fetuses were within U.S. EPA's goals and the probabilities of exceeding these goals from exposure to lead in soil or sediment would not be greater than the U.S.EPA goal of five percent.

The results of the TRW modeling are presented in Appendix I.

Note that currently that are no methods available for evaluating exposure to lead in surface water. Therefore this exposure pathway was not evaluated. However, the average lead concentration in gully surface water was 6.4 µg/L, which is less than the U.S. EPA screening value (15 µg/L). In addition, if the average surface water concentration were conservatively evaluated in the IUEBK Model (assuming residential exposure), the predicted blood lead levels would be much lower than the U.S.EPA goals.

7.5.2.6 External Sump/Drainage Channel Investigation

This section discusses the analytical results of the External Sump/Drainage Channel Investigation (ES/DI) as they relate to human health risk. The risk analysis is performed by comparing the ES/DI sample data for soil and sediment with the data used in the SWMU 13 risk assessment, with screening concentrations based on Region 9 PRGs, and with facility or upgradient background levels (for metals). The comparisons are presented in Tables 7-20 through 7-24 and are discussed in the following paragraphs. Tables 7-20 through 7-23 present the comparisons of metal concentrations of ES/DI sediment samples with the Mainstream and Gully sediment sample results used in the HHRA for SWMU 13. Table 7-25 presents the comparisons of explosive results for surface and subsurface soil collected during the ES/D Investigation with historical data generated during the Bioremediation Program.

Comparison of Mainstream and Boggs Creek Sediment Samples

This section presents the comparison of metals data from five Mainstream sediment samples collected during the RFI and five Boggs Creek samples collected during the ES/DI (Table 7-20). As indicated in the table, the concentrations of metals in the Boggs Creek samples are generally less than concentrations in the Mainstream samples. The metals that exceeded the screening levels are the same in both data sets, with the exception of antimony. The maximum concentration of antimony in the RFI samples slightly exceeded the screening concentration but it was not detected in the ES/DI Boggs Creek samples. In the risk assessment for Mainstream sediment presented in the RFI, the risks for metals were determined to be acceptable (i.e., ILCRs were with the U.S. EPA's risk management range, 1x10-6 to 1x10-4, and His were less than 1). Since the concentrations in the Boggs Creek samples were lower than the Mainstream samples, the risks for exposure to metals in Boggs Creek sediment would also be acceptable. For example, the ILCR for hypothetical future resident exposure to Mainstream sediment was 1x10-5. The ILCR for Boggs Creek sediment would be approximately 2x10-6.

Comparison of Mainstream and Turkey Creek Sediment Samples

This section presents the comparison of metals data from five Mainstream sediment samples collected during the RFI and three Turkey Creek samples collected during the ES/DI (Table 7-21). As indicated in the table, the concentrations of metals in the Turkey Creek samples are generally less than concentrations in the Mainstream samples. A notable exception is the maximum concentration of aluminum in the Turkey Creek samples (30,500 mg/kg) which was higher than the Mainstream concentration (13,700 mg/kg). The same metals exceeded the screening levels in both data sets, with the exception of antimony which was not positively detected in the Turkey Creek samples. In the risk assessment for Mainstream sediment presented in the RFI, the risks for metals were determined to be acceptable (i.e., ILCRs were with the U.S. EPA's risk management range, $1x10^{-6}$ to $1x10^{-4}$, and His were less than 1). Since the concentrations in the Turkey Creek samples were lower than the Mainstream samples, the risks for exposure to metals in Turkey Creek sediment would also be acceptable. For example, the ILCR for hypothetical future resident exposure to Mainstream sediment was $1x10^{-5}$. Similar to the Boggs Creek risks discussed above, the ILCR for exposure to metals in Turkey Creek sediment would be approximately $2x10^{-6}$. Even though the maximum concentration of aluminum in Turkey Creek was approximately 3 times greater the Mainstream concentration, the HQ for aluminum would be well less than 1 (based on the maximum concentration).

Comparison of Gully and Boggs Creek Sediment Samples

This section presents the comparison of metals data from 30 Gully sediment samples collected during the RFI and five Boggs Creek samples collected during the ES/DI (Table 7-22). As indicated in the table, the concentrations of metals in the Boggs Creek samples are generally much less than concentrations in the Gully samples. The same metals exceeded the screening levels in both data sets, with the exception of barium and lead which were less than their respective screening concentrations in the ES/DI Boggs Creek samples. In the risk assessment for Gully sediment presented in the RFI, the risks for metals were determined to be acceptable. Since the concentrations in the Boggs Creek samples were lower than the Gully samples, the risks for exposure to metals in Boggs Creek sediment would also be acceptable. For example, the ILCR for hypothetical future resident exposure to Mainstream sediment was $5x10^{-6}$. The ILCR for Boggs Creek sediment would be approximately $2x10^{-6}$.

Comparison of Gully and Turkey Creek Sediment Samples

This section presents the comparison of metals data from 30 Gully sediment samples collected during the RFI and three Turkey Creek samples collected during the ES/DI (Table 7-23). As indicated in the table, the concentrations of metals in the Turkey Creek samples are generally less than concentrations in the Gully samples with the exception of aluminum which had a maximum concentration of 30,500 mg/kg in the Turkey Creek samples compared to Gully concentration of 18,500 mg/kg. The metals that exceeded the screening levels are the same in both data sets, with the exception of barium and lead which were less than their respective screening concentrations in the ES/DI Turkey Creek samples. In the risk assessment for Gully sediment presented in the RFI, the risks for metals were acceptable. Since the concentrations in the Turkey Creek samples were lower than the Gully samples, the risks for exposure to metals in Turkey Creek sediment would also be acceptable. For example, the ILCR for hypothetical future resident exposure to Gully sediment was $5x10^{-6}$ and the ILCR for exposure to metals in Turkey Creek sediment would be approximately $2x10^{-6}$. Also, the HQ for aluminum in Turkey Creek would be well less than 1 based on the maximum concentration.

In summary, the comparisons of metals concentrations in the ES/Di sediment samples collected in Boggs Creek and Turkey Creek indicated that the concentrations were generally less than the concentrations in the RFI sediment samples. The comparisons also indicated that risks from exposure to the maximum metal concentrations in ES/DI samples would be acceptable for all potential receptors

Comparison of Explosive Concentrations in ES/DI samples with Historical and Bioremediated Soil Data

This section presents comparisons of explosive results for surface and subsurface soil collected during the ES/DI with historical data generated during the Bioremediation Program (Table 7-24). The ES/DI data sets consist of 25 surface soil samples and 42 subsurface soil samples which were analyzed for explosives only. The historical data set consists of initial characterization samples (ICS) from areas not excavated during the bioremediation program, post-excavation samples (PES) collected from the six building areas evaluated in the RFI, and samples from the bioremediated compost backfilled into excavated areas. The historical data were used in the risk assessment for SWMU 13 to evaluate risks from explosives in soil and the risks calculated for explosives were less than U.S. EPA benchmarks for carcinogenic and noncarcinogenic health effects.

The comparison of the surface and subsurface soil data collected during the ES/DI with the historical data presented in Table 7-24 indicates that the concentrations of explosives in the ES/DI samples are within the range of the concentrations of the historical data with the exception of two surface soil samples collected near Building 166. Sample 13SS480002 located on the southeastern side of Building 166 had RDX and 2,4,6-TNT concentrations of 1,800 and 250 mg/kg, respectively. Sample 13SS600002 located on the northeastern side of Building 166 had an RDX concentration of 760 mg/kg. These concentrations exceed the range of concentrations of the historical data and the risk-based screening concentrations and correspond to residential risks greater than $1x10^{-4}$ and industrial risks slightly less than $1x10^{-4}$. According to Table 3-3 of QAPP Addendum No. 4 (TtNUS, January 2006), Sample 13SS480002 was located at the exterior collection sump at the end of an interior drainage system near Building 166 and Sample 13SS600002 was located at a drainage system near the boot and shoe change building (Building 2514). Consequently, the elevated explosive concentrations in these two samples are likely due to the fact that the locations have been impacted by drainage contaminated with explosives. Also, concentrations in subsurface soil samples collected at these locations were much lower than concentrations in the surface soil samples. Therefore, it is likely that surface runoff from the drainage system has occurred. The extent of the contamination is not known. Risks for surface soil in the other building areas and for subsurface soil would be less than $1x10^{-6}$.

7.5.2.7 2006 PCB Delineation Study

Additional soil and sediment samples were collected in June and October 2006 to delineate the extent of PCB contamination and migration from the Building 171 and 166 areas to the adjacent drainage ditches. Soil samples were collected at depth at locations where the deepest soil previously collected exceeded the subsurface clean up level of 25 mg/kg. Surface and subsurface soils (0-2 and 2-4 ft bgs) were

collected around the periphery of areas where soil samples previously were shown to exceed PRGs (1 mg/kg surface, 25 mg/kg subsurface). Sediment samples were collected from 0-1 and 1-2 ft bgs in swales and gullies downgradient of locations where sediment clean up levels were previously exceeded. Impacts of the recently collected PCB data on the human health risk assessment for SWMU 13 are discussed in the following sections.

Surface Soil

Surface soil samples were collected as part of the PCB delineation investigation to further delineate the extent of contamination. One PCB, Aroclor-1248, was positively detected in 17 of 19 samples collected in 2006 at concentrations ranging from 31 to 64,000 µg/kg. These concentrations are within the range of concentrations evaluated in the HHRA (42 to 160,000 µg/kg) (see Tables 7-1 and 7-2). Because the concentrations of the 2006 surface soil samples are within the range of samples used for the HHRA, the additional data would not change the risks to human receptors and the results and conclusions of the risk assessment would not be affected by the data collected in 2006.

Subsurface Soil

Nine additional subsurface soil samples were collected in 2006. One PCB, Aroclor-1248, was positively detected in three of the 2006 samples at concentrations ranging from 110 to 2,700 µg/kg. These concentrations are at the low end of the range of concentrations evaluated in the HHRA (13 to 210,000 µg/kg) (see Tables 7-3 and 7-4). Because the concentrations of the 2006 subsurface soil samples are within the range of samples used for the HHRA, the additional data would not change the risks to human receptors and the results and conclusions of the risk assessment would remain the same.

Sediment

Twenty additional sediment samples were collected from the drainage ditches adjacent to the Building 171 and 166 areas. Fourteen of the samples were collected from the ditch near Building 171 and six samples were collected from the ditch near Building 161. The samples were analyzed for PCBs. The samples from both sites were grouped together for COPC screening and for risk evaluation.

The COPC screening of the 2006 sediment data is presented in Table 7-25. As shown in Table 7-25, two PCBs Aroclor-1248 (detected in 17 of 20 samples) and Aroclor-1260 (detected in 1 of 20 samples) were reported in the sediment samples. The maximum concentrations of both compounds exceeded the U.S. EPA Region 9 residential PRG and the IDEM residential default closure level for PCBs. Therefore, risks for exposure to Aroclor-1248 and Aroclor-1260 in sediment were quantitatively evaluated for the potential

receptors and exposure assumptions described in Section 7.3. The results of this risk assessment are presented in the following table.

Cancer Risks from Exposure to PCBs in Sediment – 2006 Samples

Potential Receptor	Cancer Risk (ILCR)
Maintenance Workers	3 x 10-6
Adolescent Trespassers	2 x 10-6
Child Recreational Users	6 x 10-6
Adult Recreational Users	4 x 10-6
Lifelong Recreational Users (Child + Adult)	1 x 10-5
Future Child Residents	6 x 10-6
Future Adult Residents	3 x 10-6
Future Lifelong Residents (Child + Adult)	9 x 10-6

Cancer risks were calculated for maintenance workers, adolescent trespassers, recreational users, and hypothetical future residents. Noncancer risks were not calculated because noncarcinogenic RfDs have not been determined for Aroclor-1248 and Aroclor-1260 by the U.S. EPA. The risk estimates were based on the 95 percent UCL concentration of Aroclor-1248 (18,000 µg/kg) and the maximum detected concentration of Aroclor-1260 (1,900 µg/kg). As indicated in the above table, risks for these receptors ranged between 1x10-6 and 1x10-5. These risks are within the U.S. EPA's "risk management range" (1x10-6 to 1x10-4) which is discussed in Section 7.5.1.1.

7.6 UNCERTAINTY ANALYSIS

This section presents a summary of uncertainties inherent in the risk assessment and includes a discussion of how they may affect the quantitative risk estimates and conclusions of the risk analysis. The baseline HHRA for SWMU 13 was performed in accordance with current U.S. EPA and IDEM guidance. However, there are varying degrees of uncertainty associated with the baseline HHRA. The following sections discuss general uncertainties in risk assessment and uncertainties specific to the risk assessment for SWMU 13.

Uncertainty in the selection of COPCs was related to the current status of the predictive databases, the grouping of samples, the numbers, types and distributions of samples, data quality, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment included the values used as input variables for a given intake route or scenario, the assumptions made to determine EPCs, and the predictions regarding future land use and population characteristics. Uncertainty in the toxicity assessment included the quality of the existing toxicity data needed to support dose-response relationships and the weight-of-evidence used to determine the

carcinogenicity of COPCs. Uncertainty in risk characterization was associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier steps of the risk assessment process.

Whereas there were various sources of random uncertainty and bias, the magnitude of bias and uncertainty and the direction of bias was influenced by the assumptions made throughout the risk assessment including selection of COPCs and selection of values for dose-response relationships. Throughout the entire risk assessment assumptions that considered safety factors were made so that the final calculated risks were overestimated.

Generally, risk assessments carry two types of uncertainty: measurement and informational uncertainty. Measurement uncertainty refers to the usual variance that accompanies scientific measurements. For example, this type of uncertainty is associated with analytical data collected for each site. The risk assessment reflects the accumulated variances of the individual values used.

Informational uncertainty stems from inadequate availability of information needed to complete the toxicity and exposure assessments. Often, this gap is significant, such as the absence of information on the effects of human exposure to low doses of a chemical, the biological mechanism of action of a chemical, or the behavior of a chemical in soil.

Once the risk assessment is complete, the results must be reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading. For example, to account for uncertainties in the development of exposure assumptions, conservative estimates were made to ensure that the particular assumptions were protective of sensitive subpopulations or the maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions, thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward overpredicting both carcinogenic and non-carcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation of uncertainty is especially relevant when the risks exceed the point of departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are less than an acceptable risk level (i.e., 10^{-6}), the interpretation of no significant risk is typically straightforward.

However, when risks calculated using a high degree of uncertainty exceed an acceptable risk level (i.e., 10^{-4}), a conclusion can be difficult unless uncertainty is considered.

7.6.1 Uncertainty in Selection of COPCs

The most significant issues related to uncertainty in COPC selection were the usability of existing databases (i.e., the use of validated and unvalidated sample results [only validated data were used in this risk assessment] and the completeness, precision, and accuracy of the data set), the inclusion of chemicals potentially attributable to background in the quantitative risk assessment, the screening levels used, and the absence of screening levels for a few chemicals detected in the site media. A brief discussion of each of these issues is provided in the remainder of this section.

Usability and Completeness of Existing Databases

Data from samples collected for the RFI and historical data from the bioremediation program (reported in the IMR) were used to assess risks to potential human receptors. Both the RFI and bioremediation program data were biased because samples were collected in areas of known or suspected contamination. For example, the soil samples collected during the RFI were obtained near SWMU 13 buildings and the Therminol boiler area. The RFI data were primarily designed to evaluate the nature and extent of PCB contamination, but also to verify that other contaminants were not significant. The data collected during the bioremediation program was obtained from areas where soil was suspected to be impacted by historical operations, i.e., areas around the bulk loading buildings (172/173/2501 and 167/168/2500) and the production buildings (165, 166 and 171). Data was also collected around Building 174 but no explosives were detected in the Building 174 samples.

The soil and groundwater contamination from the RFI and the historical soil contamination appear to be well bounded. In the bioremediation program, samples were collected around each building area until concentrations in the grids around each building met residential or industrial cleanup goals. No samples were collected in the areas between buildings and this may be a source of some uncertainty in the risk assessment. However, because the sampling was biased and contamination well bounded and because these areas were not known to be impacted by site activities, the uncertainty is expected to be minimal and risks are not likely to be underestimated.

The historical samples were analyzed for a limited number of analytes (i.e., explosives, nine metals (aluminum, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), and six VOCs (acetone, methyl ethyl ketone, methylene chloride, methyl isobutyl ketone, toluene, and xylenes). These

chemicals were identified as COCs for SWMU 13 in the RFI Phase I Environmental Monitoring Report for Mine Fill B (Halliburton NUS, 1992a) because, according to the Phase I report they are “RCRA classified wastes which may have been, or are currently, generated in Mine Fill B”. Use of this limited list may underestimate risks, but as previously stated, sampling at SWMU was biased towards known or suspected contaminants and contaminated areas. In addition, list of chemicals in the 2003/2004 RFI was expanded to fill in data gaps and included Target Compound List (TCL) VOCs, SVOCs, PCBs, and dioxins/furans. Therefore, the sampling and analytical program should be adequate for characterizing site-related risks.

Both the RFI and historical were validated. A data quality report is included in Section 3.0 of this report. Fixed-based analytical results only for the Target Analyte Lists for the field investigations were used in the quantitative risk evaluation. Filtered and unfiltered samples were collected for groundwater and surface water but only unfiltered results are used to assess risks. Data regarded as unreliable (i.e., qualified as "R" during the data validation process) were not used in the quantitative risk assessment. The elimination of data qualified “R” may increase the uncertainty in the risk assessment. However, as shown in Section 3.2, the chemicals qualified “R” are not typical COCs at SWMU 13. The detection limit for 2-amino-4,6-dinitrotoluene in one gully surface water sample was rejected in the explosive analyses. However, this chemical was selected as a COPC for gully surface water. Therefore, it is unlikely that risks have been underestimated by the removal of the unreliable data from the data sets.

As discussed in Section 7.2.1, historical data from samples collected during the bioremediation program in 1997 and 1998 were used in conjunction with the data obtained from the investigation conducted in 2003/2004 in the quantitative risk analysis. The historical data were validated and all of the historical data representing post-remediation conditions at SWMU 13 were used in the risk assessment. Uncertainty associated with the use of the historical data is expected to be negligible.

Section 5.3 of the IMR discusses a pilot-scale size windrow with soil from a borrow source that was formed for use as a control windrow for toxicity testing at Rockeye (RKI). Analytical results revealed that the borrow source soil was contaminated with PCBs (Aroclor-1254 was detected at 9.3 mg/kg and Aroclor-1260 was detected at 15 mg/kg). Processing of the windrow was subsequently halted and the windrow was hauled to SWMU 13 and placed in the bottom of grid 149 located near Building 173. The grid was then backfilled with bioremediated soil, which met residential cleanup goals. Because Grid 149 is the only grid containing PCBs and because they were placed at the bottom of the excavation and covered with bioremediated soil, the PCBs in this grid were not evaluated in the risk assessment. The PCB concentrations in Grid 149 exceed the 1 mg/kg U.S. EPA residential cleanup goal for PCBs, but are

less than the 25 mg/kg cleanup goal for industrial and restricted land use (U.S. EPA, 1990). It is recommended that future workers who might dig near Grid 149 be notified about the PCB presence.

Chemicals Potentially Attributable to Background

Background was not a consideration in the COPC selection process. If the maximum concentration of a chemical exceeded its respective screening level, it was selected as a COPC and evaluated in the quantitative risk assessment. However, background soil concentrations have been characterized for the facility and upgradient surface water and sediment samples were collected at SWMU 13.

Upgradient samples were collected for mainstream and gully surface water and sediment and are presented in Tables 7-8, 7-9, 7-10, and 7-11. A comparison of maximum concentrations detected in samples from upgradient locations versus those reported for site-related surface water and sediment sampling locations indicates that the concentrations of most metals at the site-related sampling locations were significantly greater than the concentrations in the upgradient samples. However, if exceedance of background had been a COPC selection criterion, aluminum in gully and mainstream sediment would not have been selected as a COPC. Note that the HIs calculated for aluminum in gully and mainstream sediment (presented in the RAGS-Part D tables in Appendix I) are more than an order of magnitude less than the U.S. EPA goal of 1. Therefore, including or excluding aluminum from the quantitative risk assessment for sediment would have little impact on the non-cancer risk estimates presented in the risk assessment.

Fifteen (15) metals were selected as COPCs for groundwater and three of these (iron, lithium, and manganese) were identified as risk drivers for groundwater because the chemical-specific HQs exceeded unity. No upgradient or background data are available for groundwater at SWMU 13 and it cannot be determined whether or not the metal concentrations are within background levels. However, the risks for receptor exposure to metals concentrations in groundwater are probably overestimated since only aluminum is known to have been used in SWMU 13 operations. An additional factor to consider is that concentrations of some metals identified as COPCs for groundwater (e.g. aluminum, arsenic, cadmium, and chromium) were determined to be naturally occurring in soil at SWMU 13 (see Section 5.2.4) and are probably naturally occurring in groundwater as well. Consequently, risks for exposure to groundwater are likely overestimated by including the fifteen metals in the quantitative risk assessment.

As stated in Section 5.1, no formal comparisons of SMWU 13 RFI metal concentrations in soil to background levels were conducted in this investigation because no metals data were generated for soil samples collected in the RFI and the metals samples collected in the bioremediation program cannot be

subdivided into soil background groups that are comparable to the standard NSWC Crane soil background data sets. Metals analyses (for nine metals) were performed on initial characterization and post excavation samples during the bioremediation program (more than 700 samples). No metals analyses were conducted on the bioremediated soil that was later returned to the excavations. Four of the metals (aluminum, arsenic, barium, and mercury) were selected as COPCs for the risk assessment, yet the average metal concentrations were found to be comparable to background soil concentrations or only slightly elevated relative to background concentrations reported in the Basewide Background Investigation Report (TtNUS, 2001). For example, the average SWMU 13 concentration of aluminum was 13,465 mg/kg and the average background levels ranged from 5,430 to 13,019 mg/kg. Also, the average SWMU 13 concentration of arsenic was 7.2 mg/kg and the average basewide background levels for arsenic ranged from 4.15 to 7.72 mg/kg. The evaluations provided in Section 5.2.4 concluded that a few metals (arsenic, barium, mercury, selenium, and silver) had slightly elevated soil concentrations but the differences among these average soil concentrations and average Crane background soil concentrations are minor. In addition, the results of the risk assessment indicate the non-cancer risks calculated for aluminum, arsenic, barium, and mercury were well below U.S. EPA goals (HIs ranging from approximately 0.001 to 0.04) and the carcinogenic risks calculated for exposure to arsenic in soil were within the U.S. EPA's risk management range. The IMR also concluded that concentrations of arsenic at SWMU 13 were within background levels. Based on the above analysis, the inclusion of aluminum, arsenic, barium, and mercury in the risk assessment results in a slight overestimation of risks.

In summary, inclusion of metals in the quantitative risk assessment for soil, sediment, and surface water without considering background does not appear to greatly affect the calculated risks. Risks for groundwater may be overestimated by the inclusion of some metals as COPCs.

COPC Screening Levels

The use of risk-based screening values based on conservative land use scenarios (i.e., residential land use for soil and sediment and ingestion of tap water for groundwater and surface water) corresponding to an ILCR of 10^{-6} and HI of 0.1 ensured that all the significant contributors to risk from a site were evaluated. The elimination of chemicals present at concentrations that correspond to an ILCR less than 10^{-6} and an HI less than 0.1 should not have affected the final conclusions of the risk assessment because those chemicals were not expected to cause a potential health concern at the detected concentrations.

In the COPC screening for groundwater, a "CAL-Modified PRG" for TCE (1.4 µg/L) was used as the screening value for TCE instead of the U.S. EPA Region 9 PRG (0.028 µg/L), which is based on a

provisional NCEA cancer slope factor. Consequently, TCE (maximum concentration = 1 µg/L) was not selected as a COPC. The elimination of TCE as a COPC may result in an underestimation of risk. However, if TCE were evaluated in the quantitative risk assessment (EPC = 1 µg/L), the residential ILCR for TCE in groundwater would be less than $1x10^{-6}$. Therefore, the effect of omitting TCE from the quantitative risk assessment is negligible.

Chemicals without Established Screening Levels

Risk-based screening levels (RBSLs) are currently not available for some constituents (e.g., benzo(g,h,i)perylene, phenanthrene, the diamino-nitrotoluenes, DNX, MNX, and TNX). Appropriate surrogates were selected for these chemicals based on similar chemical structures, if available. For example, pyrene was selected as a surrogate for benzo(g,h,i)perylene and phenanthrene. Applying toxicity values of one compound to another increase the uncertainty in the risk assessment both in regard to the selection of COPCs and the calculated risks. Suitable surrogates could not be found for 2,4-diamino-6-nitrotoluene, 2,6-diamino-4-nitrotoluene, DNX, MNX, and TNX. The omission of these energetics from the quantitative risk assessment may result in an underestimation of risks. However, the risks calculated for explosives in the risk assessment, primarily RDX, were greater than $1x10^{-3}$ and it is unlikely that omission of these compounds would greatly affect the risk assessment results or remedial decisions. These chemicals were also detected less frequently and at lower concentrations than the major explosive contaminants (i.e., HMX, RDX, and TNT)

7.6.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arose because of the methods used to calculate EPCs, the determination of land use conditions, the selection of receptors and scenarios, the estimation of EPCs, and the selection of exposure parameters. Each of these is discussed below.

Land Use

The current land use patterns at NSWC Crane are well established, thereby limiting the uncertainty associated with land use assumptions. Land use at SWMU 13 is currently limited and is expected to be limited in the future, as long as NSWC remains open (potential and infrequent trespassers are the only current and likely future receptors). To be conservative, risks to potential and future construction workers, maintenance workers, occupational workers, recreational users, and on-site residents were estimated for the site.

Exposure Point Concentrations

Uncertainty was associated with the use of the 95 percent UCL on the mean concentration as the EPC. As a result of using the 95 percent UCL, the estimations of potential risk for the RME scenario were most likely overstated because this is a representation of the upper limit that potential receptors would be exposed to over the entire exposure period. In some cases (because datasets contained fewer than 10 samples or because the UCL was greater than the maximum concentration), the maximum concentration was used as the EPC. Use of the maximum concentration as the EPC tends to overestimate potential risks because receptors are assumed to be exposed continuously to the maximum concentration for the entire exposure period. Uncertainty was also introduced when the non-detect results were assigned a value of one-half the non-detect quantitation limit in the calculation of the EPC. This may have either overstated or understated the risks to the receptors.

As discussed in Section 7.5.2.2, risks for groundwater were based on the assumption that EPCs for groundwater were the concentrations in the most highly contaminated area of the explosive groundwater plume. The use of these averages is recommended by U.S. EPA Regions 1 and 4 (U.S. EPA, 2000). The plume area used for averaging was selected based on concentrations of explosives, especially RDX (see Section 7.3.3). This area also included maximum concentrations of some metals (e.g., iron, lithium, manganese, and nickel). Using the most contaminated part of the plume may result in overestimation of risks for explosives and several metals. However, the maximum concentrations of some metals were outside this plume area (e.g., aluminum, chromium, barium, and vanadium at location 13MWT05) and risks could be underestimated for these metals. Because of this uncertainty, an additional evaluation of risks for metals in groundwater was performed and is presented below.

Fifteen metals were identified as COPCs for groundwater at SWMU 13. For purposes of this discussion, these metals fall into the following three categories:

- Metals with maximum concentrations within the explosive plume (i.e., iron, lithium, manganese and nickel) that were evaluated in the risk assessment. Since the maximum concentrations of these metals were included in the risk evaluation, risks were not likely underestimated, and these will not be discussed further.

- Metals with maximum concentrations that were less than MCLs and PRGs (i.e., antimony, barium, beryllium, cadmium, cobalt, lithium, nickel, and zinc). Risks for these metals are minimal and are not discussed further.

- Metals with concentrations that were greater than MCLs and PRGs in one or more samples but the concentrations were outside the explosive plume and were not included in the risk assessment calculations (i.e., aluminum, arsenic, chromium, and vanadium). Risks for these metals could be underestimated and an additional evaluation is warranted. The highest concentrations of these metals occurred at locations 13MWT05 and 13MWT25. Risks for the average concentrations of these locations were calculated for all receptors. The results of the reanalysis indicated that risks for workers and recreational users were acceptable but risks for the future child and adult residents exceeded U.S. EPA benchmarks. The results for child and adult residents are presented in the following tables.

Comparison of Hazard Quotients (HQs) Calculated in the HHRA for SWMU 13 vs. HQs Based on Most Highly Contaminated Wells - Future Child Residents

COPC	EPC Used in Risk Assessment (µg/L)	Hazard Quotient from Risk Assessment	Average of MWT05 and MWT25 (µg/L)	Hazard Quotient Based on MWT05 and MWT25
Aluminum	2,800	0.3	106,000	10
Arsenic	1.25	0.4	22	7
Chromium	2.2	0.08	117	4
Vanadium	1.8	0.2	114	11
Total HI		1		32

Comparison of Hazard Quotients (HQs) Calculated in the HHRA for SWMU 13 vs. HQs Based on Most Highly Contaminated Wells - Future Adult Residents

COPC	EPC Used in Risk Assessment (µg/L)	Hazard Quotient from Risk Assessment	Average of MWT05 and MWT25 (µg/L)	Hazard Quotient Based on MWT05 and MWT25
Aluminum	2,800	0.08	106,000	3
Arsenic	1.25	0.1	22	2
Chromium	2.2	0.02	117	1
Vanadium	1.8	0.05	114	3
Total HI		0.25		9

In regard to cancer risks for the lifelong resident, the ILCR for exposure to arsenic in groundwater increased from $3x10^{-5}$ to $6x10^{-4}$ when using the average concentration from the most contaminated wells (22 µg/L).

As can be seen from the comparisons presented above, the ILCR and HQs based on exposure to the most highly contaminated wells are between one and two orders of magnitude greater than the risks calculated in the risk assessment. However, there is considerable uncertainty associated with the

concentrations in samples collected from locations MWT05 and MWT25. An examination of the analytical results for the filtered samples associated with the unfiltered samples shows that aluminum, arsenic, chromium, and vanadium were not detected in either of the filtered samples (13GWT0502-F and 13GWT0525-F). For example, aluminum was detected in Sample 13GWT0502 at a concentration of 139,000 µg/L but the result in the associated filtered sample was 164 U µg/L (not detected). The filtered sample results indicate that suspended matter in the unfiltered samples has affected the analysis of these metals resulting in elevated concentrations. An additional factor in regard to aluminum is that since the risk assessment for SWMU 13 was completed (July 2005), the U.S. EPA has withdrawn the RfD for aluminum. Therefore, risks for aluminum could not be calculated if the risk assessment were performed at the present time. The conclusions of the above analysis indicate that there is great uncertainty in the risks calculated for aluminum, arsenic, chromium, and vanadium based on concentrations in the most contaminated wells resulting in an overestimation of risks.

As explained in Section 7.3.3, the EPCs for the historical soil data in the remediated areas of SWMU 13 were weighted averages based on assumed volumes of residual soil and bioremediated soil. Averages were used for the for the historical data because the concentrations of the bioremediated soil compost, which constitutes a large portion of the soil volume, are averages of windrow data calculated in the IMR. Often bioremediated soil from different windrows were mixed in the same excavated grid, thereby combining average concentrations from various windrows, and further averaging concentrations which had already been averaged. Furthermore, much of the data from grids that were not excavated (because concentrations were less than cleanup goals) were composited samples and are, therefore, average concentrations. Because much of the historical data consisted mainly of average concentrations, averages were used as EPCs rather than UCLs. In order to evaluate the uncertainties associated with using weighted averages rather than UCLs, UCLs were calculated for RDX using the U.S. EPA's ProUCL guidance. The results of the ProUCL analysis indicated that the 95 percent UCLs (normal or lognormal) were slightly greater than the RDX average, but were still less than the residential cleanup goal (4 mg/kg). An additional consideration is the fact that, with a few exceptions, concentrations in residual soil and bioremediated compost samples were less than residential or industrial cleanup goals (with more than 80 percent of the samples being less than residential goals). Based on this analysis, the uncertainty in using weighted averages is minimal and risks have not been underestimated by use of the weighted averages.

As demonstrated in Section 7.3.3, the following weighting scheme was used to estimate the soil EPCs: concentrations in non-excavated areas and backfilled areas were assumed to represent 90 percent of the soil volume, concentrations in the excavated areas were assumed to constitute 9 percent of the total soil volume, and concentrations in the grids that could not be excavated were assumed to constitute

1 percent of the total soil volume. These assumptions were based on an examination of the remediated and unremediated grids areas, discussions with TT personnel, and professional judgment. There is some uncertainty in the weighted averages because they are based on several "unknowns", such as the actual soil volumes. It was also necessary to use some professional judgment when interpreting and applying data from the IMR to determine contaminant concentrations in some grids. The degree and direction of the uncertainty is not known. However, an attempt was made to be conservative when making the assumptions, especially in regard to the assumption of one percent for the volume of soil that could not be excavated. This was an important assumption because these areas contained the highest residual concentrations of RDX. The assumption of one percent affects only eight grids over the six building areas. This represents eight data points out of more than 600. Therefore, the assumption of one percent should be sufficiently conservative.

EPCs were calculated for each of the six building areas investigated in the IMR. However, risks were only quantified for Buildings 171 and 166 because weighted averages for explosives and metals were highest in these areas and because the areas around these buildings were also investigated for PCBs in the RFI. The highest weighted average for RDX was for soil and compost at Building 171 (3.89 mg/kg) which corresponds to a total residential ILCR of 7.0×10^{-7}, which is less than the U.S. EPA's risk management range. Because this risk was based on the highest weighted RDX average, it was not necessary to calculate risks for explosives in the other building areas. Similarly, HIs for metals were less than unity in these areas and it, therefore, was not necessary to calculate metal risks for the other building areas. The weighted averages for arsenic in all the building areas were similar (average = 7.6 mg/kg) corresponding to a residential ILCR of approximately 1×10^{-5}, which is within the U.S. EPA target risk range. In addition, as discussed previously, the concentrations of arsenic in soil at SWMU 13 are within background levels.

There is additional uncertainty associated with post-remediation conditions at Building 165. As discussed in Section 1.3.1.5, contaminated soil was excavated by MK from Grids 1 and 22 at Building165 but there is no record that PES were ever obtained from these grids, nor were the excavation areas surveyed. The IMR indicates that equipment was installed in Building 165 after the initial characterization which included a partially buried tunnel leading into the building. The tunnel covers Grids 1 and 22 (in which concentrations of RDX exceeded industrial cleanup goals). Because of the haste and urgency to complete the tunnel system, PES were not obtained from these grids. Since the IMR states that Grids 1 and 22 were excavated, data from these grids was removed from the data set when calculating EPCs. Uncertainty lies in the fact that the excavation is not well documented and PES samples were not collected. The areas of Grids 1 and 22 are now covered with a tunnel, thereby preventing access to the soil. Because the soil in Grids 1 and 22 are known to have been excavated (even though not well

documented), the uncertainty in the calculated risks associated with removing these grids from the data set is negligible. Note that explosive concentrations in all other grids at Building 165 met cleanup goals.

The weighted averages for COPCs in the six areas are presented in Table I-1 in Appendix I.

Another factor to be considered regarding the bioremediated backfilled soil is that fact that the explosives in the compost will continue to be biodegraded overtime. Evidence of this was shown in the IMR report for data for re-sampled windrows (Table 4-4 of the IMR) in which bioremediation was allowed to continue for more than 400 days. In these cases, the concentrations of RDX decreased to about 2 mg/kg or less and concentrations of HMX and TNT decreased to less than 1 mg/kg. It should also be noted that no other explosives (i.e., other than RDX, HMX, and TNT) were detected in the bioremediated soil.

There was also uncertainty in assuming that current groundwater concentrations will not change in the future, and this introduced additional uncertainty in the EPC and risks for any groundwater or surface water COPC. Concentrations in groundwater may diminish over time due to natural attenuation processes involving source depletion and dilution. This is an important consideration for SWMU 13 because extensive remediation has already occurred at the facility and the elevated groundwater RDX concentrations are most likely due to pre-remediation soil contamination.

Exposure Routes and Receptor Identification

The determination of various receptor groups and exposure routes of potential concern was based on current land use observed at the site and the anticipated future land use. Therefore, the uncertainty associated with the selection of exposure routes and potential receptors was minimal because they were considered to be well defined. Although residential use of groundwater was evaluated as an exposure scenario, groundwater is not currently used at the site nor is it expected to be used in the future. Therefore, the evaluation of direct exposure to groundwater that was performed in this baseline HHRA was included primarily to aid in risk management decision making.

An important uncertainty issue for the SWMU 13 risk assessment is exposure to gully surface water because ILCRs for this exposure pathway exceeded $1x10^{-4}$ (see Section 7.5.2.2). Exposure to the surface water in gullies is not always a complete exposure pathway. The gullies are often dry and based on the experiences of field personnel during the RFI, surface water is present in the gullies after rain events only. Therefore, exposure to gully surface water is often not possible. In addition, the concentrations of some PAHs were close to or exceeded published water solubility levels (IDEM, 2004) indicating that these compounds were probably present on particulate matter in the samples and that the PAHs were not

present in the dissolved phase. Furthermore, as discussed in Section 7.5.2.2, the elevated risks calculated for PAHs in surface water were primarily due to dermal absorption and this exposure route is subject to large uncertainties which can greatly overestimate potential risks. An estimate by U.S. EPA Region 4 indicates that the uncertainty associated with the dermal absorption of PAHs in water is "greater than a billion fold".

Exposure Parameters

Each exposure factor (for RME and CTE scenarios) selected for use in the risk assessment had some associated uncertainty. Generally, exposure factors were based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally had a broad distribution. To avoid underestimation of exposure, in most cases, the U.S. EPA guidelines (U.S. EPA, 1991) on the RME receptor were used, which generally specify the use of the 95th percentile value for most parameters. Therefore, the selected values for the RME receptor represented an upper bound of the observed or expected habits of the majority of the population.

Generally, the uncertainty can be assessed quantitatively for many assumptions made in determining factors for calculating exposures and intakes. Many of these parameters were determined from statistical analyses on human population characteristics. Often, the database used to summarize a particular exposure parameter (i.e., body weight) is quite large. Consequently, the values chosen for such variables in the RME scenario have low uncertainty.

For many parameters for which limited information exists (i.e., dermal absorption of chemicals from soil), greater uncertainty exists. For example, current U.S. EPA guidance (U.S. EPA, 2004a) does not provide dermal absorption factors for exposure to most metals (except arsenic and cadmium) in soil. Therefore, risks for dermal contact from soil were not evaluated for most metals in this risk assessment. Consequently, risks from exposure to soil may have been underestimated.

Many of the exposure parameters used to calculate exposures and risks in this report were selected from a distribution of possible values including U.S. EPA guidance (U.S. EPA, 1991; U.S. EPA, 1993a) and dermal guidance (U.S. EPA, 1997b; U.S. EPA, 2004a). For the RME scenario, the value representing the 95th percentile was generally selected for each parameter to ensure that the assessment bounds the majority of actual risks from a postulated exposure. This risk number is used in risk management decisions but does not indicate what a more average or typical exposure might be or what risk range might be expected for individuals in the exposed population.

To address these issues, U.S. EPA (1992) has suggested the use of the CTE receptor, whose intake variables are often set at approximately the 50th percentile of the distribution. The risks for this receptor seek to incorporate the range of uncertainty associated with various intake assumptions. Some of the parameters presented in this risk assessment were estimated using professional judgment, although U.S. EPA does provide limited guidance for the CTE evaluation (U.S. EPA, 1993a).

7.6.3 Uncertainty in the Toxicological Evaluation

Uncertainties associated with the toxicity assessment (determination of RfDs and CSFs and use of available criteria) are presented in this section.

Derivation of Toxicity Criteria

Uncertainty associated with the toxicity assessment was associated with hazard assessment and dose-response evaluations for the COPCs. The hazard assessment dealt with characterizing the nature and strength of the evidence of causation or the likelihood that a chemical that induces adverse effects in animals will also induce adverse effects in humans. Hazard assessment of carcinogenicity was evaluated as a weight-of-evidence determination using U.S. EPA methods. Positive animal cancer test data suggest that humans contain tissue(s) that may manifest a carcinogenic response; however, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of non-cancer effects, however, positive animal data often suggest the nature of the effects (i.e., the target tissues and type of effects) anticipated in humans.

Uncertainty in hazard assessment arose from the nature and quality of the animal and human data. Uncertainty was reduced when similar effects were observed across species, strain, sex, and exposure route; when the magnitude of the response was clearly dose related; when pharmacokinetic data indicated a similar fate in humans and animals; when postulated mechanisms of toxicity were similar for humans and animals; and when the COC was structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose-response evaluation included the determination of a CSF for the carcinogenic assessment and derivation of an RfD for the non-carcinogenic assessment. Uncertainty was introduced from interspecies (animal to human) extrapolation, which, in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also resulted from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so intragroup biological variation is minimal, but the

human population of concern may reflect a great deal of heterogeneity, including unusual sensitivity or tolerance to the COPC. Even toxicity data from human occupational exposure reflect a bias because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the chemical are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate was derived and the database used. For cancer effects, the uncertainty associated with dose-response factors was mitigated by assuming the 95 percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a non-threshold assumption of carcinogenesis. Evidence suggests, however, that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are non-carcinogenic. Therefore, the use of the linearized multistage model was conservative for chemicals that exhibited a threshold for carcinogenicity.

For non-cancer effects, additional uncertainty factors may have been applied in the derivation of the RfD to mitigate poor quality of the key study or gaps in the database. Additional uncertainty for non-cancer effects arose from the use of an effect level in the estimation of an RfD, because this estimation was predicated on the assumption of a threshold less than which adverse effects were not expected. Therefore, an uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arose in estimation of an RfD for chronic exposure from subchronic data. Unless empirical data indicated that effects did not worsen with increasing duration of exposure, an additional uncertainty factor was applied to the no-effect level in the subchronic study. Uncertainty in the derivation of RfDs was mitigated by the use of uncertainty and modifying factors that normally ranged between 3 and 10. The resulting combination of uncertainty and modifying factors may have reached 1,000 or more.

The derivation of dermal RfDs and CSFs from oral values may have caused uncertainty. This was particularly the case when no gastrointestinal absorption rates were available in the literature or when only qualitative statements regarding absorption were available.

Uncertainty Associated with Evaluation of the Dermal Exposure Pathway

According to RAGS Part E (U.S. EPA, 2004a), risks for dermal absorption of chemicals in soil are quantitatively evaluated for arsenic, cadmium, chlordane, 2,4-dichlorophenoxyacetic acid, dichloro-diphenyl-trichloroethane (DDT), TCDD (and other dioxins), PAHs, PCBs, pentachlorophenol, and SVOCs only because of the limited information guidance available to evaluate dermal exposure to other constituents. Therefore, risks from dermal exposure to metals in soil and sediment (except for arsenic and cadmium)

were not quantified in the risk assessment. Consequently, potential risks may have been underestimated by excluding these constituents from the dermal risk assessment calculations.

The significant uncertainty associated with the evaluation of dermal absorption of chemicals in an aqueous medium is discussed in Sections 7.5.2.2 and 7.6.2.

Use of Aluminum and Iron Toxicity Criteria

NCEA provisional RfDs were used to evaluate non-carcinogenic effects from exposure to aluminum and iron. The provisional RfDs for these chemicals are based on allowable intakes rather than adverse effect levels. Therefore, there was some degree of uncertainty associated with the use of the RfDs. Note that some U.S. EPA regions (e.g., Region 1) consider the use of the oral RfD for aluminum and iron inappropriate and recommend that these metals not be evaluated quantitatively in risk assessments.

Alternate RfD for Iron

As previously discussed there is uncertainty associated with the toxicity data for iron. The RfD for iron is based on the recommended daily allowance (RDA) for adult human nutrition. Children and adolescents require more iron in their diets than adults do, consequently, using an RfD based on the adult RDA for iron to evaluate exposures to children results in an overestimation of the risks for children. When the HI for exposures to iron by children exceed unity, U.S. EPA Region 3 recommends recalculating the HI using an RfD of 1.1 mg/kg/day (instead of the 0.3 mg/kg/day provided in IRIS). If this value were used to estimate risks for children, the HQs calculated for iron would decrease by a factor of 1.1/0.3. Therefore, the risk estimates calculated for iron may be overestimated. The HI for the child resident assumed to be exposed to groundwater was 7.0. If the alternate RfD was used the HI would be 2 and still exceed the goal of unity for the RME. The HI for the CTE would be less than unity if the alternate RfD were used. The risks for child exposure to iron in sediment were less than unity and, therefore, the overestimation is not significant.

Alternate RfD for Manganese

The oral RfD for manganese listed in the Region 9 PRG table (0.024 mg/kg/day) was used to calculate risks for ingestion of groundwater. This value includes a modification factor of 3 and an adjustment factor for the dietary contribution which is applied to the non-dietary RfD (0.14 mg/kg/day) presented in IRIS. IRIS indicates that an adjustment for the dietary contribution should be subtracted from this allowable intake. Using the modified and adjusted RfD results in risk estimates 6 times higher than if the non-

dietary RfD were used. However, the HI for the future child resident would still exceed the goal of unity if the non-dietary RfD were used.

Uncertainty in the Toxicity Criteria for Chromium

Toxicity criteria are available for different forms of chromium, which is considered to be more toxic in the hexavalent state. Because there is no evidence to support the conclusion that hexavalent chromium is present at the SWMU 13, speciation analyses were not completed for SWMU 13. However, risks associated with this chemical were assessed by conservatively assuming that 100 percent of the reported total chromium result is attributable to hexavalent chromium. Therefore, the risks calculated for chromium in groundwater, surface water, and sediment are likely overestimated. However, since the HQs calculated for chromium in these media were less than unity by an order or magnitude or more, the uncertainty introduced into the risk assessment is minimal.

Uncertainty in the Toxicity of Nitrate and Nitrite

Results for nitrate and nitrite in groundwater and surface water were reported as nitrate/nitrite-N by the laboratory. However the RfDs for these two species are considerably different. The RfD for nitrate is 1.6 mg/kg/day and the RfD for nitrite is 0.1 mg/kg/day (IRIS, 2005). Therefore, nitrite is considered approximately 15 times more toxic than nitrate. The RfD values used in the risk assessment calculations were based on the expected water chemistry of the two species. Surface water is exposed to the air, is generally well mixed, and is more likely to be an oxidizing environment. This environment favors the predominance of nitrate. Therefore, nitrate/nitrite-N in surface water is evaluated in the risk assessment as if it were nitrate. Groundwater could be an oxidizing or reducing environment depending on conditions in the aquifer. Since nitrate/nitrite-N in groundwater might equally exist as either species, it is conservatively assumed to be predominantly nitrite for risk assessment purposes. In the risk assessment, the HI calculated for ingestion of nitrate/nitrite in groundwater based on the RfD for nitrite was 6.5 for the future child resident. If the RfD for nitrate had been used, the HI would be 0.4. Thus, the risks from exposure to nitrate/nitrite in groundwater may be overestimated by using the RfD for nitrite. The risks for exposure to nitrate/nitrite in surface water were less than unity regardless of whether it was assumed that nitrate or nitrite was present.

7.6.4 Uncertainty in the Risk Characterization

Uncertainty in risk characterization resulted from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty existed when summing non-cancer risks for several substances across different exposure pathways. This assumed that each

substance has a similar effect and/or mode of action. Even when compounds affect the same target organs, they may have different mechanisms of action or differ in their fate in the body, so additivity may not have been an appropriate assumption. However, the assumption of additivity was considered because in most cases it represented a conservative estimate of risk.

Risks to any individual may also have been overestimated by summing multiple assumed exposure pathway risks for any single receptor. Although every effort was made to develop reasonable scenarios, not all individual receptors may have been exposed via all pathways considered.

Finally, the risk characterization did not consider antagonistic or synergistic effects. Little or no information was available to determine the potential for antagonism or synergism for the COPCs. Because chemical-specific interactions could not be predicted, the likelihood for risks to be overpredicted or underpredicted could not be defined, but the methodology used was based on current U.S. EPA guidance.

7.7 SUMMARY AND CONCLUSIONS

This section briefly summarizes the results of the HHRA performed for SWMU 13. Table 7-26 contains a summary of conclusions and recommendations.

The baseline HHRA for SWMU 13 was performed to characterize the potential risks to likely human receptors under current and potential future land use. Potential receptors under current and future land use are adolescent trespassers, maintenance workers, and occupational workers. Potential receptors under future land use are construction workers, recreational users, and hypothetical residents (children and adults). Although future land use is likely to be the same as current land use, the potential future receptors were evaluated in the baseline HHRA, primarily for decision-making purposes.

Potential risks associated with inhalation exposures were considered to be minimal for soil, sediment, and surface water, and groundwater. Inhalation of volatile emissions and fugitive dust was evaluated qualitatively via a comparison of site data with U.S. EPA generic SSLs for transfers from soil to air. Inhalation exposure was considered to be relatively insignificant because all detected soil concentrations were less than the SSLs. Few VOCs were detected in groundwater, surface water, or sediment and no VOCs were identified as COPCs for these media.

The list of COPCs for SWMU 13 included the following:

- Surface Soil – dioxins/furans, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and Aroclor-1248

- Subsurface Soil - dioxins/furans, Aroclor-1248

- Surface/subsurface Soil (historical samples) - 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, RDX, aluminum, arsenic, barium, and mercury

- Groundwater – 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, 2-6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 2-nitrotoluene, HMX, RDX, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, iron, lead, lithium, manganese, nickel, vanadium, zinc, and nitrate/nitrite-N

- Gully Surface Water – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, RDX, aluminum, arsenic, chromium, iron, lead, manganese, vanadium, and nitrate/nitrite-N

- Gully Sediment – benzo(a)pyrene, dibenzo(a,h)anthracene, aluminum, arsenic, barium, cadmium, chromium, iron, lead, manganese, and vanadium

- Mainstream Surface Water – RDX, barium

- Mainstream Sediment – aluminum, antimony, arsenic, cadmium, iron, manganese, and vanadium

Quantitative estimates of non-carcinogenic and carcinogenic risks (HIs and ILCRs, respectively) were developed for potential human receptors and are summarized below.

Exposure to Soil

Risk from exposure to COPCs in soil were evaluated for the areas near Buildings 166 and 171 because these areas contained the highest residual concentrations of explosives and metals and these areas were a concern for PCBs. Risks for the other building areas are expected to be less than these two areas. Cumulative HIs for current and future receptors exposed to surface and/or subsurface soil scenarios were less than unity (1.0) on a target organ basis, indicating that adverse non-carcinogenic effects are not anticipated for these receptors under the defined exposure conditions.

Cumulative ILCRs for the construction worker, maintenance worker, adolescent trespasser, and total recreational user (child + adult) were within the U.S. EPA target risk range, $1x10^{-6}$ to $1x10^{-4}$.

Total ILCRs for the occupational worker and the total residential ILCR (child + adult) exceeded the target risk range. The primary contributor to these ILCRs (i.e., ILCRs greater than 10^{-4}) was Aroclor-1248 in the areas near Buildings 166 and 171. Minor contributors to the ILCRs were PAHs, dioxins/furans, and arsenic. The risks for arsenic in soil were slightly greater than $1x10^{-5}$, but the background analysis provided in Section 5.2.4 concluded that the concentrations of arsenic are likely within background levels. It is, therefore, recommended that arsenic not be considered as a COC for SWMU 13.

Exposure to Groundwater

Maintenance workers and adolescent trespassers were not evaluated for exposure to groundwater.

The cumulative HI for the future construction worker was less than unity.

HIs for occupational workers, recreational users (children and adults), and hypothetical residents (children and adults) assumed to be exposed to groundwater exceeded unity. RDX in groundwater was the major contributor (HI greater than unity) to the total HIs for these receptors. The HIs for TNT, 4-amino-2,6-dinitrotoluene, iron, lithium, manganese, and nitrate/nitrite (as nitrite) also exceeded unity for the residential exposure scenarios.

Cumulative ILCRs for future construction workers assumed to be exposed to groundwater were within the U.S. EPA target risk range.

Cumulative ILCRs for occupational workers, total recreational users (child + adult), and future on-site child and adult residents assumed to be exposed to groundwater exceeded the U.S. EPA target risk range. RDX was the major contributor (ILCR > $1.0x10^{-4}$) to the ILCRs for groundwater. Arsenic and TNT were minor contributors to the groundwater risks.

As discussed in Sections 7.5 and 7.6, there are a number important uncertainties associated the groundwater risks. Among these are the fact that the calculated groundwater risks were based on average concentrations of COPCs in the most highly contaminated area of the plume; no background upgradient well data were available for the site and therefore risks for metals may be overestimated; even though arsenic was a minor risk driver, the average concentration of arsenic is far less than the U.S. EPA

and IDEM MCLs; the risks for nitrate/nitrite may be overestimated by using the RfD for nitrite to estimate risks; and groundwater is not currently used at SWMU 13 nor is it expected to be used in the future.

Exposure to Mainstream Surface Water and Sediment

Construction workers and occupational workers were not evaluated for exposure to surface water and sediment.

The cumulative HIs for COPCs detected in mainstream surface water and sediment for all potential receptors were less than unity, on a target organ basis.

The cumulative ILCRs for COPCS detected in mainstream surface water and sediment for all potential receptors were within the U.S. EPA's target risk range.

Exposure to Gully Surface Water and Sediment

The cumulative HIs for COPCs detected in gully surface water and sediment for maintenance workers, adolescent trespassers, adult recreational users, and future adult residents were less than unity.

The cumulative HIs for child recreational users and future child residents from exposure to gully surface water slightly exceeded unity (HI = 1.7). RDX in gully surface water was the major contributor to the child HIs.

Cumulative ILCRs for COPCS detected in gully surface water and sediment for maintenance workers and adolescent trespassers were within the U.S. EPA's target risk range.

Cumulative ILCRs for COPCS detected in gully surface water and sediment for recreational users (child + adult) and future residents exceeded the U.S. EPA target risk range. PAHs in gully surface water were the major contributors to the ILCRs (ILCRs > 1.0×10^{-4}). RDX and arsenic in gully surface water and arsenic in gully sediment were minor contributors the cumulative ILCRs. As discussed in Section 7.5.2.2, the risk estimates for gully surface water are subject to a great deal of uncertainty. Exposure to the surface water in gullies is not always a complete exposure pathway. The gullies are often dry and, based on the experiences of field personnel during the RFI, water is present in the gullies usually after rain events. Therefore, exposure to gully surface water is often not possible. The concentrations of some PAHs were close to or exceeded published water solubility levels indicating that PAHs are associated with soil/sediment particulates in surface water (i.e., were due to turbidity in the samples). Also, the

elevated risks calculated for PAHs in surface water were based on a dermal absorption model which may overestimate the risks from PAHs by several orders or magnitude.

Exposure to Lead

Lead was identified as a COPC for groundwater, gully surface water, and gully sediment. Exposure to lead was evaluated for future child residents by using the IEUBK Model and for workers and adult recreational users by the TRW adult lead model. Results of the lead evaluation indicated that predicted blood-lead levels were less than the U.S. EPA level of concern (10 µg/dL) for all potential receptors and the probabilities of the receptors having blood-lead levels greater than 10 µg/dL were less than U.S. EPA's goal of five percent.

Summary

In summary for SWMU 13, no significant potential human health risks are expected for exposures to soil, groundwater, surface water, or sediment for construction workers, maintenance workers, and trespassers. Non-carcinogenic and carcinogenic risks exceeding U.S. EPA benchmarks were estimated for occupational workers, child and adult recreational users, and future on-site child and adult residents. The elevated risk estimates were due to exposure to Aroclor-1248 in surface and subsurface soil, energetics (mainly RDX), and several inorganics in groundwater, and PAHs in gully surface water. As discussed in the risk assessment, the risk estimates for groundwater and gully surface water were subject to a number of significant uncertainties. Although risks for exposure to PAHs in gully surface water exceeded U.S. EPA benchmarks, these risks are considered to be overestimated by several orders of magnitude and it is recommended that PAHs in gully surface water not be considered as a COC for SWMU 13. It is recommended that energetics, iron, lithium, manganese, and nitrate/nitrite in groundwater and Aroclor-1248 in soil be considered as COCs for SWMU 13. In regard to iron, lithium, and manganese in groundwater, it should be noted these metals were not used in processes and operations at SWMU 13 and that background data for groundwater are not available for the facility. Also, the concentrations of iron and manganese detected in groundwater at SWMU 13 are similar to the levels found at other sites at NSWC Crane and could possibly be naturally occurring in the area or be the result of natural chemical processes in the aquifers.

A summary of the major contributors to risks at SWMU 13 is provided in Table 7-20.

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL - DIRECT CONTACT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dioxins (ng/kg)															
3268-87-9	1,2,3,4,6,7,8,9-OCDD	813 J	4140	ng/kg	13SS060002	12/12	---	4140	NA	39000	C(8)	NA	NA	No	BSL
39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.55 J	9.5 J	ng/kg	13SS140001	4/12	0.2 - 2	9.5	NA	39000	C	NA	NA	No	BSL
35822-46-9	1,2,3,4,6,7,8-HPCDD	6.2	45.4	ng/kg	13SS060002	12/12	---	45.4	NA	390	C	NA	NA	No	BSL
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.57 J	3.1 J	ng/kg	13SS100002	4/12	0.09 - 4	3.1	NA	390	C	NA	NA	No	BSL
55673-89-7	1,2,3,4,7,8,9-HPCDF	1.3 J	1.3 J	ng/kg	13SS140001	1/12	0.1 - 0.7	1.3	NA	390	C	NA	NA	No	BSL
39227-28-6	1,2,3,4,7,8-HXCDD	0.42 J	0.63 J	ng/kg	13SS130002	3/12	0.1 - 0.7	0.63	NA	39	C	NA	NA	No	BSL
70648-26-9	1,2,3,4,7,8-HXCDF	1.8 J	6.4	ng/kg	13SS140001	2/12	0.07 - 1.2	6.4	NA	39	C	NA	NA	No	BSL
57653-85-7	1,2,3,6,7,8-HXCDD	0.69 J	0.84 J	ng/kg	13SS140001	2/12	0.1 - 1	0.84	NA	39	C	NA	NA	No	BSL
57117-44-9	1,2,3,6,7,8-HXCDF	1.6 J	1.6 J	ng/kg	13SS140001	1/12	0.07 - 0.41	1.6	NA	39	C	NA	NA	No	BSL
19408-74-3	1,2,3,7,8,9-HXCDD	0.72 J	1.6 J	ng/kg	13SS130002	5/12	0.1 - 2	1.6	NA	39	C	NA	NA	No	BSL
72918-21-9	1,2,3,7,8,9-HXCDF	0.31 J	0.33 J	ng/kg	13SS140001	2/12	0.09 - 0.5	0.33	NA	39	C	NA	NA	No	BSL
40321-76-4	1,2,3,7,8-PECDD	0.71 J	0.71 J	ng/kg	13SS130002	1/12	0.1 - 0.8	0.71	NA	3.9	C	NA	NA	No	BSL
57117-41-6	1,2,3,7,8-PECDF	0.36 J	2.5 J	ng/kg	13SS140001	2/12	0.09 - 0.4	2.5	NA	78	C	NA	NA	No	BSL
60851-34-5	2,3,4,6,7,8-HXCDF	0.21 J	1.8 J	ng/kg	13SS140001	4/12	0.07 - 0.4	1.8	NA	39	C	NA	NA	No	BSL
57117-31-4	**2,3,4,7,8-PECDF**	0.47 J	21.8	ng/kg	13SS140001	7/12	0.1 - 0.53	21.8	NA	**7.8**	**C**	NA	NA	**Yes**	ASL
1746-01-6	2,3,7,8-TCDD	0.52 J	0.52 J	ng/kg	13SS090002	1/12	0.1 - 1.2	0.52	NA	3.9	C	NA	NA	No	BSL
51207-31-9	2,3,7,8-TCDF	0.35 J	21	ng/kg	13SS140001	10/12	0.1 - 0.3	21	NA	39	C	NA	NA	No	BSL
37871-00-4	TOTAL HPCDD	11.8	112	ng/kg	13SS060002	12/12	---	112	NA	NA	C	NA	NA	No	NTX
38998-75-3	TOTAL HPCDF	0.38 J	10.1 J	ng/kg	13SS140001	7/12	0.1 - 1.9	10.1	NA	NA	C	NA	NA	No	NTX
34465-46-8	TOTAL HXCDD	0.77 J	15.7 J	ng/kg	13SS050002	11/12	1.1	15.7	NA	NA	C	NA	NA	No	NTX
55684-94-1	TOTAL HXCDF	0.33	19.4 J	ng/kg	13SS140001	8/12	0.07 - 0.2	19.4	NA	NA	C	NA	NA	No	NTX
36088-22-9	TOTAL PECDD	0.71	0.71	ng/kg	13SS130002	1/12	0.1 - 2.8	0.71	NA	NA	C	NA	NA	No	NTX
30402-15-4	TOTAL PECDF	0.83	135 J	ng/kg	13SS140001	9/12	0.1 - 0.3	135	NA	NA	C	NA	NA	No	NTX
41903-57-5	TOTAL TCDD	0.52	2.1 J	ng/kg	13SS060002	2/12	0.1 - 2.2	2.1	NA	NA	C	NA	NA	No	NTX
55722-27-5	TOTAL TCDF	1.8	540 J	ng/kg	13SS140001	11/12	0.1	540	NA	NA	C	NA	NA	No	NTX
	2,3,7,8-TCDD TEQ	0.45	15.1	ng/kg	13SS140001	12/12	---	15.1	NA	**3.9**	**C**	NA	NA	**Yes**	NTX
Volatile Organics (ug/kg)															
156-60-5	TRANS-1,2-DICHLOROETHENE	2 J	2 J	ug/kg	13SS060002	1/2	1.4	2	NA	6900	N	180000	IDEM	No	BSL
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SS150002	2/2	---	3	NA	39000	N	NA	NA	No	BSL
Semivolatile Organics (ug/kg)															
83-32-9	ACENAPHTHENE	52 J	52 J	ug/kg	13SS090002	1/12	3.8 - 4.9	52	NA	370000	N	9500000	IDEM	No	BSL
120-12-7	ANTHRACENE	5 J	210 J	ug/kg	13SS090002	2/12	3.8 - 4.9	210	NA	2200000	N	47000000	IDEM	No	BSL
56-55-3	**BENZO(A)ANTHRACENE**	4 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4.9	1100	NA	**620**	**C**	5000	IDEM	**Yes**	ASL
50-32-8	**BENZO(A)PYRENE**	6 J	1000 J	ug/kg	13SS090002	6/12	3.8 - 4.9	1000	NA	**62**	**C**	**500**	IDEM	**Yes**	ASL
205-99-2	**BENZO(B)FLUORANTHENE**	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	**620**	**C**	5000	IDEM	**Yes**	ASL
191-24-2	BENZO(G,H,I)PERYLENE	6 J	750 J	ug/kg	13SS090002	6/12	3.8 - 4.9	750	NA	230000	N(9)	50000	IDEM	No	BSL
207-08-9	BENZO(K)FLUORANTHENE	5 J	640 J	ug/kg	13SS090002	7/12	3.8 - 4	640	NA	6200	C	50000	IDEM	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	91 J	140 J	ug/kg	13SS060002, 13SS090002	7/12	78 - 190	140	NA	35000	C	300000	IDEM	No	BSL
218-01-9	CHRYSENE	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	62000	C	500000	IDEM	No	BSL
53-70-3	**DIBENZO(A,H)ANTHRACENE**	200 J	200 J	ug/kg	13SS090002	1/12	3.8 - 4.9	200	NA	**62**	**C**	500	IDEM	**Yes**	ASL
206-44-0	FLUORANTHENE	6 J	1800 J	ug/kg	13SS090002	9/12	3.8 - 4	1800	NA	230000	N	6300000	IDEM	No	BSL
86-73-7	FLUORENE	50 J	50 J	ug/kg	13SS090002	1/12	3.8 - 4.9	50	NA	2700000	N	6300000	IDEM	No	BSL
193-39-5	**INDENO(1,2,3-CD)PYRENE**	4 J	650 J	ug/kg	13SS090002	6/12	3.8 - 4.9	650	NA	**620**	**C**	5000	IDEM	**Yes**	ASL
91-20-3	NAPHTHALENE	5 J	5 J	ug/kg	13SS100002	1/12	3.8 - 4.9	5	NA	5600	N	3200000	IDEM	No	BSL
85-01-8	PHENANTHRENE	4 J	1000 J	ug/kg	13SS090002	7/12	3.8 - 4.2	1000	NA	230000	N(9)	470000	IDEM	No	BSL
129-00-0	PYRENE	6 J	2400 J	ug/kg	13SS090002	9/12	3.8 - 4	2400	NA	230000	N	4700000	IDEM	No	BSL
Pesticides PCBs (ug/kg)															
12672296	**AROCLOR-1248**	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	**220**	**C**	**1800**	IDEM	**Yes**	ASL

TABLE 7-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL - DIRECT CONTACT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Concentration above Background ?(4)	EPA Region 9 PRG (Residential)(5)		Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Miscellaneous Parameters															
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA		NA	NA	No	NTX
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA		NA	NA	No	NTX

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Screening values for dioxins/furans are based on the PRG for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.
9 - Pyrene is used as a surrogate for benzo(g,h,i)perylene and phananthrene.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level
BKG = Below Background
BSL = Below Screening Level
NTX = No Toxicity Data

Associated Samples

13SS020002	13SS090002-D	13SS190002	13SS300002
13SS030002	13SS150002	13SS200002	13SS320002
13SS040002	13SS100002	13SS210002	13SS330002
13SS040002-D	13SS110002	13SS220002	13SS340002
13SS050002	13SS120002	13SS230002	13SS350002
13SS060002	13SS130002	13SS240002	13SS360002
13SS070002	13SS140001	13SS250002	13SS370002
13SS080002	13SS160002	13SS260002	13SS380002
13SS080002-D	13SS170002	13SS270002	13SS390002
13SS090002	13SS180002	13SS290002	13SS400002

TABLE 7-2

COMPARISON OF SURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]		U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Dioxins (ng/kg)													
3268-87-9	**1,2,3,4,6,7,8,9-OCDD**	813 J	4140	ng/kg	13SS060002	12/12	---	4140	NA	430000	C(7)	**2800**	NA
39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.55 J	9.5 J	ng/kg	13SS140001	4/12	0.2 - 2	9.5	NA	430000	C	2800	NA
35822-46-9	**1,2,3,4,6,7,8-HPCDD**	6.2	45.4	ng/kg	13SS060002	12/12	---	45.4	NA	4300	C	**28**	NA
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.57 J	3.1 J	ng/kg	13SS100002	4/12	0.09 - 4	3.1	NA	4300	C	28	NA
55673-89-7	1,2,3,4,7,8,9-HPCDF	1.3 J	1.3 J	ng/kg	13SS140001	1/12	0.1 - 0.7	1.3	NA	4300	C	28	NA
39227-28-6	1,2,3,4,7,8-HXCDD	0.42 J	0.63 J	ng/kg	13SS130002	3/12	0.1 - 0.7	0.63	NA	430	C	2.8	NA
70648-26-9	**1,2,3,4,7,8-HXCDF**	1.8 J	6.4	ng/kg	13SS140001	2/12	0.07 - 1.2	6.4	NA	430	C	**2.8**	NA
57653-85-7	1,2,3,6,7,8-HXCDD	0.69 J	0.84 J	ng/kg	13SS140001	2/12	0.1 - 1	0.84	NA	430	C	2.8	NA
57117-44-9	1,2,3,6,7,8-HXCDF	1.6 J	1.6 J	ng/kg	13SS140001	1/12	0.07 - 0.41	1.6	NA	430	C	2.8	NA
19408-74-3	1,2,3,7,8,9-HXCDD	0.72 J	1.6 J	ng/kg	13SS130002	5/12	0.1 - 2	1.6	NA	430	C	2.8	NA
72918-21-9	1,2,3,7,8,9-HXCDF	0.31 J	0.33 J	ng/kg	13SS140001	2/12	0.09 - 0.5	0.33	NA	430	C	2.8	NA
40321-76-4	**1,2,3,7,8-PECDD**	0.71 J	0.71 J	ng/kg	13SS130002	1/12	0.1 - 0.8	0.71	NA	43	C	**0.28**	NA
57117-41-6	1,2,3,7,8-PECDF	0.36 J	2.5 J	ng/kg	13SS140001	2/12	0.09 - 0.4	2.5	NA	860	C	5.6	NA
60851-34-5	2,3,4,6,7,8-HXCDF	0.21 J	1.8 J	ng/kg	13SS140001	4/12	0.07 - 0.4	1.8	NA	430	C	2.8	NA
57117-31-4	**2,3,4,7,8-PECDF**	0.47 J	21.8	ng/kg	13SS140001	7/12	0.1 - 0.53	21.8	NA	86	C	**0.56**	NA
1746-01-6	**2,3,7,8-TCDD**	0.52 J	0.52 J	ng/kg	13SS090002	1/12	0.1 - 1.2	0.52	NA	43	C	**0.28**	NA
51207-31-9	**2,3,7,8-TCDF**	0.35 J	21	ng/kg	13SS140001	10/12	0.1 - 0.3	21	NA	430	C	**2.8**	NA
37871-00-4	TOTAL HPCDD	11.8	112	ng/kg	13SS060002	12/12	---	112	NA	NA	C	NA	NA
38998-75-3	TOTAL HPCDF	0.38 J	10.1 J	ng/kg	13SS140001	7/12	0.1 - 1.9	10.1	NA	NA	C	NA	NA
34465-46-8	TOTAL HXCDD	0.77 J	15.7 J	ng/kg	13SS050002	11/12	1.1	15.7	NA	NA	C	NA	NA
55684-94-1	TOTAL HXCDF	0.33	19.4 J	ng/kg	13SS140001	8/12	0.07 - 0.2	19.4	NA	NA	C	NA	NA
36088-22-9	TOTAL PECDD	0.71	0.71	ng/kg	13SS130002	1/12	0.1 - 2.8	0.71	NA	NA	C	NA	NA
30402-15-4	TOTAL PECDF	0.83	135 J	ng/kg	13SS140001	9/12	0.1 - 0.3	135	NA	NA	C	NA	NA
41903-57-5	TOTAL TCDD	0.52	2.1 J	ng/kg	13SS060002	2/12	0.1 - 2.2	2.1	NA	NA	C	NA	NA
55722-27-5	TOTAL TCDF	1.8	540 J	ng/kg	13SS140001	11/12	0.1	540	NA	NA	C	NA	NA
	2,3,7,8-TCDD TEQ	0.45	15.1	ng/kg	13SS140001	12/12	0.1 - 1.2	15.1	NA	43	C	**0.28**	NA
Volatile Organics (ug/kg)													
156-60-5	TRANS-1,2-DICHLOROETHENE	2 J	2 J	ug/kg	13SS060002	1/2	1.4	2	NA	NA	N	34	680
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SS150002	2/2	---	3	NA	110000	N	8000	NA
Semivolatile Organics (ug/kg)													
83-32-9	ACENAPHTHENE	52 J	52 J	ug/kg	13SS090002	1/12	3.8 - 4.9	52		NA	N	31000	130000
120-12-7	ANTHRACENE	5 J	210 J	ug/kg	13SS090002	2/12	3.8 - 4.9	210	NA	NA	N	650000	51000
56-55-3	**BENZO(A)ANTHRACENE**	4 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4.9	1100	NA	NA	C	**160**	19000
50-32-8	**BENZO(A)PYRENE**	6 J	1000 J	ug/kg	13SS090002	6/12	3.8 - 4.9	1000	NA	NA	C	**410**	8200
205-99-2	**BENZO(B)FLUORANTHENE**	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	NA	C	**490**	57000
191-24-2	BENZO(G,H,I)PERYLENE	6 J	750 J	ug/kg	13SS090002	6/12	3.8 - 4.9	750	NA	NA	N	230000	16000
207-08-9	**BENZO(K)FLUORANTHENE**	5 J	640 J	ug/kg	13SS090002	7/12	3.8 - 4	640	NA	NA	C	**490**	39000
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	91 J	140 J	ug/kg	13SS060002, 13SS090002	7/12	78 - 190	140	NA	NA	C	180000	3600000
218-01-9	**CHRYSENE**	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	NA	C	**160**	25000
53-70-3	DIBENZO(A,H)ANTHRACENE	200 J	200 J	ug/kg	13SS090002	1/12	3.8 - 4.9	200	NA	NA	C	1500	500
206-44-0	FLUORANTHENE	6 J	1800 J	ug/kg	13SS090002	9/12	3.8 - 4	1800	NA	NA	N	310000	880000
86-73-7	FLUORENE	50 J	50 J	ug/kg	13SS090002	1/12	3.8 - 4.9	50	NA	NA	N	41000	170000
193-39-5	INDENO(1,2,3-CD)PYRENE	4 J	650 J	ug/kg	13SS090002	6/12	3.8 - 4.9	650	NA	NA	C	1400	3100
91-20-3	NAPHTHALENE	5 J	5 J	ug/kg	13SS100002	1/12	3.8 - 4.9	5	NA	17000	N	3100	700
85-01-8	PHENANTHRENE	4 J	1000 J	ug/kg	13SS090002	7/12	3.8 - 4.2	1000	NA	NA	N	230000	13000
129-00-0	PYRENE	6 J	2400 J	ug/kg	13SS090002	9/12	3.8 - 4	2400	NA	NA	N	230000	570000
Pesticides PCBs (ug/kg)													
12672296	**AROCLOR-1248**	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	NA	C	NA	**6200**

TABLE 7-2

COMPARISON OF SURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Concentration above Background ?(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM Closure Level for Migration to Groundwater(6)
Miscellaneous Parameters												
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA	NA	NA
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA	NA	NA

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - Screening values for dioxins/furans are based on the value for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.

Definitions:
C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available

Associated Samples

13SS010002			
13SS020002	13SS090002-D	13SS190002	13SS300002
13SS030002	13SS150002	13SS200002	13SS320002
13SS040002	13SS100002	13SS210002	13SS330002
13SS040002-D	13SS110002	13SS220002	13SS340002
13SS050002	13SS120002	13SS230002	13SS350002
13SS060002	13SS130002	13SS240002	13SS360002
13SS070002	13SS140001	13SS250002	13SS370002
13SS080002	13SS160002	13SS260002	13SS380002
13SS080002-D	13SS170002	13SS270002	13SS390002
13SS090002	13SS180002	13SS290002	13SS400002

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - DIRECT CONTACT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dioxins (ng/kg)															
3268-87-9	1,2,3,4,6,7,8,9-OCDD	330	4430	ng/kg	13SB010204	11/11	---	4430	NA	39000	C(8)	NA	IDEM	No	BSL
39001-02-0	1,2,3,4,6,7,8,9-OCDF	2.9 J	2.9 J	ng/kg	13SB100204	1/11	0.1 - 3.4	2.9	NA	39000	C	NA	IDEM	No	BSL
35822-46-9	1,2,3,4,6,7,8-HPCDD	5	26.2	ng/kg	13SB010204	11/11	---	26.2	NA	390	C	NA	IDEM	No	BSL
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.69	1.1 J	ng/kg	13SB100204	2/11	0.08 - 1.3	1.1	NA	390	C	NA	IDEM	No	BSL
39227-28-6	1,2,3,4,7,8-HXCDD	0.44 J	0.44 J	ng/kg	13SB130204	1/11	0.09 - 1.5	0.44	NA	39	C	NA	IDEM	No	BSL
70648-26-9	1,2,3,4,7,8-HXCDF	0.73	2.7 J	ng/kg	13SB040204	3/11	0.07 - 0.2	2.7	NA	39	C	NA	IDEM	No	BSL
19408-74-3	1,2,3,7,8,9-HXCDD	0.53 J	1.1 J	ng/kg	13SB110204	5/11	0.1 - 1.5	1.1	NA	39	C	NA	IDEM	No	BSL
40321-76-4	1,2,3,7,8-PECDD	0.21 J	0.21 J	ng/kg	13SB120204	1/11	0.1 - 1.1	0.21	NA	3.9	C	NA	IDEM	No	BSL
57117-41-6	1,2,3,7,8-PECDF	0.3 J	0.31	ng/kg	13SB090204	2/11	0.08 - 0.7	0.31	NA	78	C	NA	IDEM	No	BSL
60851-34-5	2,3,4,6,7,8-HXCDF	0.09 J	0.59 J	ng/kg	13SB100204	2/11	0.07 - 0.8	0.59	NA	39	C	NA	IDEM	No	BSL
57117-31-4	**2,3,4,7,8-PECDF**	0.31 J	15.4	ng/kg	13SB040204	3/11	0.1 - 0.66	15.4	NA	**7.8**	**C**	NA	IDEM	**Yes**	BSL
51207-31-9	2,3,7,8-TCDF	2.9	5.2	ng/kg	13SB100204	2/11	0.09 - 0.5	5.2	NA	39	C	NA	IDEM	No	BSL
37871-00-4	TOTAL HPCDD	8.7	52.1	ng/kg	13SB050204	11/11	---	52.1	NA	NA	C	NA	IDEM	No	NTX
38998-75-3	TOTAL HPCDF	1.5 J	2 J	ng/kg	13SB100204	2/11	0.1 - 1.4	2	NA	NA	C	NA	IDEM	No	NTX
34465-46-8	TOTAL HXCDD	0.65 J	4.2 J	ng/kg	13SB050204	9/11	0.2 - 1.4	4.2	NA	NA	C	NA	IDEM	No	NTX
55684-94-1	TOTAL HXCDF	0.43	5.4 J	ng/kg	13SB100204	4/11	0.07 - 0.13	5.4	NA	NA	C	NA	IDEM	No	NTX
36088-22-9	TOTAL PECDD	0.21	0.21	ng/kg	13SB120204	1/11	0.1 - 1.4	0.21	NA	NA	C	NA	IDEM	No	NTX
30402-15-4	TOTAL PECDF	0.3	71.8 J	ng/kg	13SB040204	5/11	0.09 - 0.49	71.8	NA	NA	C	NA	IDEM	No	NTX
41903-57-5	TOTAL TCDD	0.15	3 J	ng/kg	13SB100204	2/11	0.1 - 5.2	3	NA	NA	C	NA	IDEM	No	NTX
55722-27-5	TOTAL TCDF	1.7	292 J	ng/kg	13SB040204	5/11	0.09 - 1.3	292	NA	NA	C	NA	IDEM	No	NTX
	2,3,7,8-TCDD TEQ	0.41	9.7	ng/kg	13SB040204	11/11	---	9.7	NA	**3.9**	**C**	NA	IDEM	**Yes**	NTX
Volatile Organics (ug/kg)															
78-93-3	2-BUTANONE	18	18	ug/kg	13SB150204	1/2	1	18	NA	2200000	N	44000000	IDEM	No	BSL
108-10-1	4-METHYL-2-PENTANONE	3 J	3 J	ug/kg	13SB150204	1/2	1	3	NA	530000	N	12000000	IDEM	No	BSL
67-64-1	ACETONE	89 J	89 J	ug/kg	13SB150204	1/2	1	89	NA	1400000	N	4800000	IDEM	No	BSL
75-71-8	DICHLORODIFLUOROMETHANE	7 J	7 J	ug/kg	13SB150204	1/2	1	7	NA	9400	N	NA	NA	No	BSL
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SB150204	2/2	---	3	NA	39000	N	NA	NA	No	BSL
Semivolatile Organics (ug/kg)															
TTNUS042	3&4-METHYLPHENOL	560	560	ug/kg	13SB090204	1/11	76 - 87	560	NA	31000	C	910000	IDEM	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	90 J	130 J	ug/kg	13SB050204	6/11	76 - 83	130	NA	35000	C	300000	IDEM	No	BSL
218-01-9	CHRYSENE	4 J	4 J	ug/kg	13SB020204	1/11	3.7 - 4.3	4	NA	62000	C	500000	IDEM	No	BSL
206-44-0	FLUORANTHENE	7 J	7 J	ug/kg	13SB020204	1/11	3.7 - 4.3	7	NA	230000	N	6300000	IDEM	No	BSL
85-01-8	PHENANTHRENE	6 J	6 J	ug/kg	13SB020204	1/11	3.7 - 4.3	6	NA	230000	N(9)	470000	IDEM	No	BSL
108-95-2	PHENOL	110 J	110 J	ug/kg	13SB090204	1/11	76 - 87	110	NA	1800000	N	44000000	IDEM	No	BSL
129-00-0	PYRENE	13	13	ug/kg	13SB020204	1/11	3.7 - 4.3	13	NA	230000	N	4700000	IDEM	No	BSL
Pesticides PCBs (ug/kg)															
12672296	**AROCLOR-1248**	13 J	210000	ug/kg	13SB100204	21/46	9 - 20	210000	NA	**220**	**C**	**1800**	IDEM	**Yes**	ASL
Herbicides (ug/kg)															
87-86-5	PENTACHLOROPHENOL	0.67 J	0.85 J	ug/kg	13SB010204	2/11	0.51 - 0.58	0.85	NA	3000	C	20000	IDEM	No	BSL
Miscellaneous Parameters															
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	13	14	mg/kg	13SB070810	2/2	---	14	NA	NA		NA	NA	No	NTX
TTNUS002	PH (S.U.)	5.3	5.8	mg/kg	13SB080608	2/2	---	5.8	NA	NA		NA	NA	No	NTX
TTNUS003	TOTAL ORGANIC CARBON (mg/kg)	1100 J	1100 J	mg/kg	13SB070810	1/2	1000	1100	NA	NA		NA	NA	No	NTX

TABLE 7-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - DIRECT CONTACT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Screening values for dioxins/furans are based on the PRG for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.
9 - Pyrene is used as a surrogate for phananthrene.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level
For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data

Associated Samples

13SB010204	13SB110204	13SB210204-D	13SB300204-D	13SB390204
13SB020204	13SB120204	13SB220204	13SB310406	13SB400204
13SB030204	13SB130204	13SB230204	13SB310406-D	13SB410406
13SB040204	13SB140204	13SB240203	13SB310608	13SB410608
13SB050204	13SB160204	13SB250204	13SB320204	13SB420406
13SB060204	13SB170204	13SB260204	13SB330204	13SB420608
13SB070810	13SB180204	13SB270204	13SB340204	13SB430406
13SB080608	13SB180204-D	13SB280204	13SB350204	13SB440406
13SB090204	13SB190203	13SB280406	13SB360204	13SB450406
13SB150204	13SB200204	13SB290204	13SB370204	13SB460406
13SB100204	13SB210204	13SB300204	13SB380204	13SB470406

TABLE 7-4

COMPARISONOF SUBSURFACE SOIL CONCENTRATIONS TO CERITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Dioxins (ng/kg)												
3268-87-9	**1,2,3,4,6,7,8,9-OCDD**	330	4430	ng/kg	13SB010204	11/11	---	4430	NA	430000 C(7)	**2800**	NA
39001-02-0	1,2,3,4,6,7,8,9-OCDF	2.9 J	2.9 J	ng/kg	13SB100204	1/11	0.1 - 3.4	2.9	NA	430000 C	2800	NA
35822-46-9	1,2,3,4,6,7,8-HPCDD	5	26.2	ng/kg	13SB010204	11/11	---	26.2	NA	4300 C	28	NA
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.69	1.1 J	ng/kg	13SB100204	2/11	0.08 - 1.3	1.1	NA	4300 C	28	NA
39227-28-6	1,2,3,4,7,8-HXCDD	0.44 J	0.44 J	ng/kg	13SB130204	1/11	0.09 - 1.5	0.44	NA	430 C	2.8	NA
70648-26-9	1,2,3,4,7,8-HXCDF	0.73	2.7 J	ng/kg	13SB040204	3/11	0.07 - 0.2	2.7	NA	430 C	2.8	NA
19408-74-3	1,2,3,7,8,9-HXCDD	0.53 J	1.1 J	ng/kg	13SB110204	5/11	0.1 - 1.5	1.1	NA	430 C	2.8	NA
40321-76-4	1,2,3,7,8-PECDD	0.21 J	0.21 J	ng/kg	13SB120204	1/11	0.1 - 1.1	0.21	NA	43 C	0.28	NA
57117-41-6	1,2,3,7,8-PECDF	0.3 J	0.31	ng/kg	13SB090204	2/11	0.08 - 0.7	0.31	NA	860 C	5.6	NA
60851-34-5	2,3,4,6,7,8-HXCDF	0.09 J	0.59 J	ng/kg	13SB100204	2/11	0.07 - 0.8	0.59	NA	430 C	2.8	NA
57117-31-4	**2,3,4,7,8-PECDF**	0.31 J	15.4	ng/kg	13SB040204	3/11	0.1 - 0.66	15.4	NA	86 C	**0.56**	NA
51207-31-9	**2,3,7,8-TCDF**	2.9	5.2	ng/kg	13SB100204	2/11	0.09 - 0.5	5.2	NA	430 C	**2.8**	NA
37871-00-4	TOTAL HPCDD	8.7	52.1	ng/kg	13SB050204	11/11	---	52.1	NA	NA C	NA	NA
38998-75-3	TOTAL HPCDF	1.5 J	2 J	ng/kg	13SB100204	2/11	0.1 - 1.4	2	NA	NA C	NA	NA
34465-46-8	TOTAL HXCDD	0.65 J	4.2 J	ng/kg	13SB050204	9/11	0.2 - 1.4	4.2	NA	NA C	NA	NA
55684-94-1	TOTAL HXCDF	0.43	5.4 J	ng/kg	13SB100204	4/11	0.07 - 0.13	5.4	NA	NA C	NA	NA
36088-22-9	TOTAL PECDD	0.21	0.21	ng/kg	13SB120204	1/11	0.1 - 1.4	0.21	NA	NA C	NA	NA
30402-15-4	TOTAL PECDF	0.3	71.8 J	ng/kg	13SB040204	5/11	0.09 - 0.49	71.8	NA	NA C	NA	NA
41903-57-5	TOTAL TCDD	0.15	3 J	ng/kg	13SB100204	2/11	0.1 - 5.2	3	NA	NA C	NA	NA
55722-27-5	TOTAL TCDF	1.7	292 J	ng/kg	13SB040204	5/11	0.09 - 1.3	292	NA	NA C	NA	NA
	2,3,7,8-TCDD TEQ	0.41	9.7	ng/kg	13SB040204	11/11	---	9.7	NA	43 C	**0.28**	NA
Volatile Organics (ug/kg)												
78-93-3	2-BUTANONE	18	18	ug/kg	13SB150204	1/2	1	18	NA	24000000 sat	4400	35000
108-10-1	4-METHYL-2-PENTANONE	3 J	3 J	ug/kg	13SB150204	1/2	1	3	NA	2700000 sat	620	20000
67-64-1	ACETONE	89 J	89 J	ug/kg	13SB150204	1/2	1	89	NA	NA N	6600	3800
75-71-8	DICHLORODIFLUOROMETHANE	7 J	7 J	ug/kg	13SB150204	1/2	1	7	NA	25000 N	28000	NA
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SB150204	2/2	---	3	NA	110000 N	8000	NA
Semivolatile Organics (ug/kg)												
TTNUS042	**3&4-METHYLPHENOL**	560	560	ug/kg	13SB090204	1/11	3.8 - 4	560	NA	NA C	**66**	1100
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	90 J	130 J	ug/kg	13SB050204	6/11	78 - 190	130	NA	NA C	180000	3600000
218-01-9	CHRYSENE	4 J	4 J	ug/kg	13SB020204	1/11	3.8 - 4	4	NA	NA C	160	25000
206-44-0	FLUORANTHENE	7 J	7 J	ug/kg	13SB020204	1/11	3.8 - 4	7	NA	NA N	310000	880000
85-01-8	PHENANTHRENE	6 J	6 J	ug/kg	13SB020204	1/11	3.8 - 4.2	6	NA	NA N	230000	13000
108-95-2	PHENOL	110 J	110 J	ug/kg	13SB090204	1/11	3.8 - 4.9	110	NA	NA N	2800	56000
129-00-0	PYRENE	13	13	ug/kg	13SB020204	1/11	3.8 - 4	13	NA	NA N	230000	570000
Pesticides PCBs (ug/kg)												
12672296	**AROCLOR-1248**	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	NA C	NA	**6200**
Herbicides												
87-86-5	PENTACHLOROPHENOL	0.67 J	0.85 J	ug/kg	13SB010204	2/11	8.8 - 20	0.85	NA	NA C	1.4	28
Miscellaneous Parameters												
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA	NA	NA
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA	NA	NA

TABLE 7-4

COMPARISONOF SUBSURFACE SOIL CONCENTRATIONS TO CERITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Concentration above Background ?(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM Closure Level for Migration to Groundwater(6)

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - Screening values for dioxins/furans are based on the value for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.

Definitions:
C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available

Associated Samples

13SB010204	13SB110204	13SB210204-D	13SB300204-D	13SB390204
13SB020204	13SB120204	13SB220204	13SB310406	13SB400204
13SB030204	13SB130204	13SB230204	13SB310406-D	13SB410406
13SB040204	13SB140204	13SB240203	13SB310608	13SB410608
13SB050204	13SB160204	13SB250204	13SB320204	13SB420406
13SB060204	13SB170204	13SB260204	13SB330204	13SB420608
13SB070810	13SB180204	13SB270204	13SB340204	13SB430406
13SB080608	13SB180204-D	13SB280204	13SB350204	13SB440406
13SB090204	13SB190203	13SB280406	13SB360204	13SB450406
13SB150204	13SB200204	13SB290204	13SB370204	13SB460406
13SB100204	13SB210204	13SB300204	13SB380204	13SB470406

TABLE 7-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE / SUBSURFACE SOIL - DIRECT CONTACT - HISTORICAL DATA
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]		Maximum Concentration[1]		Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Energetics (mg/kg)																	
99-35-4	1,3,5-TRINITROBENZENE	0.121	J	2.2		mg/kg	Bldg 166, Grid 103	8/637	0.1085 - 1.23	2.2	NA	180	N	NA	IDEM	No	BSL
118-96-7	**2,4,6-TRINITROTOLUENE**	0.035	J	57		mg/kg	Bldg 166, Grid 271	286/632	0.217 - 1.18	57	NA	**3.1**	**N**	NA	IDEM	**Yes**	ASL
121-14-2	2,4-DINITROTOLUENE	0.1	J	0.1	J	mg/kg	Bldg 166, Side 181/231	1/637	0.217 - 1.23	0.1	NA	12	N	NA	IDEM	No	BSL
1321-12-6	**2-AMINO-4,6-DINITROTOLUENE**	0.052	J	150	J	mg/kg	Bldg 165, Grid 20	73/637	0.217 - 2.5	150	NA	**1.2**	**N**	NA	IDEM	**Yes**	ASL
99-08-1	2-NITROTOLUENE	0.43		0.43		mg/kg	Bldg 165, Grid 12	1/637	0.217 - 1.23	0.43	NA	0.88	C	NA	IDEM	No	BSL
1321-12-6	**4-AMINO-2,6-DINITROTOLUENE**	0.045	J	303		mg/kg	Bldg 171, Grid 129	94/637	0.045 - 2	303	NA	**1.2**	**N**	NA	IDEM	**Yes**	ASL
2691-41-0	**HMX**	0.081	J	5390		mg/kg	Bldg 171, Grid 125	481/633	0.476 - 2.2	5390	NA	**310**	**N**	NA	IDEM	**Yes**	ASL
78-11-5	PETN	470		470		mg/kg	Bldg 171, Grid 217	1/636	0.1085 - 3.08	470	NA	NA		NA	IDEM	No	NTX
121-82-4	**RDX**	0.039	J	290		mg/kg	Bldg 171, Grid 178	464/634	0.476 - 1	290	NA	**4.4**	**C**	NA	IDEM	**Yes**	ASL
Inorganics (mg/kg)																	
7429-90-5	**ALUMINUM**	4050		58500		mg/kg	Bldg 171, Side 138/239	496/496	---	58500	NA	**7600**	**N**	NA	NA	**Yes**	ASL
7440-38-2	**ARSENIC**	1.2		64.7		mg/kg	Bldg 171, Grid 173	360/496	10.3 - 25.9	64.7	NA	**0.39**	**C**	**3.9**	IDEM	**Yes**	ASL
7440-39-3	**BARIUM**	10.5		1160	J	mg/kg	Bldg 165, Grid 23	496/496	---	1160	NA	**540**	**N**	23000	IDEM	**Yes**	ASL
7440-43-9	CADMIUM	0.05		1.7		mg/kg	Bldg 165, Grid 99	77/496	0.03 - 1.3	1.7	NA	3.7	N	12	IDEM	No	BSL
18540-29-9	CHROMIUM	5.7		95.8		mg/kg	Bldg 171, Grid 212	496/496	---	95.8	NA	210	C	430	IDEM	No	BSL
7439-92-1	LEAD	5.82		275	J	mg/kg	Bldg 168, Grid 39	487/487	---	275	NA	400	N	400	IDEM	No	BSL
7487-94-7	**MERCURY**	0.0058	J	8.9		mg/kg	Bldg 171, Grid 133	377/492	0.02 - 0.15	8.9	NA	**2.3**	**N**	100	IDEM	**Yes**	ASL
7782-49-2	SELENIUM	0.51	B	12.4	J	mg/kg	Bldg 166, Side 256/257	122/496	0.36 - 51.8	12.4	NA	39	N	1700	IDEM	No	BSL
7440-22-4	SILVER	0.25	J	0.95	J	mg/kg	Bldg 173, Grid 232	12/496	0.13 - 2.6	0.95	NA	39	N	1700	IDEM	No	BSL
Volatile Organics (ug/kg)																	
67-64-1	ACETONE	5	J	15000	B	ug/kg	Bldg 173, Grid 166	265/366	4 - 123	15000	NA	1400000	N	4800000	IDEM	No	BSL
78-93-3	2-BUTANONE	5	J	85		ug/kg	Bldg 171, Grid 174	46/366	4 - 616	85	NA	2200000	N	44000000	IDEM	No	BSL
75-09-2	METHYLENE CHLORIDE	1	J	35		ug/kg	Bldg 171, Grid 133	39/366	4 - 308	35	NA	9100	C	120000	IDEM	No	BSL
108-10-1	4-METHYL-2-PENTANONE	14		14		ug/kg	Bldg 165, Grid 99	1/366	4 - 308	14	NA	530000	N	12000000	IDEM	No	BSL
108-88-3	TOLUENE	1	J	30		ug/kg	Bldg 174, Grid 281	27/366	4 - 6200	30	NA	520000	sat	1700000	IDEM	No	BSL
1330-20-7	XYLENES	1	J	1300		ug/kg	Bldg 173, Side 188/197	16/366	4 - 810	1300	NA	27000	N	690000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - A discusstion of metals concentrations in histiorical samples relative to Crane background levels is presented in Section 5.2.4.
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
B = compound was found in the associated blank
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
PRG = Preliminary Remediation Goal
sat = soil saturation concentration

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data

TABLE 7-6

COMPARISON OF SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER - HISTORICAL SURFACE / SUBSURFACE SOIL DATA
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]		Maximum Concentration[1]		Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background?[4]	U.S. EPA Generic SSL for Soil to Air[5]		U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Explosives (mg/kg)															
99-35-4	**1,3,5-TRINITROBENZENE**	0.121	J	2.2		mg/kg	Bldg 166, Grid 103	8/637	0.1085 - 1.23	2.2	NA	NA	N	**0.25**	NA
118-96-7	**2,4,6-TRINITROTOLUENE**	0.035	J	57		mg/kg	Bldg 166, Grid 271	286/632	0.217 - 1.18	57	NA	NA	N	**0.00057**	NA
121-14-2	**2,4-DINITROTOLUENE**	0.1	J	0.1	J	mg/kg	Bldg 166, Side 181/231	1/637	0.217 - 1.23	0.1	NA	NA	N	**0.000049**	NA
1321-12-6	2-AMINO-4,6-DINITROTOLUENE	0.052	J	150	J	mg/kg	Bldg 165, Grid 20	73/637	0.217 - 2.5	150	NA	NA	N	NA	NA
88-72-2	**2-NITROTOLUENE**	0.43		0.43		mg/kg	Bldg 165, Grid 12	1/637	0.217 - 1.23	0.43	NA	NA	C	**0.00015**	NA
1321-12-6	4-AMINO-2,6-DINITROTOLUENE	0.045	J	303		mg/kg	Bldg 171, Grid 129	94/637	0.045 - 2	303	NA	NA	N	NA	NA
2691-41-0	HMX	0.081	J	5390		mg/kg	Bldg 171, Grid 125	481/633	0.476 - 2.2	5390	NA	NA	N	NA	NA
78-11-5	PETN	470		470		mg/kg	Bldg 171, Grid 217	1/636	0.1085 - 3.08	470	NA	NA		NA	NA
121-82-4	RDX	0.039	J	290		mg/kg	Bldg 171, Grid 178	464/634	0.476 - 1	290	NA	NA	C	NA	NA
Inorganics (mg/kg)															
7429-90-5	**ALUMINUM**	4050		58500		mg/kg	Bldg 171, Side 138/239	496/496	---	58500	NA	686000	N	**8.3**	NA
7440-38-2	**ARSENIC**	1.2		64.7		mg/kg	Bldg 171, Grid 173	360/496	10.3 - 25.9	64.7	NA	745	C	**0.29**	**3.9**
7440-39-3	**BARIUM**	10.5		1160	J	mg/kg	Bldg 165, Grid 23	496/496	---	1160	NA	68600	N	**82**	1600
7440-43-9	**CADMIUM**	0.05		1.7		mg/kg	Bldg 165, Grid 99	77/496	0.03 - 1.3	1.7	NA	1780	C	**0.38**	7.5
18540-29-9	**CHROMIUM**	5.7		95.8		mg/kg	Bldg 171, Grid 212	496/496	---	95.8	NA	267	C	**2.1**	**38**
7439-92-1	**LEAD**	5.82		275	J	mg/kg	Bldg 168, Grid 39	487/487	---	275	NA	NA	N	NA	**81**
7487-94-7	**MERCURY**	0.0058	J	8.9		mg/kg	Bldg 171, Grid 133	377/492	0.02 - 0.15	8.9	NA	NA	N	NA	**2.1**
7782-49-2	**SELENIUM**	0.51	B	12.4	J	mg/kg	Bldg 166, Side 256/257	122/496	0.36 - 51.8	12.4	NA	NA	N	**0.26**	**5.2**
7440-22-4	SILVER	0.25	J	0.95	J	mg/kg	Bldg 173, Grid 232	12/496	0.13 - 2.6	0.95	NA	NA	N	1.6	31
Volatile Organics (ug/kg)															
67-64-1	**ACETONE**	5	J	15000	B	ug/kg	Bldg 173, Grid 166	265/366	4 - 123	15000	NA	NA	N	**6600**	**3800**
78-93-3	2-BUTANONE	5	J	85		ug/kg	Bldg 171, Grid 174	46/366	4 - 616	85	NA	24000000	sat	4400	35000
75-09-2	**METHYLENE CHLORIDE**	1	J	35		ug/kg	Bldg 171, Grid 133	39/366	4 - 308	35	NA	13000	C	**1.2**	**23**
108-10-1	4-METHYL-2-PENTANONE	14		14		ug/kg	Bldg 165, Grid 99	1/366	4 - 308	14	NA	2700000	sat	620	20000
108-88-3	TOLUENE	1	J	30		ug/kg	Bldg 174, Grid 281	27/366	4 - 6200	30	NA	650000	sat	590	12000
1330-20-7	XYLENES	1	J	1300		ug/kg	Bldg 173, Side 188/197	16/366	4 - 810	1300	NA	71000	N	7100	170000

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - A discusstion of metals concentrations in histiorical samples relative to Crane background levels is presented in Section 5.2.4.
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:
B = compound was found in the associated blank
C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
sat = soil saturation concentration

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Volatile Organic Compounds														
79-01-6	Trichloroethene	1 J	1 J	ug/L	13GWT2001	1/2	0.3	1	NA	1.4 C	5 5	FED-MCL IDEM	No	BSL
Energetics														
99-35-4	1,3,5-Trinitrobenzene	0.4 J	1.3	ug/L	13GWT0903, 13GWT2102	4/124	0.039 - 0.65	1.3	NA	110 N	NA NA	NA NA	No	BSL
99-65-0	**1,3-Dinitrobenzene**	0.3 J	2.4	ug/L	13GWT0903	8/124	0.039 - 0.65	2.4	NA	**0.36 N**	NA NA	NA NA	**Yes**	ASL
118-96-7	**2,4,6-Trinitrotoluene**	1.6	69 J	ug/L	13GWT2102	12/124	0.039 - 0.65	69	NA	**1.8 N[8]**	NA NA	NA NA	**Yes**	ASL
6629-29-4	2,4-Diamino-6-Nitrotoluene	0.77 J	3.9	ug/L	13GWT0903	4/47	0.236 - 0.301	3.9	NA	NA	NA NA	NA NA	No	NTX
121-14-2	2,4-Dinitrotoluene	0.48 J	1.6	ug/L	13GWT1103	7/124	0.039 - 0.65	1.6	NA	7.3 N	NA NA	NA NA	No	BSL
59229-75-3	2,6-Diamino-4-Nitrotoluene	1.8 J	1.8 J	ug/L	13GWT1102	1/47	0.236 - 0.301	1.8	NA	NA	NA NA	NA NA	No	NTX
606-20-2	**2,6-Dinitrotoluene**	1 J	9.9	ug/L	13GWT0903	7/124	0.039 - 0.65	9.9	NA	**3.6 N**	NA NA	NA NA	**Yes**	ASL
35572-78-2	**2-Amino-4,6-Dinitrotoluene**	0.28 J	15 J	ug/L	13GWT0904	15/124	0.039 - 0.65	15	NA	**0.73 N[9]**	NA NA	NA NA	**Yes**	ASL
88-72-2	**2-Nitrotoluene**	0.37 J	1	ug/L	13GWT2403	3/124	0.039 - 0.65	1	NA	**0.049 C**	NA NA	NA NA	**Yes**	ASL
99-08-1	3-Nitrotoluene	0.34 J	0.58 J	ug/L	13GWT1103	2/124	0.039 - 0.65	0.58	NA	12 N	NA NA	NA NA	No	BSL
19406-51-0	**4-Amino-2,6-Dinitrotoluene**	0.12 J	19	ug/L	13GWT0904, 13GWT1101	22/124	0.039 - 0.65	19	NA	**0.73 N[9]**	NA NA	NA NA	**Yes**	ASL
99-99-0	4-Nitrotoluene	0.5 J	0.5 J	ug/L	13GWT2101	1/124	0.039 - 0.65	0.5	NA	0.66 C	NA NA	NA NA	No	BSL
TTNUS498	DNX	0.31 J	50 J	ug/L	13GWT2102	10/47	0.236 - 0.301	50	NA	NA	NA NA	NA NA	No	NTX
2691-41-0	**HMX**	0.29 J	640	ug/L	13GWT2102	88/124	0.236 - 0.6	640	NA	**180 N**	NA NA	NA NA	**Yes**	ASL
TTNUS232	MNX	0.32 J	11	ug/L	13GWT1702	13/47	0.236 - 0.291	11	NA	NA	NA NA	NA NA	No	NTX
121-82-4	**RDX**	0.27 J	7700	ug/L	13GWT2102	90/124	0.236 - 0.465	7700	NA	**0.61 C**	NA NA	NA NA	**Yes**	ASL
TTNUS337	TNX	0.31 J	2.4	ug/L	13GWT3901	6/47	0.236 - 0.301	2.4	NA	NA	NA NA	NA NA	No	NTX
Total Metals														
7429-90-5	**Aluminum**	93.9 J	139000 J	ug/L	13GWT0502	67/82	8.35 - 332	139000	NA	**3600 N**	NA NA	NA NA	**Yes**	ASL
7440-36-0	**Antimony**	2.9 J	6.7 J	ug/L	13GWT3501	4/82	0.02 - 1.5	6.7	NA	**1.5 N**	**6** **6**	FED-MCL IDEM	**Yes**	ASL
7440-38-2	**Arsenic**	0.65 J	24.5 J	ug/L	13GWT3801	32/82	0.07 - 1.4	24.5	NA	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
7440-39-3	**Barium**	10.4 J	727 J	ug/L	13GWT0502	82/82	---	727	NA	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
7440-41-7	**Beryllium**	2.1 J	12.8 J	ug/L	13GWT4701	22/82	0.02 - 2.1	12.8	NA	**7.3 N**	**4** **4**	FED-MCL IDEM	**Yes**	ASL
7440-43-9	**Cadmium**	2.7 J	2.7 J	ug/L	13GWT2501, 13GWT2502	2/82	0.039 - 1.9	2.7	NA	**1.8 N**	5 5	FED-MCL IDEM	**Yes**	ASL
7440-70-2	Calcium	1720 J	148000 J	ug/L	13GWT4801	81/82	2580	148000	NA	NA	NA NA	NA NA	No	NUT
7440-47-3	**Chromium**	0.76 J	145 J	ug/L	13GWT0502	32/82	0.02 - 2.2	145	NA	**11 N**[10]	**100** **100**	FED-MCL IDEM[10]	**Yes**	ASL
7440-48-4	**Cobalt**	1.1 J	249 J	ug/L	13GWT4702	73/82	0.36 - 14.8	249	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7440-50-8	Copper	0.83 J	89.5 J	ug/L	13GWT2501	46/82	0.19 - 6.9	89.5	NA	150 N	1300 1300	FED-MCL[11] IDEM	No	BSL
7439-89-6	**Iron**	92.9 J	143000 J	ug/L	13GWT2001	65/82	25 - 440	143000	NA	**1100 N**	NA NA	NA NA	**Yes**	ASL
7439-92-1	**Lead**	1.1 J	54.3 J	ug/L	13GWT2501	31/82	0.04 - 2.5	54.3	NA	NA	**15** **15**	FED-MCL[11] IDEM	**Yes**	ASL
7439-93-2	**Lithium**	2.3 J	340 J	ug/L	13GWT2001	26/26	---	340	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7439-95-4	Magnesium	1040 J	70300 J	ug/L	13GWT2001	82/82	---	70300	NA	NA	NA NA	NA NA	No	NUT
7439-96-5	**Manganese**	33.6 J	11600 J	ug/L	13GWT2001	72/82	48.3 - 566	11600	NA	**88 N**	NA NA	NA NA	**Yes**	ASL
7439-97-6	Mercury	0.007 J	0.39	ug/L	13GWT0102	14/82	0.007 - 0.2	0.39	NA	1.1 N	2 2	FED-MCL IDEM	No	BSL
7440-02-0	**Nickel**	2.2 J	477 J	ug/L	13GWT2001	81/82	1.4	477	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7440-09-7	Potassium	240 J	27500 J	ug/L	13GWT0502	82/82	---	27500	NA	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium	1.8 J	6 J	ug/L	13GWT5001	5/82	0.04 - 2.2	6	NA	18 N	50 50	FED-MCL IDEM	No	BSL
7440-23-5	Sodium	6030 J	166000 J	ug/L	13GWT3501	82/82	---	166000	NA	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium	14.5 J	396 J	ug/L	13GWT0201	26/26	---	396	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium	2.5 J	659 J	ug/L	13GWT0502	52/73	0.13 - 2.2	659	NA	15000 N	NA NA	NA NA	No	BSL
7440-62-2	**Vanadium**	0.63 J	135 J	ug/L	13GWT0502	29/82	0.05 - 1.4	135	NA	**3.6 N**	NA NA	NA NA	**Yes**	ASL
7440-66-6	**Zinc**	0.5 J	1220 J	ug/L	13GWT4702	73/82	1.8 - 12.4	1220	NA	**1100 N**	NA 11000	NA IDEM	**Yes**	ASL

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dissolved Metals														
7429-90-5	**Aluminum, Filtered**	124 J	11800 J	ug/L	13GWT2001-F	13/26	6.4 - 164	11800	NA	**3600 N**	NA NA	NA NA	**Yes**	ASL
7440-36-0	**Antimony**	3 J	7.3 J	ug/L	13GWT3501-F	4/26	0.02 - 1	7.3	NA	**1.5 N**	**6** **6**	FED-MCL IDEM	**Yes**	ASL
7440-38-2	**Arsenic, Filtered**	0.8 J	21.3 J	ug/L	13GWT3801-F	9/26	0.11 - 1.4	21.3	NA	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL
7440-39-3	Barium, Filtered	9.6 J	93.6 J	ug/L	13GWT3901-F	26/26	---	93.6	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-41-7	**Beryllium, Filtered**	2 J	5.6 J	ug/L	13GWT2001-F	4/26	0.03 - 1.5	5.6	NA	7.3 N	**4** **4**	FED-MCL IDEM	**Yes**	ASL
7440-70-2	Calcium, Filtered	2250 J	70900 J	ug/L	13GWT2001-F	26/26	---	70900	NA	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	1.3 J	2.7 J	ug/L	13GWT2001-F	4/26	0.13 - 1.4	2.7	NA	11 N[10]	100 100	FED-MCL IDEM[10]	No	BSL
7440-48-4	**Cobalt, Filtered**	1.3 J	230 J	ug/L	13GWT2001-F	23/26	0.11 - 1.5	230	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7440-50-8	Copper, Filtered	2.5 J	13.1 J	ug/L	13GWT2503-F	10/26	0.35 - 5.2	13.1	NA	150 N	1300 1300	FED-MCL[11] IDEM	No	BSL
7439-89-6	**Iron, Filtered**	93.8 J	142000 J	ug/L	13GWT2001-F	13/26	17.2 - 219	142000	NA	**1100 N**	NA NA	NA NA	**Yes**	ASL
7439-92-1	**Lead, Filtered**	11.5 J	35.7 J	ug/L	13GWT1502-F	2/26	0.04 - 1.3	35.7	NA	**15**	**15** 15	FED-MCL[11] IDEM	**Yes**	ASL
7439-93-2	**Lithium, Filtered**	9.7 J	322 J	ug/L	13GWT2001-F	7/7	---	322	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7439-95-4	Magnesium, Filtered	1800 J	67900 J	ug/L	13GWT2001-F	25/26	140	67900	NA	NA	NA NA	NA NA	No	NUT
7439-96-5	**Manganese, Filtered**	9 J	11500 J	ug/L	13GWT2001-F	23/26	3.7 - 30.9	11500	NA	**88 N**	NA NA	NA NA	**Yes**	ASL
7440-02-0	**Nickel, Filtered**	2.6 J	470 J	ug/L	13GWT2001-F	22/26	0.48 - 1.6	470	NA	**73 N**	NA NA	NA NA	**Yes**	ASL
7440-09-7	Potassium, Filtered	366 J	20800 J	ug/L	13GWT5101-F	25/26	151	20800	NA	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium, Filtered	2 J	4.2 J	ug/L	13GWT4101-F	4/26	0.04 - 2.4	4.2	NA	18 N	NA 50	NA IDEM	No	BSL
7440-23-5	Sodium, Filtered	7100 J	161000 J	ug/L	13GWT3501-F	26/26	---	161000	NA	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium, Filtered	13.6 J	188 J	ug/L	13GWT0501-F	7/7	---	188	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium, Filtered	2.6 J	9.3 J	ug/L	13GWT0601-F	7/22	0.42 - 3.8	9.3	NA	15000 N	NA NA	NA NA	No	BSL
7440-62-2	**Vanadium, Filtered**	1.1 J	7 J	ug/L	13GWT3801-F	4/26	0.05 - 0.8	7	NA	**3.6 N**	NA NA	NA NA	**Yes**	BSL
7440-66-6	Zinc, Filtered	2.1 J	695	ug/L	13GWT2001-F	24/26	1.7 - 3.5	695	NA	1100 N	NA 11000	NA IDEM	No	BSL

TABLE 7-7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Miscellaneous Parameters (mg/L)														
	Ammonia-N	0.01	3.4	mg/L	13GWT0903	54/73	0.005 - 0.01	3.4	NA	NA	NA NA	NA NA	No	NTX
	Nitrite/Nitrate-N	0.03	92	mg/L	13GWT0901	49/73	0.02 - 0.05	92	NA	**1 N**	**1** NA	FED-MCL[12] NA	**Yes**	ASL
	Total Organic Carbon	1	1.1	mg/L	13GWT1502	2/3	0.5	1.1	NA	NA	NA NA	NA NA	No	NTX

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - There are no background or upgradient monitoring wells at SWMU 13.
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
9 - Values are for aminodinitrotoluene.
10 - Values are for hexavalent chromium.
11 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.
12 - The MCL for Nitrite (as N) is presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SMCL = Secondary Maximum Contaminant Level

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

Associated Samples

13GWT0101	13GWT0502-F	13GWT0802-F-D	13GWT1202	13GWT1702	13GWT2102	13GWT2602	13GWT3601
13GWT0102	13GWT0503	13GWT0803	13GWT1203	13GWT1702-D	13GWT2103	13GWT2603	13GWT3601-D
13GWT0103	13GWT0503-F	13GWT0901	13GWT1301	13GWT1703	13GWT2201	13GWT2701	13GWT3602
13GWT0201	13GWT0601	13GWT0901-D	13GWT1301-D	13GWT1801	13GWT2202	13GWT2702	13GWT3701
13GWT0202	13GWT0601-F	13GWT0902	13GWT1302	13GWT1801-F	13GWT2203	13GWT2901	13GWT3702
13GWT0203	13GWT0602	13GWT0902-D	13GWT1303	13GWT1802	13GWT2301	13GWT2902	13GWT3702-D
13GWT0301	13GWT0602-F	13GWT0903	13GWT1401	13GWT1802-F	13GWT2302	13GWT3001	13GWT3901
13GWT0301-F	13GWT0603	13GWT0903-D	13GWT1402	13GWT1803	13GWT2303	13GWT3002	13GWT3901-F
13GWT0302	13GWT0701	13GWT0904	13GWT1403	13GWT1901	13GWT2401	13GWT3101	13GWT3902
13GWT0302-F	13GWT0702	13GWT1001	13GWT1501	13GWT1902	13GWT2402	13GWT3102	13GWT4001
13GWT0303	13GWT0702-D	13GWT1002	13GWT1502	13GWT1903	13GWT2403	13GWT3201	13GWT4002
13GWT0401	13GWT0703	13GWT1003	13GWT1502-D	13GWT2001	13GWT2501	13GWT3202	13GWT4201
13GWT0402	13GWT0703-D	13GWT1101	13GWT1502-F	13GWT2001-F	13GWT2501-F	13GWT3301	13GWT4201-F
13GWT0403	13GWT0801	13GWT1102	13GWT1503	13GWT2002	13GWT2502	13GWT3301-F	13GWT4202
13GWT0501	13GWT0802	13GWT1103	13GWT1601	13GWT2003	13GWT2502-F	13GWT3302	13GWT4301
13GWT0501-F	13GWT0802-D	13GWT1201	13GWT1602	13GWT2004	13GWT2503	13GWT3302-F	13GWT4302
13GWT0502	13GWT0802-F	13GWT1201-F	13GWT1603	13GWT2101	13GWT2503-F	13GWT3401	13GWT4701
			13GWT1701	13GWT2101-D	13GWT2601	13GWT3402	13GWT4702

TABLE 7-8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Mainstream Surface Water

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Energetics														
2691-41-0	HMX	1.4	3.2 J	ug/L	13SW3001	4/5	0.264	3.2	NA	180 N	NA NA	NA NA	No	BSL
TTNUS232	MNX	0.28 J	0.31 J	ug/L	13SW3002	2/5	0.25 - 0.264	0.31	NA	NA	NA NA	NA NA	No	NTX
121-82-4	**RDX**	1.3	9.9	ug/L	13SW3002	4/5	0.264	9.9	NA	**0.61 C**	NA NA	NA NA	**Yes**	ASL
Total Metals														
7440-39-3	Barium	54.1 J	57.8 J	ug/L	13SW3002	2/2	---	57.8	53.7 J - 62.7 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-70-2	Calcium	50000 J	54800 J	ug/L	13SW3001	2/2	---	54800	55700 J - 65300 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium	0.68 J	0.68 J	ug/L	13SW3002	1/2	0.84	0.68	3.8 J	11 N	100 100	FED-MCL IDEM	No	BSL
7440-50-8	Copper	1.3 J	1.4 J	ug/L	13SW3001	2/2	---	1.4	1.1 J - 5.5	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	Iron	175 J	175 J	ug/L	13SW3001	1/2	70.1	175	2460	1100 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium	8780 J	9770 J	ug/L	13SW3001	2/2	---	9770	9090 J - 14500 J	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese	7.9 J	7.9 J	ug/L	13SW3001	1/2	5.3	7.9	23	88 N	NA NA	NA NA	No	BSL
7440-02-0	Nickel	0.45 J	0.45 J	ug/L	13SW3001	1/2	0.93	0.45	0.77 J - 6.9	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium	4850 J	6690 J	ug/L	13SW3002	2/2	---	6690	2560 J - 3860 J	NA	NA NA	NA NA	No	NUT
7440-23-5	Sodium	18400 J	25600 J	ug/L	13SW3001	2/2	---	25600	29900 J - 34300 J	NA	NA NA	NA NA	No	NUT
7440-32-6	Titanium	2.3 J	2.3 J	ug/L	13SW3001	1/1	---	2.3	0.31 J	15000 N	NA NA	NA NA	No	BSL
Dissolved Metals														
7440-39-3	**Barium, Filtered**	81.6 J	280 J	ug/L	13SW3002-F	2/2	---	280	52.7 J - 56 J	**260 N**	2000 2000	FED-MCL IDEM	**Yes**	ASL
7440-70-2	Calcium, Filtered	29000 J	52400 J	ug/L	13SW3002-F	2/2	---	52400	54900 J - 75800 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	0.6 J	0.6 J	ug/L	13SW3002-F	1/2	0.3	0.6	ND	11 N	100 100	FED-MCL IDEM	No	BSL
7440-48-4	Cobalt, Filtered	2.8 J	2.8 J	ug/L	13SW3001-F	1/2	0.088	2.8	0.16 J - 3.2 J	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper, Filtered	1.2 J	1.5 J	ug/L	13SW3001-F	2/2	---	1.5	1 J - 1.6 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-95-4	Magnesium, Filtered	8840 J	9090 J	ug/L	13SW3001-F	2/2	---	9090	9630 J - 15700	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese, Filtered	23 J	23 J	ug/L	13SW3001-F	1/2	3	23	4.9 J - 6.1 J	88 N	NA NA	NA NA	No	BSL

TABLE 7-8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Mainstream Surface Water

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
7440-02-0	Nickel, Filtered	1.4	1.4	ug/L	13SW3001-F	1/2	0.84	1.4	0.87 J - 1.8	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium, Filtered	6780 J	15100 J	ug/L	13SW3001-F	2/2	---	15100	2470 J - 3550 J	NA	NA NA	NA NA	No	NUT
7440-23-5	Sodium, Filtered	9830 J	18700 J	ug/L	13SW3002-F	2/2	---	18700	33800 J - 35700 J	NA	NA NA	NA NA	No	NUT
7440-32-6	Titanium, Filtered	0.6 J	0.6 J	ug/L	13SW3001-F	1/1	---	0.6	0.22 J	15000 N	NA NA	NA NA	No	BSL
Miscellaneous Parameters (mg/L)														
	Nitrite/Nitrate-N	0.26	0.28	mg/L	13SW3301	2/5	0.025	0.28	ND	1 N	1	FED-MCL[9]	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD31 (samples 13SW3101 and 13SW3102).
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value.
Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) is presented.
9 - The MCL for Nitrite (as N) is presented.

Associated Samples

13SW3001	13SW3301
13SW3001-F	13SW3401
13SW3002	13SW3501
13SW3002-F	13SW3501-D

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Semivolatile Organic Compounds														
79-01-6	**BENZO(A)ANTHRACENE**	0.2 J	0.22	ug/L	13SW0601	2/5	0.049 - 0.05	0.22	NA	**0.092 C**	1.2	NA NA	**Yes**	ASL
99-35-4	**BENZO(A)PYRENE**	0.26	0.27 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.27	NA	**0.0092 C**	**0.2**	FED-MCL IDEM	**Yes**	ASL
99-65-0	**BENZO(B)FLUORANTHENE**	0.38	0.4 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.4	NA	**0.092 C**	1.2	NA NA	**Yes**	ASL
118-96-7	BENZO(G,H,I)PERYLENE	0.22 J	0.23	ug/L	13SW0601	2/5	0.049 - 0.05	0.23	NA	18 N	0.26	NA NA	No	BSL
6629-29-4	BENZO(K)FLUORANTHENE	0.19 J	0.2	ug/L	13SW0601	2/5	0.049 - 0.05	0.2	NA	0.92 C	0.8	NA NA	No	BSL
121-14-2	CHRYSENE	0.33 J	0.35	ug/L	13SW0601	2/5	0.049 - 0.05	0.35	NA	9.2 C	1.6	NA NA	No	BSL
59229-75-3	FLUORANTHENE	0.77 J	0.96	ug/L	13SW0601	2/5	0.049 - 0.05	0.96	NA	150 N	210	NA NA	No	BSL
606-20-2	**INDENO(1,2,3-CD)PYRENE**	0.2	0.21 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.21	NA	**0.092 C**	**0.022**	NA NA	**Yes**	ASL
35572-78-2	PHENANTHRENE	0.32 J	0.51	ug/L	13SW0601	2/5	0.049 - 0.05	0.51	NA	18 N	23	NA NA	No	BSL
35572-78-2	PYRENE	0.58 J	0.65	ug/L	13SW0601	2/5	0.049 - 0.05	0.65	NA	18 N	140	NA NA	No	BSL
Energetics														
118-96-7	**2,4,6-Trinitrotoluene**	0.42 J	6.8	ug/L	13SW1301	5/34	0.21 - 0.65	6.8	NA	**1.8 N**	NA NA	NA NA	**Yes**	ASL
6629-29-4	2,4-Diamino-6-Nitrotoluene	0.44 J	0.44 J	ug/L	13SW1302	1/21	0.24 - 0.287	0.44	NA	NA	NA NA	NA NA	No	NTX
35572-78-2	**2-Amino-4,6-Dinitrotoluene**	0.26 J	8.3 J	ug/L	13SW1302	11/33	0.24 - 0.65	8.3	NA	**0.73 N**	NA NA	NA NA	**Yes**	ASL
99-08-1	3-Nitrotoluene	0.29 J	0.31 J	ug/L	13SW1302	2/34	0.21 - 0.65	0.31	NA	12 N	NA NA	NA NA	No	BSL
19406-51-0	**4-Amino-2,6-Dinitrotoluene**	0.46 J	21 J	ug/L	13SW1302	14/34	0.24 - 0.65	21	NA	**0.73 N**	NA NA	NA NA	**Yes**	ASL
TTNUS498	DNX	0.59 J	35	ug/L	13SW1102	10/21	0.24 - 0.27	35	NA	NA	NA NA	NA NA	No	NTX
2691-41-0	**HMX**	0.67	730	ug/L	13SW1102	21/34	0.24 - 0.65	730	NA	**180 N**	NA NA	NA NA	**Yes**	ASL
TTNUS232	MNX	1.2	72	ug/L	13SW1102	10/21	0.24 - 0.27	72	NA	NA	NA NA	NA NA	No	NTX
121-82-4	**RDX**	0.29 J	5500	ug/L	13SW1102	25/34	0.24 - 0.6	5500	NA	**0.61 C**	NA NA	NA NA	**Yes**	ASL
TTNUS337	TNX	0.48 J	4	ug/L	13SW1102, 13SW1501	7/21	0.24 - 0.27	4	NA	NA	NA NA	NA NA	No	NTX
Herbicides (ug/L)														
87-66-5	Pentachlorophenol	0.025 J	0.091	ug/L	13SW0401	2/3	0.013	0.091	NA	0.56 C	1 1	FED-MCL IDEM	No	BSL

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Total Metals														
7429-90-5	**Aluminum**	108 J	19100 J	ug/L	13SW0701	28/33	41.9 - 106	19100	486 J - 1770 J	**3600 N**	NA NA	NA NA	**Yes**	ASL
7440-38-2	**Arsenic**	0.85 J	35.7 J	ug/L	13SW1101	15/33	0.11 - 0.97	35.7	0.8 J	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL
7440-39-3	Barium	25.3 J	247 J	ug/L	13SW0701	33/33	---	247	58.1 J - 58.2 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-43-9	Cadmium	1.3 J	1.3 J	ug/L	13SW0102	1/33	0.039 - 0.56	1.3	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
7440-70-2	Calcium	3040 J	133000 J	ug/L	13SW0701	33/33	---	133000	5060 J - 6550 J	NA	NA NA	NA NA	No	NUT
7440-47-3	**Chromium**	1 J	20.5 J	ug/L	13SW0701	17/33	0.19 - 1	20.5	0.82 J - 2.2 J	**11 N**	100 100	FED-MCL IDEM	**Yes**	ASL
7440-48-4	Cobalt	0.47 J	9.4 J	ug/L	13SW1101	18/33	0.07 - 0.72	9.4	ND	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper	0.89 J	27.1 J	ug/L	13SW1101	30/33	0.38 - 0.89	27.1	1.3 J - 2.2 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	**Iron**	152 J	16200 J	ug/L	13SW0701	26/33	34.7 - 162	16200	415 J - 1600 J	**1100 N**	NA NA	NA NA	**Yes**	ASL
7439-92-1	**Lead**	1.3 J	137 J	ug/L	13SW0102	14/33	0.07 - 1.6	137	ND	NA	**15** **15**	FED-MCL[8] IDEM	**Yes**	ASL
7439-93-2	Lithium	2.8 J	14.3 J	ug/L	13SW0701	8/13	1.3 - 2.2	14.3	NA	73 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium	836 J	92200 J	ug/L	13SW1101	32/33	14200	92200	2830 J - 3600 J	NA	NA NA	NA NA	No	NUT
7439-96-5	**Manganese**	7.5 J	3190 J	ug/L	13SW0802	32/33	9.4	3190	60.1 J - 122 J	**88 N**	NA NA	NA NA	**Yes**	ASL
7439-97-6	Mercury	0.047 J	0.047 J	ug/L	13SW1501	1/33	0.007 - 0.2	0.047	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
7440-02-0	Nickel	0.67 J	22 J	ug/L	13SW1501	32/33	2	22	2.3 J	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium	621 J	690000 J	ug/L	13SW1101	33/33	---	690000	1800 J - 2920 J	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium	2 J	2 J	ug/L	13SW1101	1/33	0.04 - 0.62	2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
7440-23-5	Sodium	2260 J	325000 J	ug/L	13SW0701	33/33	---	325000	1540 J	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium	48 J	245 J	ug/L	13SW0701	13/13	---	245	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium	1.3 J	356 J	ug/L	13SW0701	30/31	0.73	356	10.1 J	15000 N	NA NA	NA NA	No	BSL
7440-62-2	**Vanadium**	0.42 J	43.5 J	ug/L	13SW1101	25/33	0.11 - 0.61	43.5	0.89 J - 2.9	**3.6 N**	NA NA	NA NA	**Yes**	ASL
7440-66-6	Zinc	6.8 J	269 J	ug/L	13SW0102	25/33	2.1 - 13.1	269	8.8 J	1100 N	NA 11000	NA IDEM	No	BSL

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dissolved Metals														
7429-90-5	Aluminum, Filtered	52.7 J	822	ug/L	13SW0901-F	18/33	7.6 - 52.8	822	254 J - 938 J	3600 N	NA NA	NA NA	No	BSL
7440-38-2	**Arsenic, Filtered**	0.64 J	35.3 J	ug/L	13SW1101-F	8/33	0.09 - 0.73	35.3	ND	**0.045 C**	**10** 50	FED-MCL IDEM	**Yes**	ASL
7440-39-3	Barium, Filtered	10.1 J	149 J	ug/L	13SW0701-F	33/33	---	149	51.7 J - 54.1 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-70-2	Calcium, Filtered	5660 J	121000 J	ug/L	13SW0701-F	33/33	---	121000	5120 J - 6680 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	2 J	2 J	ug/L	13SW1101-F	1/33	0.13 - 1.5	2	1 J	11 N	100 100	FED-MCL IDEM[10]	No	BSL
7440-48-4	Cobalt, Filtered	0.6 J	8.8 J	ug/L	13SW1101-F	20/33	0.088 - 0.7	8.8	0.79 J	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper, Filtered	0.57 J	26.4 J	ug/L	13SW1101-F	28/33	0.3 - 1.2	26.4	1.5 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	**Iron, Filtered**	35.7 J	1120 J	ug/L	13SW0802-F	15/33	6.15 - 122	1120	155 J - 645 J	**1100 N**	NA NA	NA NA	**Yes**	ASL
7439-92-1	Lead, Filtered	1.1 J	1.1 J	ug/L	13SW0102-F	1/33	0.02 - 0.38	1.1	ND	15	15 15	FED-MCL[8] IDEM	No	BSL
7439-93-2	Lithium, Filtered	3.1 J	5.5 J	ug/L	13SW1001-F	3/13	0.37 - 1.5	5.5	NA	73 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium, Filtered	3440 J	92900 J	ug/L	13SW1101-F	32/33	13700	92900	2740 J - 3770 J	NA	NA NA	NA NA	No	NUT
7439-96-5	**Manganese, Filtered**	2.9 J	3110 J	ug/L	13SW0802-F	30/33	2.1 - 10.7	3110	112 J	**88 N**	NA NA	NA NA	**Yes**	ASL
7440-02-0	Nickel, Filtered	0.58 J	18.6 J	ug/L	13SW1101-F	28/33	0.55 - 1.5	18.6	1.8 J	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium, Filtered	600 J	700000 J	ug/L	13SW1101-F	33/33	---	700000	1850 J - 2700 J	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium, Filtered	2.2 J	2.2 J	ug/L	13SW1101-F	1/33	0.04 - 0.59	2.2	ND	18 N	NA 50	NA IDEM	No	BSL
7440-23-5	Sodium, Filtered	2920 J	311000 J	ug/L	13SW0701-F	33/33	---	311000	1660 J	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium, Filtered	45.5 J	219 J	ug/L	13SW0701-F	13/13	---	219	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium, Filtered	0.1 J	19.5 J	ug/L	13SW0901-F	26/31	0.34 - 1.1	19.5	5.3 J	15000 N	NA NA	NA NA	No	BSL
7440-62-2	**Vanadium, Filtered**	0.44 J	38.5 J	ug/L	13SW1101-F	9/33	0.06 - 1.14	38.5	ND	**3.6 N**	NA NA	NA NA	**Yes**	ASL
7440-66-6	Zinc, Filtered	3.4 J	54.5 J	ug/L	13SW0902-F	18/33	2.1 - 16	54.5	18.6 J	1100 N	NA 11000	NA IDEM	No	BSL

TABLE 7-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects(2)	Concentration Used for Screening(3)	Upgradient Sample Concentrations (4)	Screening Toxicity Value(5)	Potential ARAR/TBC(6)	Potential ARAR/TBC Source(6)	COPC Flag	Rationale for Contaminant Deletion or Selection(7)
Miscellaneous Parameters (mg/L)														
	Ammonia-N	0.01	3.4	mg/L	13SW1101	18/31	0.005 - 0.01	3.4	ND	NA	NA NA	NA NA	No	NTX
	Nitrite/Nitrate-N	0.14	200	mg/L	13SW2401	23/34	0.02 - 0.13	200	4	**1 N**	**1** NA	FED-MCL(9) NA	**Yes**	ASL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD28 (samples 13SW2801 and 13SW2802).
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) is presented.
9 - The MCL for Nitrite (as N) is presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

Associated Samples

13SW0101	13SW0701-F	13SW1002	13SW1401-F-D	13SW2201-F	13SW1101
13SW0101-F	13SW0702	13SW1002-F	13SW1402	13SW2202	13SW1101-F
13SW0102	13SW0702-F	13SW1201	13SW1501	13SW2202-F	13SW1102
13SW0102-F	13SW0801	13SW1201-F	13SW1501-F	13SW2401	13SW1102-F
13SW0201	13SW0801-F	13SW1202	13SW1502	13SW2401-F	13SW3001
13SW0201-F	13SW0802	13SW1202-F	13SW1601	13SW2501	13SW3001-F
13SW0301	13SW0802-F	13SW1301	13SW1601-F	13SW2501-D	13SW3002
13SW0301-F	13SW0901	13SW1301-F	13SW1602	13SW2501-F	13SW3002-F
13SW0401	13SW0901-F	13SW1302	13SW1801	13SW2501-F-D	13SW3301
13SW0401-F	13SW0902	13SW1302-D	13SW1801-F	13SW2601	13SW3401
13SW0501	13SW0902-F	13SW1302-F	13SW1901	13SW2601-F	13SW3501
13SW0501-F	13SW1001	13SW1302-F-D	13SW1901-F	13SW2701	13SW3501-D
13SW0601	13SW1001-D	13SW1401	13SW2001	13SW2701-F	
13SW0601-F	13SW1001-F	13SW1401-D	13SW2001-F	13SW2901	
13SW0701	13SW1001-F-D	13SW1401-F	13SW2201	13SW3201	

TABLE 7-10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SEDIMENT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Mainstream Sediment

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Inorganics														
7429-90-5	**Aluminum**	11500 J	13700 J	mg/kg	13SD3501	5/5	---	13700	14400 J - 22100 J	**7600 N**	NA	NA	**Yes**	ASL
7440-36-0	**Antimony**	1.9 J	4.7 J	mg/kg	13SD3001	5/5	---	4.7	1.8 J - 2.1 J	**3.1 N**	140	IDEM	**Yes**	ASL
7440-38-2	**Arsenic**	23.9 J	56.9 J	mg/kg	13SD3001	5/5	---	56.9	25.6 J - 33.3 J	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
7440-39-3	Barium	77.4 J	207 J	mg/kg	13SD3002	5/5	---	207	90.8 J - 137 J	540 N	23000	IDEM	No	BSL
7440-41-7	Beryllium	1.9 J	3.7 J	mg/kg	13SD3001	5/5	---	3.7	2 J - 2.3 J	15 N	680	IDEM	No	BSL
7440-43-9	**Cadmium**	9.4 J	17.1 J	mg/kg	13SD3001	5/5	---	17.1	1.8 J - 4.3 J	**3.7 N**	**12**	IDEM	**Yes**	ASL
7440-70-2	Calcium	1290 J	12200 J	mg/kg	13SD3501	5/5	---	12200	2010 J - 2500 J	NA	NA	NA	No	NUT
7440-47-3	Chromium	51.7 J	192 J	mg/kg	13SD3001	5/5	---	192	49.1 J - 77.2 J	210 C	430[8]	IDEM	No	BSL
7440-48-4	Cobalt	19 J	29.9 J	mg/kg	13SD3501	5/5	---	29.9	20.4 J - 27.5 J	140 N[9]	NA	NA	No	BSL
7440-50-8	Copper	16.4 J	18.4 J	mg/kg	13SD3002	5/5	---	18.4	18.4 J - 22 J	310 N	13000	IDEM	No	BSL
7439-89-6	**Iron**	89600 J	299000 J	mg/kg	13SD3001	5/5	---	299000	120000 J - 121000 J	**2300 N**	NA	NA	**Yes**	ASL
7439-92-1	Lead	25.6 J	45.6 J	mg/kg	13SD3001	5/5	---	45.6	20.6 J - 25.2 J	400	400	IDEM	No	BSL
7439-95-4	Magnesium	610 J	2110 J	mg/kg	13SD3501	5/5	---	2110	1490 J - 1940 J	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	1450 J	3960 J	mg/kg	13SD3002	5/5	---	3960	1250 J - 1330 J	**180 N**	NA	NA	**Yes**	ASL
7439-97-6	Mercury	0.016 J	0.016 J	mg/kg	13SD3001	1/5	0.026 - 0.044	0.016	0.021 J	2.3 N	100	IDEM	No	BSL
7440-02-0	Nickel	35.8 J	47.8 J	mg/kg	13SD3002	5/5	---	47.8	41.5 J - 54.1 J	160 N	6900	IDEM	No	BSL
7440-09-7	Potassium	452 J	1680 J	mg/kg	13SD3501	5/5	---	1680	2080 J - 3190 J	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.62 J	1.5 J	mg/kg	13SD3401	5/5	---	1.5	0.48 J - 0.85 J	39 N	1700	IDEM	No	BSL
7440-23-5	Sodium	91.1 J	298 J	mg/kg	13SD3301	3/5	28.4 - 77.4	298	92.3 J - 126 J	NA	NA	NA	No	NUT
7440-32-6	Titanium	65.6 J	65.6 J	mg/kg	13SD3001	1/1	---	65.6	26.4 J	31000 N[10]	NA	NA	No	BSL
7440-62-2	**Vanadium**	48.3 J	101 J	mg/kg	13SD3001	5/5	---	101	47.6 J - 61.6 J	**7.8 N**	NA	NA	**Yes**	ASL
7440-66-6	Zinc	121 J	195 J	mg/kg	13SD3301	5/5	---	195	73.1 J - 98.3 J	2300 N	100000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).
3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The PRG for residential land use for total chromium is presented.
9 - Value is for hexavalent chromium.
10 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG. The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

13SD3001	13SD3501
13SD3002	13SD3101
13SD3301	13SD3102
13SD3401	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient

TABLE 7-11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SEDIMENT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Semi-Volatile Organic Compounds														
91-57-6	2-Methylnaphthalene	6 J	6 J	ug/kg	13SD2501	1/5	3.9 - 4.4	6	NA	5600 N[8]	3200000	IDEM	No	BSL
83-32-9	Acenaphthene	24	43 J	ug/kg	13SD0501	2/5	4.1 - 4.4	43	NA	370000 N	9500000	IDEM	No	BSL
120-12-7	Anthracene	72	88	ug/kg	13SD0501	2/5	4.1 - 4.4	88	NA	2200000 N	47000000	IDEM	No	BSL
56-55-3	Benzo(a)anthracene	10	330	ug/kg	13SD0501	5/5	---	330	NA	620 C	5000	IDEM	No	BSL
50-32-8	**Benzo(a)pyrene**	12	390 J	ug/kg	13SD0601	5/5	---	390	NA	**62 C**	500	IDEM	**Yes**	ASL
205-99-2	Benzo(b)fluoranthene	18	460 J	ug/kg	13SD0601	5/5	---	460	NA	620 C	5000	IDEM	No	BSL
191-24-2	Benzo(g,h,i)perylene	10	380 J	ug/kg	13SD0601	5/5	---	380	NA	230000 N[9]	50000	IDEM	No	BSL
207-08-9	Benzo(k)fluoranthene	7 J	250 J	ug/kg	13SD0501	5/5	---	250	NA	6200 C	50000	IDEM	No	BSL
218-01-9	Chrysene	15	430 J	ug/kg	13SD0601	5/5	---	430	NA	62000 C	500000	IDEM	No	BSL
84-74-2	di-n-Butyl Phthalate	86 J	86 J	ug/kg	13SD0601	1/3	83 - 87	86	NA	610000 N	18000000	IDEM	No	BSL
117-84-0	di-n-Octyl Phthalate	100 J	100 J	ug/kg	13SD0601	1/3	83 - 87	100	NA	240000 N	3700000	IDEM	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	66 J	74 J	ug/kg	13SD0601	2/5	4.1 - 4.4	74	NA	**62 C**	500	IDEM	**Yes**	ASL
206-44-0	Fluoranthene	29	860	ug/kg	13SD0501	5/5	---	860	NA	230000 N	6300000	IDEM	No	BSL
86-73-7	Fluorene	33	42 J	ug/kg	13SD0501	2/5	4.1 - 4.4	42	NA	270000 N	6300000	IDEM	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	8 J	290 J	ug/kg	13SD0601	5/5	---	290	NA	620 C	5000	IDEM	No	BSL
91-20-3	Naphthalene	6 J	6 J	ug/kg	13SD0501, 13SD0601	2/5	4.1 - 4.4	6	NA	5600 N	3200000	IDEM	No	BSL
85-01-8	Phenanthrene	17	620	ug/kg	13SD0601	5/5	---	620	NA	230000 N[9]	470000	IDEM	No	BSL
129-00-0	Pyrene	25	1300 J	ug/kg	13SD0601	5/5	---	1300	NA	230000 N	4700000	IDEM	No	BSL
Energetics														
2691-41-0	HMX	0.8 J	1.9 J	mg/kg	13SD1101	2/28	0.25	1.9	NA	310 N	NA	NA	No	BSL
121-82-4	RDX	0.44 J	2.2	mg/kg	13SD1101	3/28	0.25	2.2	NA	4.4 C	NA	NA	No	BSL
Herbicides														
87-86-5	Pentachlorophenol	2.1 J	2.1 J	ug/kg	13SD0601	1/3	0.56 - 0.58	2.1	NA	3000 C	20000	IDEM	No	BSL
Inorganics														
7429-90-5	**Aluminum**	1480	18500	mg/kg	13SD2201	30/30	---	18500	13400 J - 17100 J	**7600 N**	NA	NA	**Yes**	ASL
7440-36-0	Antimony	0.8 J	2.3 J	mg/kg	13SD2401	10/30	0.13 - 0.55	2.3	0.98 J - 1.1 J	3.1 N	140	IDEM	No	BSL
7440-38-2	**Arsenic**	3.7 J	58.2 J	mg/kg	13SD2401	29/30	0.53	58.2	22.2 J - 28.7 J	**0.39 C**	**3.9**	IDEM	**Yes**	ASL
7440-39-3	**Barium**	28.5 J	693 J	mg/kg	13SD0102	30/30	---	693	129 J - 199 J	**540 N**	23000	IDEM	**Yes**	ASL
7440-41-7	Beryllium	0.53 J	4.3 J	mg/kg	13SD2201	26/30	0.18 - 0.65	4.3	2 J - 2.1 J	15 N	680	IDEM	No	BSL
7440-43-9	**Cadmium**	0.41 J	4.1 J	mg/kg	13SD1301	20/30	0.17 - 0.45	4.1	0.59 J - 0.63 J	**3.7 N**	12	IDEM	**Yes**	ASL
7440-70-2	Calcium	766 J	89700 J	mg/kg	13SD1301	30/30	---	89700	799 J - 845 J	NA	NA	NA	No	NUT
7440-47-3	**Chromium**	7.9 J	228 J	mg/kg	13SD2401	30/30	---	228	38.7 J - 55 J	**210 C**[10]	430[11]	IDEM	**Yes**	ASL
7440-48-4	Cobalt	1.8 J	107 J	mg/kg	13SD1901	30/30	---	107	31.3 J - 40.7 J	140 N[12]	NA	NA	No	BSL
7440-50-8	Copper	7 J	52.1 J	mg/kg	13SD0101	30/30	---	52.1	17.3 J - 27.8 J	310 N	13000	IDEM	No	BSL
7439-89-6	**Iron**	1990 J	195000 J	mg/kg	13SD2401	30/30	---	195000	93700 J - 112000 J	**2300 N**	NA	NA	**Yes**	ASL
7439-92-1	**Lead**	4.2 J	521 J	mg/kg	13SD0102	30/30	---	521	35.7 J - 37.2 J	**400**	**400**	IDEM	**Yes**	ASL
7439-93-2	Lithium	2.1 J	38.8 J	mg/kg	13SD1901	23/23	---	38.8	NA	160 N	NA	NA	No	BSL
7439-95-4	Magnesium	292 J	7540 J	mg/kg	13SD0701	30/30	---	7540	1470 J - 1580 J	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	65.3 J	6130 J	mg/kg	13SD1201	30/30	---	6130	2570 J - 3240 J	**180 N**	NA	NA	**Yes**	ASL
7439-97-6	Mercury	0.013 J	0.16 J	mg/kg	13SD0101	19/30	0.01 - 0.076	0.16	0.026 J	2.3 N	100	IDEM	No	BSL
7440-02-0	Nickel	7.9 J	83.9 J	mg/kg	13SD2201	30/30	---	83.9	33.5 J - 36.6 J	160 N	6900	IDEM	No	BSL
7440-09-7	Potassium	252 J	2390 J	mg/kg	13SD1501	30/30	---	2390	1340 J - 2000 J	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.18 J	1.1 J	mg/kg	13SD2401	22/30	0.02 - 0.37	1.1	0.56 J - 0.61 J	39 N	1700	IDEM	No	BSL

TABLE 7-11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SEDIMENT
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
7440-23-5	Sodium	31.7 J	334 J	mg/kg	13SD0701	5/30	21.8 - 126	334	31.6 J - 183 J	NA	NA	NA	No	NUT
7440-24-6	Strontium	4.1 J	77.1 J	mg/kg	13SD1101	23/23	---	77.1	NA	4700 N	NA	NA	No	BSL
7440-31-5	Tin	0.52 J	12 J	mg/kg	13SD1201	9/30	0.3 - 0.64	12	ND	4700 N	NA	NA	No	BSL
7440-32-6	Titanium	13.8 J	164 J	mg/kg	13SD2401	28/28	---	164	40.9 J	31000 N[13]	NA	NA	No	BSL
7440-62-2	**Vanadium**	11.8 J	144 J	mg/kg	13SD2401	30/30	---	144	46.2 J - 53.8 J	**7.8 N**	NA	NA	**Yes**	ASL
7440-66-6	Zinc	7.9 J	541 J	mg/kg	13SD0101	25/30	33.4 - 386	541	72.8 J - 79.7 J	2300 N	100000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD28 (samples 13SD2801 and 13SD2802).
3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
10 - The PRG for residential land use for total chromium is presented.
11 - Value is for hexavalent chromium.
12 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
13 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient

Associated Samples

13SD0101	13SD0901	13SD1801	13SD2701
13SD0102	13SD1001	13SD1901	13SD2901
13SD0201	13SD1101	13SD2001	13SD2901-D
13SD0301	13SD1201	13SD2101	13SD3201
13SD0401	13SD1301	13SD2201	
13SD0501	13SD1401	13SD2202	
13SD0501-D	13SD1501	13SD2301	
13SD0601	13SD1601	13SD2401	
13SD0701	13SD1701	13SD2501	
13SD0801	13SD1701-D	13SD2601	

TABLE 7-12

EXPOSURE POINT CONCENTRATIONS (EPCs) FOR COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern	Exposure Point Concentration								
	Surface Soil Building 166(1) (mg/kg)	Surface/ Subsurface Soil Building 166(2) (mg/kg)	Surface Soil Building 171(1) (mg/kg)	Surface/ Subsurface Soil Building 171(2) (mg/kg)	Mainstream Surface Water(1) (ug/L)	Mainstream Sediment(1) (mg/kg)	Gully Surface Water(3) (ug/L)	Gully Sediment(3) (mg/kg)	Groundwater(4) (ug/L)
1,3-Dinitrobenzene									0.24
2,4,6-Trinitrotoluene		1.89		0.53			1.4		6.9
2,6-Dinitrotoluene									0.99
2-Amino-4,6-Dinitrotoluene		0.4		0.37			3.1		2.0
2-Nitrotoluene									0.14
4-Amino-2,6-Dinitrotoluene		0.45		5.5			7.6		3.4
HMX		1.44		191			263		79
RDX		1.96		3.9	9.9		1,939		669
2,3,7,8-TCDD TEQ	6.9E-06	6.0E-06	1.51E-05	5.4E-06					
Benzo(a)anthracene	0.032	0.018	1.1	1.1			0.22(5)		
Benzo(a)pyrene	0.042	0.042(5)	1.0	0.995			0.27(5)	0.39(5)	
Benzo(b)fluoranthene	0.058	0.058(5)	1.1	1.1			0.4(5)		
Dibenzo(a,h)anthracene			0.2	0.20				0.74(5)	
Indeno(1,2,3-cd)pyrene	0.026	0.015	0.65	0.65			0.21(5)		
Aroclor-1248	46	23	160	77					
Aluminum		14,313		15,834		13,700	3,713	10,167	2,797
Antimony						4.7			0.037
Arsenic		7.4		8.1		56.9	6.3	25	1.2
Barium		75		66	280			170	48
Beryllium									1.6
Cadmium						17.1		1.3	0.13
Chromium							12	88	2.2
Cobalt									49
Iron						299,000	3,370		21,904
Lead							6.4(6)	59(6)	4.5(6)
Lithium									85
Manganese						3,960	418	2,391	1,792
Mercury		0.211		0.33					
Nickel									106
Vanadium						101	9.8	58	1.8
Zinc									135
Nitrite/Nitrate-N							22.4 (mg/L)		6.73 (mg/L)

BLANK SPACES INDICATE THAT THE CHEMICAL WAS NOT SELECTED AS A COPC FOR THE SPECIFIED MEDIUM

1 - Dataset consists of less than 10 samples. Therefore, the maximum concentration is used as the EPC.
2 - Surface/subsurface soil data was obtained from two investigations. Explosives and metals data were obtained during the bioremediation program and reported in the IMR (TT, 2002). The EPCs for explosives and metals are weighted averages representing post-remediation conditions at SWMU 13 (See Section 7.3.3 of text). EPCs for dioxins, PAHs, and Aroclor-1248 are UCLs calculated according to U.S EPA's ProUCL guidance, unless otehrwise noted. See RAGS-Part D Table 3s in Appendix I for details concerning the UCLs.
3- UCLs calculated according to the U.S EPA's ProUCL guidance, unless otherwise noted. SeeRAGS-Part D Table 3s in Appendix I for details concerning the UCLs.
4 - The EPC for groundwater is the arithmetic average of samples in the most highly contaminated area of the plume (See Section 7.3.3 of text).
5 - UCL is greater than the maximum concentration. Therefore, the maximum concentration is used as the EPC.
6 - The EPC for lead is the arithmetic average, as recommended by U.S. EPA guidance (U.S. EPA, 1999c).

TABLE 7-13

RECEPTORS AND EXPOSURE ROUTES FOR QUANTITATIVE EVALUATION
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Receptors	Exposure Routes
Maintenance Workers (current/future land use)	• Soil dermal contact (surface/subsurface) • Soil ingestion (surface/subsurface) • Inhalation of air/dust/emissions (surface/subsurface) • Surface water/sediment dermal contact • Sediment (Incidental ingestion)
Occupational Worker (current/future land use)	• Soil dermal contact (surface/subsurface) • Soil ingestion (surface/subsurface) • Inhalation of air/dust/emissions (surface/subsurface) • Direct ingestion of groundwater • Groundwater dermal contact
Adolescent Trespassers (6 to 17 years) (current/future land use)	• Soil dermal contact (surface/subsurface) • Soil ingestion (surface/subsurface) • Inhalation of air/dust/emissions (surface/subsurface) • Surface water/sediment dermal contact • Surface water/sediment Ingestion
Construction Workers (future land use)	• Soil dermal contact (surface and subsurface) • Soil ingestion (surface and subsurface) • Inhalation of air/dust/emissions (surface and subsurface) • Groundwater dermal contact (during excavation)
Small Child (0 to 6 years) and Adult Recreational Users (future land use)	• Soil dermal contact (surface/subsurface) • Soil ingestion (surface/subsurface) • Inhalation of air/dust/emissions (surface/subsurface) • Surface water/sediment dermal contact • Surface water/sediment ingestion • Groundwater dermal contact • Direct ingestion of groundwater
On-Base Residents (Adult/Children) (future land use)	• Soil dermal contact (surface/subsurface) • Soil ingestion (surface/subsurface) • Inhalation of air/dust/emissions (surface/subsurface) • Direct ingestion of groundwater • Groundwater dermal contact (showering/bathing) • Surface water/sediment dermal contact • Surface water/sediment ingestion

TABLE 7-14

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}/C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
C_{gw} (µg/L)	Average	NA	Average	NA	Average	Average	Average	Average
C_{sw} (µg/L)	NA	Maximum or 95% UCL[1]	NA	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
ED (years)	1[2]	25[3]	25[3]	11[4]	6[5]	24[5]	6[5]	24[5]
BW (kg)	70[5]	70[5]	70[5]	43[6]	15[5]	70[5]	15[5]	70[5]
AT_n (days)	365[6]	9,125[6]	9,125[6]	4,015[6]	2,190[6]	8,760[6]	2,190[6]	8,760[6]
AT_c (days)	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]	25,550[6]
Incidental Ingestion/Dermal Contact with Soil								
IR (mg/day)	330[7]	100[5]	100[5]	100[5]	200[5]	100[5]	200[5]	100[5]
EF-Soil (days/year)	150[8]	24[9]	250[5]	26[10]	52[11]	52[11]	350[5]	350[5]
FI (unitless)	1[5]	1[5]	1[5]	1[5]	0.5[2]	0.5[2]	1[5]	1[5]
SA (cm^2/day)	3,300[12]	3,300[12]	3,300[12]	3,280[13]	3,300[14]	9,070[15]	2,800[12]	5,700[12]
AF (mg/cm^2)	0.3[12]	0.2[12]	0.2[12]	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS (unitless)	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Ingestion/Dermal Contact with Groundwater								
IR_{gw} (L/day)	NA	NA	1[2]	NA	1[2]	1[2]	1.5[16]	2[5]
EF (days/year)	150[8]	NA	250[5]	NA	52[11]	52[11]	350[5]	350[5]
ET (hours/day) and t_{event} (hours/event)	2[2]	NA	0.25[2]	NA	0.25[2]	0.25[2]	0.25[16]	0.25[16]
EV (events/day)	1[2]	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	3,300[12]	NA	3,300[12]	NA	3,300[14]	9,070[15]	6,600[12]	18,000[12]
K_p (cm/hour)	chemical-specific[12]	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[12]	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
Ingestion/Dermal Contact with Surface Water								
CR_{sw} (ml/hr)	NA	NA	NA	0.05[17]	0.05[17]	0.01[17]	0.05[17]	0.01[17]
EF (days/year)	NA	24[9]	NA			52[11]	52[11]	52[11]

TABLE 7-14

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
ET (hours/day) and t_{event} (hours/event)	NA	2[2]	NA	4[2]	4[2]	4[2]	4[2]	4[2]
EV (events/day)	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	NA	3,300[12]	NA	3,280[13]	3,300[14]	9,070[15]	3,300[14]	9,070[15]
K_p (cm/hour)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
t* (hour/event), τ (hour), and B (unitless)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (L/cm^3)	NA	1E-03	NA	1E-03	1E-03	1E-03	1E-03	1E-03
Incidental Ingestion/Dermal Contact with Sediment								
IR (mg/day)	NA	100[5]	NA	100[5]	200[5]	100[5]	100[2]	50[2]
EF-Sediment (days/year)	NA	24[9]	NA	26[10]	52[11]	52[11]	52[11]	52[11]
FI (unitless)	NA	1[5]	NA	1[5]	0.5[2]	0.5[2]	1[5]	1[5]
SA (cm^2/day)	NA	3,300[12]	NA	3,280[13]	3,300[14]	9,070[15]	2,800[12]	5,700[12]
AF (mg/cm^2)	NA	0.2[12]	NA	0.2[12]	0.2[12]	0.07[12]	0.2[12]	0.07[12]
ABS (unitless)	NA	chemical-specific[12]	NA	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]	chemical-specific[12]
CF (kg/mg)	NA	1E-06	NA	1E-06	1E-06	1E-06	1E-06	1E-06

Notes:

A	Skin surface area available for contact	EF	Exposure frequency
ABS	Absorption factor	ET	Exposure time
AF	Soil-to-skin adherence factor	EV	Event frequency
AT_c	Averaging time for carcinogenic effects	FI	Fraction ingested from contaminated source
AT_n	Averaging time for noncarcinogenic effects	InhR	Inhalation rate
B	Bunge Model partitioning coefficient	IR	Ingestion rate (soil or groundwater)
BW	Body weight	K_p	Permeability coefficient from water through skin
CF	Conversion factor	SA	Skin surface area available for contact
CR	Contact rate	PEF	Particulate emission factor
$C_{soil/sed}$	Exposure concentration for soil/sediment	τ	Lag time
$C_{gw/sw}$	Exposure concentration for groundwater/surface water	t*	Time it takes to reach steady-state conditions
C_{air}	Exposure concentration for air	t_{event}	Duration of event
ED	Exposure duration		

TABLE 7-14

SUMMARY OF EXPOSURE INPUT PARAMETERS
REASONABLE MAXIMUM EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident

1 - U.S. EPA, 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - U.S. EPA, 1991: Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03.
4 - Adolescents ages 7 to 16 years old.
5 - U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
6 - U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
7 - U.S. EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9365.4-24.
8 - Ground is assumed to be frozen or snow covered 22 weeks/year.
9 - Assume two days a month for reasonable maximum exposure and one day a month for central tendency exposure.
10 - Assume one day a week in warm weather months for reasonable maximum exposure and every other week for central tendency exposure.
11 - Assume two days a week in warm weather months for reasonable maximum exposure and one day a week for central tendency exposure.
12 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.
13 - Assume 25 percent of total body surface area is exposed, U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
14 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004.
15 - Assume that head, arms, hands, lower legs, and feet are exposed, U.S. EPA, 1997a.
16 - U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
17 - U.S. EPA Region IV, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

TABLE 7-15

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA
PAGE 1 OF 3

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
All Exposures								
C_{soil}/C_{sed} (mg/kg)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
C_{gw} (µg/L)	Average	NA	Average	NA	Average	Average	Average	Average
C_{sw} (µg/L)	NA	Maximum or 95% UCL[1]	NA	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
ED (years)	1[2]	9[3]	9[3]	11[4]	2[3]	7[3]	2[3]	7[3]
BW (kg)	70[3]	70[3]	70[3]	43[5]	15[3]	70[3]	15[3]	70[3]
AT_n (days)	365[5]	3,285[5]	3,285[5]	4,015[5]	730[5]	2,555[5]	730[5]	2,555[5]
AT_c (days)	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]	25,550[5]
Incidental Ingestion/Dermal Contact with Soil								
IR (mg/day)	165[6]	50[3]	50[3]	50[3]	100[3]	50[3]	100[3]	50[3]
EF-Soil (days/year)	150[7]	12[8]	219[3]	13[9]	26[10]	26[10]	234[3]	234[3]
FI (unitless)	1[3]	1[3]	1[3]	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA (cm^2/day)	3,300[11]	3,300[11]	3,300[11]	3,100[12]	3,300[13]	9,070[14]	2,800[11]	5,700[11]
AF (mg/cm^2)	0.1[11]	0.02[11]	0.02[11]	0.04[11]	0.04[11]	0.01[11]	0.04[11]	0.01[11]
ABS (unitless)	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Ingestion/Dermal Contact with Groundwater								
IR_{gw} (L/day)	NA	NA	1[2]	NA	1[2]	1[2]	0.66[15]	1.4[3]
EF (days/year)	150[7]	NA	219[3]	NA	26[10]	26[10]	234[3]	234[3]
ET (hours/day) and t_{event} (hours/event)	1.5[2]	NA	0.167[2]	NA	0.167[2]	0.167[2]	0.167[15]	0.167[15]
EV (events/day)	1[2]	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	3,300[11]	NA	3,300[11]	NA	3,300[13]	9,070[14]	6,600[11]	18,000[11]
K_p (cm/hour)	chemical-specific[11]	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
Ingestion/Dermal Contact with Groundwater (Continued)								
t* (hour/event), τ (hour), and B (unitless)	chemical-specific[11]	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
Ingestion/Dermal Contact with Surface Water								
CR_{sw} (ml/hr)	NA	NA	NA	0.05[16]	0.05[16]	0.01[16]	0.05[16]	0.01[16]
EF (days/year)	NA	12[8]	NA		26[10]	26[10]	26[10]	26[10]

TABLE 7-15

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident
ET (hours/day) and t_{event} (hours/event)	NA	1.5[2]	NA	2[2]	2[2]	2[2]	2[2]	2[2]
EV (events/day)	NA	1[2]	NA	1[2]	1[2]	1[2]	1[2]	1[2]
A (cm^2/day)	NA	3,300[11]	NA	3,100[12]	3,300[13]	9,070[14]	3,300[13]	9,070[14]
K_p (cm/hour)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
t* (hour/event), τ (hour), and B (unitless)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (L/cm^3)	NA	1E-03	NA	1E-03	1E-03	1E-03	1E-03	1E-03
Incidental Ingestion/Dermal Contact with Sediment								
IR (mg/day)	NA	50[3]	NA	50[3]	100[3]	50[3]	50[2]	25[2]
EF-Sediment (days/year)	NA	12[8]	NA	13[9]	26[10]	26[10]	26[10]	26[10]
FI (unitless)	NA	1[3]	NA	1[3]	0.5[2]	0.5[2]	1[3]	1[3]
SA (cm^2/day)	NA	3,300[11]	NA	3,100[12]	3,300[13]	9,070[14]	2,800[11]	5,700[11]
AF (mg/cm^2)	NA	0.02[11]	NA	0.04[11]	0.04[11]	0.01[11]	0.04[11]	0.01[11]
ABS (unitless)	NA	chemical-specific[11]	NA	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]	chemical-specific[11]
CF (kg/mg)	NA	1E-06	NA	1E-06	1E-06	1E-06	1E-06	1E-06

Notes:

A	Skin surface area available for contact	EF	Exposure frequency
ABS	Absorption factor	ET	Exposure time
AF	Soil-to-skin adherence factor	EV	Event frequency
AT_c	Averaging time for carcinogenic effects	FI	Fraction ingested from contaminated source
AT_n	Averaging time for noncarcinogenic effects	InhR	Inhalation rate
B	Bunge Model partitioning coefficient	IR	Ingestion rate (soil or groundwater)
BW	Body weight	K_p	Permeability coefficient from water through skin
CF	Conversion factor	NA	Not applicable
CR	Contact rate	SA	Skin surface area available for contact
$C_{soil/sed}$	Exposure concentration for soil/sediment	PEF	Particulate emission factor
$C_{gw/sw}$	Exposure concentration for groundwater/surface water	τ	Lag time
C_{air}	Exposure concentration for air	t*	Time it takes to reach steady-state conditions
ED	Exposure duration	t_{event}	Duration of event
		UCL	Upper confidence limit on arithmetic mean

TABLE 7-15

SUMMARY OF EXPOSURE INPUT PARAMETERS
CENTRAL TENDENCY EXPOSURES
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

Exposure Parameter	Construction Worker	Maintenance Worker	Occupational Worker	Adolescent Trespasser	Child Recreational User	Adult Recreational User	On-Site Child Resident	On-Site Adult Resident

1 - U.S. EPA, 2002. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10.
2 - Professional judgment.
3 - U.S. EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
4 - Adolescents ages 7 to 16 years old.
5 - U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.
6 - Central tendency exposure is assumed to be one-half the reasonable maximum exposure value.
7 - Ground is assumed to be frozen or snow covered 22 weeks per year.
8 - Assume 2 days a month for RME and one day a month for CTE.
9 - Assume 1 day a week in warm weather months for RME and every other week for CTE.
10 - Assume 2 days a week in warm weather months for RME and one day a week for CTE.
11 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. PA/540/R/99/005.
12 - Assume 25 percent of total body surface area is exposed, U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
13 - Assume 50 percent of total body surface area is exposed, U.S. EPA, 2004.
14 - Assume that head, arms, hands, lower legs, and feet are exposed (U.S. EPA, 1997a).
15 - U.S. EPA, 1997: Exposure Factors Handbook. EPA/600/8-95/002FA.
16 - U.S. EPA Region IV, 2000: Supplement Guidance to RAGS: Region 4 Bulletins.

TABLE 7-16

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Energetics										
1,3-Dinitrobenzene	Chronic	1.0E-04	mg/kg/day	1	1.0E-04	mg/kg/day	Spleen	3000/1	IRIS	3/01/2005
2,4,6-Trinitrotoluene	Chronic	5.0E-04	mg/kg/day	1	5.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/01/2005
2,6-Dinitrotoluene	Chronic	1.0E-03	mg/kg/day	1	1.0E-03	mg/kg/day	CNS, Blood, Kidney	3000/1	HEAST	7/1997
2-Amino-4,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10//2004
2-Nitrotoluene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Spleen	10000/1	HEAST	7/1997
4-Amino-2,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10//2004
HMX	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver, Blood	1000/1	IRIS	3/01/2005
RDX	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Prostate	100/1	IRIS	3/01/2005
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	NCEA	10/19/2004
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	3/01/2005
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	3/01/2005
Barium	Chronic	7.0E-02	mg/kg/day	0.07	4.9E-03	mg/kg/day	Kidney	3/1	IRIS	3/01/2005
Beryllium	Chronic	2.0E-03	mg/kg/day	0.007	1.4E-05	mg/kg/day	GS	300/1	IRIS	3/01/2005
Cadmium[3]	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	3/01/2005
Chromium III	Chronic	1.5E+00	mg/kg/day	0.013	2.0E-02	mg/kg/day	NOEL	100/10	IRIS	3/01/2005
Chromium VI	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	Fetotoxicity/GS/Bone	300/3	IRIS	3/01/2005
Cobalt	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	EPA 9	10//2004
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/1997
Iron	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	NA	1	NCEA	10//2004
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	Chronic	2.0E-03	mg/kg/day	1	2.0E-03	mg/kg/day	NA	NA	NCEA	10//2004
Manganese (Soil)	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	3/01/2005
Manganese (Water)	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	3/1	IRIS	3/01/2005
Mercury[4]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	CNS	1000/1	IRIS	3/01/2005
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	3/01/2005
Selenium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	NOEL	3/1	IRIS	3/01/2005
Vanadium	Chronic	1.0E-03	mg/kg/day	0.026	2.6E-05	mg/kg/day	Kidney	300	NCEA	10/19/2004
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	3/01/2005
Nitrate	Chronic	1.6E+00	mg/kg/day	1	1.6E+00	mg/kg/day	Blood	1/1	IRIS	3/01/2005
Nitrite	Chronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	Blood	1/10	IRIS	3/01/2005

Notes:

1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.

3 - Water value for cadmium is listed.

4 - Values are for mercuric chloride.

Definitions:

CNS = Central Nervous System

CVS = Cardiovascular system

EPA 9 = U.S. EPA Region 9 PRG Table, October, 2004, updated December 25, 2004.

GS = Gastrointestinal System

HEAST= Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Applicable

NOEL = No Observed Effect Level

TABLE 7-17

CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds								
Benzo(a)anthracene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Benzo(a)pyrene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/01/2005
Benzo(b)fluoranthene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Dioxins/Furans								
2,3,7,8-TCDD	1.5E+05	$(mg/kg/day)^{-1}$	1	1.5E+05	$(mg/kg/day)^{-1}$	B2	HEAST	7/1997
PCBs								
PCBs	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/01/2005
Energetics								
2,4,6-Trinitrotoluene	3.0E-02	$(mg/kg/day)^{-1}$	1	3.0E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/01/2005
RDX	1.1E-01	$(mg/kg/day)^{-1}$	1	1.1E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/01/2005
2-Nitrotoluene	2.3E-01	$(mg/kg/day)^{-1}$	1	2.3E-01	$(mg/kg/day)^{-1}$	NA	EPA 9	10//2004
Metals								
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/01/2005

Notes:
1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor x Oral Absorption Efficiency for Dermal.

IRIS = Integrated Risk Information System.
HEAST= Health Effects Assessment Summary Tables.

EPA Group:
A - Human carcinogen.
B1 - Probable human carcinogen - indicates that limited human data are available.
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .
C - Possible human carcinogen.
D - Not classifiable as a human carcinogen.
E - Evidence of noncarcinogenicity.

EPA(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

EPA 9 = U.S. EPA Region 9 PRG Table, October, 2004, updated December 25, 2004.

NA = Not Available.

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface and Subsurface Soil Area near Bldg 166	Ingestion	1E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	5E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	3E-07	- -	- -	- -	0.096	- -
		Dermal Contact	3E-08	- -	- -	- -	0.005	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-07	- -	- -	- -	0.1	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	5E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	3E-07	- -	- -	- -	0.16	- -
		Dermal Contact	3E-08	- -	- -	- -	0.007	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	0.16	- -
	Groundwater	Ingestion	NA	- -	- -	- -	NA	NA
		Dermal Contact	4E-08	- -	- -	- -	0.1	- -
		Inhalation	NA	- -	- -	- -	NA	NA
		Total	4E-08	- -	- -	- -	0.1	- -
		Total Building 166 Soil	**2E-06**				**0.1**	
		Total Building 166 Soil + Groundwater	**2E-06**				**0.2**	
		Total Building 171 Soil	**7E-06**				**0.16**	
		Total Building 171 Soil + Groundwater	**7E-06**				**0.26**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Maintenance Worker	Surface Soil Area near Bldg 166	Ingestion	3E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	3E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	4E-07	- -	- -	- -	0.005	- -
		Dermal Contact	8E-08	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	0.005	- -
	Surface Soil Area near Bldg 171	Ingestion	1E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	1E-05	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	6E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	5E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	8E-08	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	0.01	- -
	Surface Water Mainstream	Ingestion	NA	- -	- -	- -	NA	- -
		Dermal Contact	2E-09	- -	- -	- -	0.0004	- -
		Total	2E-09	- -	- -	- -	0.0004	- -
	Sediment Mainstream	Ingestion	3E-06	- -	- -	Arsenic	0.13	- -
		Dermal Contact	6E-07	- -	- -	- -	0.00	- -
		Total	3E-06	- -	- -	Arsenic	0.14	- -
	Surface Water Gully	Ingestion	NA	- -	- -	- -	NA	- -
		Dermal Contact	1E-05	- -	PAHs	- -	0.012	- -
		Total	1E-05	- -	PAHs	- -	0.012	- -
	Sediment Gully	Ingestion	1E-06	- -	- -	Arsenic	0.04	- -
		Dermal Contact	4E-07	- -	- -	- -	0.002	- -
		Total	2E-06	- -	- -	Arsenic	0.05	- -
Total Building 166 Surface Soil			**6E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**4E-06**				**0.005**	
Total Building 166 Surface Soil +Surface Water/Sediment			**3E-05**				**0.2**	
Total Building 171 Surface Soil			**2E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**1E-05**				**0.01**	
Total Building 171 Surface Soil +Surface Water/Sediment			**4E-05**				**0.2**	
Total Surface Water and Sediment			**2E-05**				**0.19**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Occupational Worker	Surface Soil Area near Bldg 166	Ingestion	3E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	3E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	4E-06	- -	- -	Arsenic	0.05	- -
		Dermal Contact	8E-07	- -	- -	- -	0.006	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Arsenic	0.05	- -
	Surface Soil Area near Bldg 171	Ingestion	1E-04	Aroclor-1248	- -	- -	NA	- -
		Dermal Contact	1E-04	Aroclor-1248	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-04	Aroclor-1248	- -	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	6E-05	- -	Aroclor-1248	PAHs	NA	- -
		Dermal Contact	5E-05	- -	Aroclor-1248	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	Aroclor-1248	- -	PAHs	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	4E-06	- -	- -	Arsenic	0.08	- -
		Dermal Contact	9E-07	- -	- -	- -	0.007	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Arsenic	0.09	- -
	Groundwater	Ingestion	3E-04	RDX	- -	Arsenic	5.3	RDX
		Dermal Contact	6E-07	- -	- -	- -	0.03	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-04	RDX	- -	Arsenic	5.4	RDX
Total Building 166 Surface Soil			**6E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**4E-05**				**0.054**	
Total Building 166 Surface Soil + Groundwater			**3E-04**				**5.4**	
Total Building 171 Surface Soil			**2E-04**				**NA**	
Total Building 171 Surface/subsurface Soil			**1E-04**				**0.09**	
Total Building 171 Surface Soil + Groundwater			**5E-04**				**5.5**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Trespasser	Surface Soil Area near Bldg 166	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	1E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	3E-07	- -	- -	- -	0.008	- -
		Dermal Contact	6E-08	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	0.009	- -
	Surface Soil Area near Bldg 171	Ingestion	9E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	8E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	4E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	4E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	3E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-08	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	0.01	- -
	Surface Water Mainstream	Ingestion	6E-08	- -	- -	- -	0.002	- -
		Dermal Contact	2E-09	- -	- -	- -	0.001	- -
		Total	6E-08	- -	- -	- -	0.004	- -
	Sediment Mainstream	Ingestion	2E-06	- -	- -	Arsenic	0.23	- -
		Dermal Contact	4E-07	- -	- -	- -	0.01	- -
		Total	3E-06	- -	- -	Arsenic	0.24	- -
	Surface Water Gully	Ingestion	1E-05	- -	RDX	- -	0.26	- -
		Dermal Contact	1E-05	- -	PAHs	- -	0.04	- -
		Total	3E-05	- -	RDX, PAHs	- -	0.3	- -
	Sediment Gully	Ingestion	1E-06	- -	- -	- -	0.08	- -
		Dermal Contact	3E-07	- -	- -	- -	0.003	- -
		Total	1E-06	- -	- -	Arsenic	0.08	- -
Total Building 166 Surface Soil			**5E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**3E-06**				**0.009**	
Total Building 166 Surface Soil +Surface Water/Sediment			**3E-05**				**0.63**	
Total Building 171 Surface Soil			**2E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**9E-06**				**0.01**	
Total Building 171 Surface Soil +Surface Water/Sediment			**5E-05**				**0.64**	
Total Surface Water and Sediment			**3E-05**				**0.62**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Child Recreational User	Surface Soil Area near Bldg 166	Ingestion	8E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	7E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	4E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	4E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	7E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	9E-07	- -	- -	- -	0.05	- -
		Dermal Contact	2E-07	- -	- -	- -	0.006	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Arsenic	0.05	- -
	Surface Soil Area near Bldg 171	Ingestion	3E-05	- -	Aroclor-1248		NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	1E-05	- -	Aroclor-1248		NA	- -
		Dermal Contact	1E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	1E-06	- -	- -	- -	0.08	- -
		Dermal Contact	2E-07	- -	- -	- -	0.007	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Arsenic	0.08	- -
	Surface Water Mainstream	Ingestion	2E-07	- -	- -	- -	0.01	- -
		Dermal Contact	7E-09	- -	- -	- -	0.007	- -
		Total	2E-07	- -	- -	- -	0.02	- -
	Sediment Mainstream	Ingestion	7E-06	- -	- -	Arsenic	1.3	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.04	- -
		Total	8E-06	- -	- -	Arsenic	1.4	- -
	Surface Water Gully	Ingestion	4E-05	- -	RDX	Arsenic	1.5	RDX
		Dermal Contact	4E-05	- -	PAHs	RDX	0.21	- -
		Total	8E-05	- -	RDX, PAHs	Arsenic	1.7	RDX
	Sediment Gully	Ingestion	3E-06	- -	- -	Arsenic	0.45	- -
		Dermal Contact	9E-07	- -	- -	- -	0.016	- -
		Total	4E-06	- -	- -	Arsenic	0.47	- -
	Groundwater	Ingestion	6E-05	- -	RDX	Arsenic	5.2	RDX
		Dermal Contact	3E-07	- -	- -	- -	0.05	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-05	- -	RDX	Arsenic	5.2	RDX
Total Building 166 Surface Soil			**1E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**9E-06**				**0.053**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-04**				**8.9**	
Total Building 171 Surface Soil			**5E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**3E-05**				**0.08**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-04**				**8.9**	
Total Surface Water and Sediment			**9E-05**				**3.6**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Adult Recreational User	Surface Soil Area near Bldg 166	Ingestion	3E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	6E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	3E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	4E-07	- -	- -	- -	0.005	- -
		Dermal Contact	2E-07	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	0.006	- -
	Surface Soil Area near Bldg 171	Ingestion	1E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	6E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-05	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	4E-07	- -	- -	- -	0.01	- -
		Dermal Contact	2E-07	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-07	- -	- -	- -	0.01	- -
	Surface Water Mainstream	Ingestion	3E-08	- -	- -	- -	0.0006	- -
		Dermal Contact	2E-08	- -	- -	- -	0.004	- -
		Total	5E-08	- -	- -	- -	0.005	- -
	Sediment Mainstream	Ingestion	3E-06	- -	- -	Arsenic	0.14	- -
		Dermal Contact	1E-06	- -	- -	- -	0.01	- -
		Total	4E-06	- -	- -	Arsenic	0.15	- -
	Surface Water Gully	Ingestion	6E-06	- -	- -	RDX	0.06	- -
		Dermal Contact	1E-04	- -	PAHs	RDX	0.12	- -
		Total	1E-04	- -	PAHs	RDX	0.2	- -
	Sediment Gully	Ingestion	1E-06	- -	- -	Arsenic	0.05	- -
		Dermal Contact	7E-07	- -	- -	- -	0.003	- -
		Total	2E-06	- -	- -	Arsenic	0.05	- -
	Groundwater	Ingestion	5E-05	- -	RDX	Arsenic	1.1	- -
		Dermal Contact	6E-07	- -	- -	- -	0.029	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-05	- -	RDX	Arsenic	1.1	- -
Total Building 166 Surface Soil			**9E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**5E-06**				**0.006**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-04**				**1.5**	
Total Building 171 Surface Soil			**3E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**2E-05**				**0.01**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-04**				**1.5**	
Total Surface Water and Sediment			**1E-04**				**0.4**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Total Recreational Risks	Surface Soil Area near Bldg 166	Ingestion	1E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	1E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	6E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	6E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	1E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
	Surface Soil Area near Bldg 171	Ingestion	4E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	5E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	1E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	4E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
	Surface Water Mainstream	Ingestion	2E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	NA	- -
	Sediment Mainstream	Ingestion	1E-05	- -	- -	Arsenic	NA	- -
		Dermal Contact	3E-06	- -	- -	Arsenic	NA	- -
		Total	1E-05	- -	Arsenic	- -	NA	- -
	Surface Water Gully	Ingestion	4E-05	- -	RDX	Arsenic	NA	- -
		Dermal Contact	1E-04	PAHs	- -	RDX	NA	- -
		Total	2E-04	PAHs	RDX	Arsenic	NA	- -
	Sediment Gully	Ingestion	5E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	2E-06	- -	- -	Arsenic	NA	- -
		Total	6E-06	- -	- -	Arsenic	NA	- -
	Groundwater	Ingestion	1E-04	RDX	- -	Arsenic	NA	- -
		Dermal Contact	9E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	RDX	- -	Arsenic	NA	- -
Total Building 166 Surface Soil			**2E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**1E-05**				**NA**	
Total Building 166 Surface Soil + GW+SW+SED			**4E-04**				**NA**	
Total Building 171 Surface Soil			**8E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**4E-05**				**NA**	
Total Building 171 Surface Soil + GW+SW+SED			**4E-04**				**NA**	
Total Surface Water and Sediment			**2E-04**				**NA**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Future Child Resident	Surface Soil Area near Bldg 166	Ingestion	1E-04	Aroclor-1248	- -	Dioxins/Furans	NA	- -
		Dermal Contact	4E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	Aroclor-1248	- -	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	5E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	7E-05	- -	Aroclor-1248	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	1E-05	- -	Arsenic	- -	0.63	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.03	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Arsenic	- -	0.67	- -
	Surface Soil Area near Bldg 171	Ingestion	4E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
		Dermal Contact	1E-04	Aroclor-1248	- -	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	2E-04	Aroclor-1248	- -	PAHs	NA	- -
		Dermal Contact	7E-05	- -	Aroclor-1248	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-04	Aroclor-1248	PAHs	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	1E-05	- -	Arsenic	- -	1	- -
		Dermal Contact	1E-06	- -	- -	Arsenic	0.04	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Arsenic	- -	1	- -
	Surface Water Mainstream	Ingestion	2E-07	- -	- -	- -	0.014	- -
		Dermal Contact	7E-09	- -	- -	- -	0.007	- -
		Total	2E-07	- -	- -	- -	0.02	- -
	Sediment Mainstream	Ingestion	7E-06	- -	- -	Arsenic	1.3	- -
		Dermal Contact	1E-06	- -	- -	- -	0.03	- -
		Total	8E-06	- -	- -	Arsenic	1.4	- -
	Surface Water Gully	Ingestion	4E-05	- -	- -	RDX	1.5	RDX
		Dermal Contact	4E-05	- -	PAHs	RDX	0.21	- -
		Total	8E-05	- -	PAHs	RDX	1.7	RDX
	Sediment Gully	Ingestion	3E-06	- -	- -	Arsenic	0.45	- -
		Dermal Contact	7E-07	- -	- -	- -	0.01	- -
		Total	4E-06	- -	- -	Arsenic	0.47	- -
	Groundwater	Ingestion	6E-04	RDX	Arsenic	2,4,6-TNT	52	TNT, 4-amino-2,6-dinitrotoluene, RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
		Dermal Contact	2E-06	- -	- -	RDX	0.3	- -
		Inhalation	NA	NA	NA	NA	NA	NA
		Total	6E-04	RDX	Arsenic	2,4,6-TNT	53	TNT, 4-amino-2,6-dinitrotoluene, RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
Total Building 166 Surface Soil			**1E-04**				**NA**	
Total Building 166 Surface/subsurface Soil			**9E-05**				**0.67**	
Total Building 166 Surface Soil + GW+SW+SED			**9E-04**				**57**	
Total Building 171 Surface Soil			**5E-04**				**NA**	
Total Building 171 Surface/subsurface Soil			**3E-04**				**1.1**	
Total Building 171 Surface Soil + GW+SW+SED			**1E-03**				**57**	
Total Surface Water and Sediment			**9E-05**				**3.6**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Future Adult Resident	Surface Soil Area near Bldg 166	Ingestion	4E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	7E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	1E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	5E-06	- -	- -	Arsenic	0.07	- -
		Dermal Contact	6E-07	- -	- -	- -	0.005	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Arsenic	0.07	- -
	Surface Soil Area near Bldg 171	Ingestion	2E-04	Aroclor-1248	- -	Dioxins/Furans, PAHs	NA	- -
		Dermal Contact	9E-05	- -	Aroclor-1248	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-04	Aroclor-1248	- -	Dioxins/Furans, PAHs	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	8E-05	- -	Aroclor-1248	PAHs	NA	- -
		Dermal Contact	4E-05	- -	Aroclor-1248	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	Aroclor-1248	- -	PAHs	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	6E-06	- -	- -	Arsenic	0.11	- -
		Dermal Contact	7E-07	- -	- -	- -	0.006	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	7E-06	- -	- -	Arsenic	0.12	- -
	Surface Water Mainstream	Ingestion	3E-08	- -	- -	- -	0.0006	- -
		Dermal Contact	2E-08	- -	- -	- -	0.004	- -
		Total	5E-08	- -	- -	- -	0.005	- -
	Sediment Mainstream	Ingestion	3E-06	- -	- -	Arsenic	0.14	- -
		Dermal Contact	7E-07	- -	- -	- -	0.01	- -
		Total	4E-06	- -	- -	Arsenic	0.15	- -
	Surface Water Gully	Ingestion	6E-06	- -	- -	RDX	0.06	- -
		Dermal Contact	1E-04	- -	PAHs	RDX	0.12	- -
		Total	1E-04	- -	PAHs	RDX	0.2	- -
	Sediment Gully	Ingestion	1E-06	- -	- -	Arsenic	0.05	- -
		Dermal Contact	4E-07	- -	- -	- -	0.002	- -
		Total	2E-06	- -	- -	Arsenic	0.05	- -
	Groundwater	Ingestion	7E-04	RDX	Arsenic	2,4,6-TNT	15	RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
		Dermal Contact	4E-06	- -	- -	RDX	0.2	- -
		Inhalation	NA	- -	- -	- -	NA	NA
		Total	7E-04	RDX	Arsenic	2,4,6-TNT	15	RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
Total Building 166 Surface Soil			**7E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**4E-05**				**0.073**	
Total Building 166 Surface Soil + GW+SW+SED			**9E-04**				**16**	
Total Building 171 Surface Soil			**2E-04**				**NA**	
Total Building 171 Surface/subsurface Soil			**1E-04**				**0.12**	
Total Building 171 Surface Soil + GW+SW+SED			**1E-03**				**16**	
Total Surface Water and Sediment			**1E-04**				**0.4**	

TABLE 7-18

SUMMARY OF CANCER RISKS AND HAZARD INDICES - REASONABLE MAXIMUM EXPOSURE (RME)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Total Residential Risks	Surface Soil Area near Bldg 166	Ingestion	1E-04	Aroclor-1248	- -	Dioxins/Furans	NA	- -
		Dermal Contact	6E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-04	Aroclor-1248	- -	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	7E-05	- -	Aroclor-1248	Dioxins/Furans	NA	- -
		Dermal Contact	3E-05	- -	Aroclor-1248	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	Aroclor-1248	- -	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	2E-05	- -	Arsenic	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	Arsenic	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Arsenic	- -	NA	- -
	Surface Soil Area near Bldg 171	Ingestion	5E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
		Dermal Contact	2E-04	Aroclor-1248	- -	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	3E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
		Dermal Contact	1E-04	Aroclor-1248	- -	PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-04	Aroclor-1248	PAHs	Dioxins/Furans	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	2E-05	- -	Arsenic	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	Arsenic	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Arsenic	- -	NA	- -
	Surface Water Mainstream	Ingestion	2E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-08	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	NA	- -
	Sediment Mainstream	Ingestion	1E-05	- -	- -	Arsenic	NA	- -
		Dermal Contact	2E-06	- -	- -	Arsenic	NA	- -
		Total	1E-05	- -	Arsenic	- -	NA	- -
	Surface Water Gully	Ingestion	4E-05	- -	RDX	Arsenic	NA	- -
		Dermal Contact	1E-04	PAHs	- -	RDX	NA	- -
		Total	2E-04	PAHs	RDX	Arsenic	NA	- -
	Sediment Gully	Ingestion	5E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	1E-06	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Arsenic	NA	- -
	Groundwater	Ingestion	1E-03	RDX	Arsenic	2,4,6-TNT	NA	- -
		Dermal Contact	6E-06	- -	- -	RDX	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-03	RDX	Arsenic	2,4,6-TNT	NA	- -
Total Building 166 Surface Soil			**2E-04**				**NA**	
Total Building 166 Surface/subsurface Soil			**1E-04**				**NA**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-03**				**NA**	
Total Building 171 Surface Soil			**8E-04**				**NA**	
Total Building 171 Surface/subsurface Soil			**4E-04**				**NA**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-03**				**NA**	
Total Surface Water and Sediment			**2E-04**				**NA**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface and Subsurface Soil Area near Bldg 166	Ingestion	7E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	2E-07	- -	- -	- -	0.048	- -
		Dermal Contact	9E-09	- -	- -	- -	0.002	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	0.050	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	2E-07	- -	- -	- -	0.08	- -
		Dermal Contact	1E-08	- -	- -	- -	0.002	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	0.08	- -
	Groundwater	Ingestion	NA	- -	- -	- -	NA	NA
		Dermal Contact	3E-08	- -	- -	- -	0.08	- -
		Inhalation	NA	- -	- -	- -	NA	NA
		Total	3E-08	- -	- -	- -	0.08	
Total Building 166 Soil			**1E-06**				**0.05**	
Total Building 166 Soil + Groundwater			**1E-06**				**0.13**	
Total Building 171 Soil			**3E-06**				**0.08**	
Total Building 171 Soil + Groundwater			**3E-06**				**0.16**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Maintenance Worker	Surface Soil Area near Bldg 166	Ingestion	3E-07	- -	- -	- -	NA	- -
		Dermal Contact	5E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	3E-08	- -	- -	- -	0.001	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00003	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	0.001	- -
	Surface Soil Area near Bldg 171	Ingestion	1E-06	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	5E-07	- -	- -	- -	NA	- -
		Dermal Contact	9E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	4E-08	- -	- -	- -	0.002	- -
		Dermal Contact	1E-09	- -	- -	- -	0.00004	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	0.002	- -
	Surface Water Mainstream	Ingestion	NA	- -	- -	- -	NA	- -
		Dermal Contact	3E-10	- -	- -	- -	0.0001	- -
		Total	3E-10	- -	- -	- -	0.0001	- -
	Sediment Mainstream	Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	1E-08	- -	- -	- -	0.00	- -
		Total	3E-07	- -	- -	- -	0.03	- -
	Surface Water Gully	Ingestion	NA	- -	- -	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	PAHs	0.007	- -
		Total	2E-06	- -	- -	PAHs	0.007	- -
	Sediment Gully	Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.000	- -
		Total	1E-07	- -	- -	- -	0.01	- -
		Total Building 166 Surface Soil	**3E-07**				**NA**	
		Total Building 166 Surface/subsurface Soil	**2E-07**				**0.001**	
		Total Building 166 Surface Soil+SW+SED	**2E-06**				**0.05**	
		Total Building 171 Surface Soil	**1E-06**				**NA**	
		Total Building 171 Surface/subsurface Soil	**6E-07**				**0.002**	
		Total Building 171 Surface Soil+SW+SED	**3E-06**				**0.05**	
		Total Surface Water and Sediment	**2E-06**				**0.05**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Occupational Worker	Surface Soil	Ingestion	5E-06	- -	- -	Aroclor-1248	NA	- -
	Area near Bldg 166	Dermal Contact	9E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and	Ingestion	3E-06	- -	- -	Aroclor-1248	NA	- -
	Subsurface Soil	Dermal Contact	5E-07	- -	- -	- -	NA	- -
	Area near Bldg 166	Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and	Ingestion	6E-07	- -	- -	- -	0.02	- -
	Subsurface Soil	Dermal Contact	2E-08	- -	- -	- -	0.001	- -
	Bldg 166	Inhalation	NA	- -	- -	- -	NA	- -
	Historical Data	Total	7E-07	- -	- -	- -	0.02	- -
	Surface Soil	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
	Area near Bldg 171	Dermal Contact	3E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and	Ingestion	9E-06	- -	- -	Aroclor-1248	NA	- -
	Subsurface Soil	Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
	Area near Bldg 171	Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and	Ingestion	7E-07	- -	- -	- -	0.03	- -
	Subsurface Soil	Dermal Contact	3E-08	- -	- -	- -	0.001	- -
	Bldg 171	Inhalation	NA	- -	- -	- -	NA	- -
	Historical Data	Total	7E-07	- -	- -	- -	0.04	- -
	Groundwater	Ingestion	8E-05	- -	RDX	- -	4.7	RDX
		Dermal Contact	1E-07	- -	- -	- -	0.02	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-05	- -	RDX	- -	4.7	RDX
Total Building 166 Surface Soil			**6E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**4E-06**				**0.02**	
Total Building 166 Surface Soil + Groundwater			**9E-05**				**4.7**	
Total Building 171 Surface Soil			**2E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**1E-05**				**0.04**	
Total Building 171 Surface Soil + Groundwater			**1E-04**				**4.7**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Trespasser	Surface Soil Area near Bldg 166	Ingestion	6E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	3E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	7E-08	- -	- -	- -	0.002	- -
		Dermal Contact	5E-09	- -	- -	- -	0.0001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-08	- -	- -	- -	0.002	- -
	Surface Soil Area near Bldg 171	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	7E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	1E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	4E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	8E-08	- -	- -	- -	0.003	- -
		Dermal Contact	6E-09	- -	- -	- -	0.0001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-08	- -	- -	- -	0.003	- -
	Surface Water Mainstream	Ingestion	1E-08	- -	- -	- -	0.0006	- -
		Dermal Contact	8E-10	- -	- -	- -	0.0003	- -
		Total	1E-08	- -	- -	- -	0.0009	- -
	Sediment Mainstream	Ingestion	3E-07	- -	- -	- -	0.03	- -
		Dermal Contact	4E-08	- -	- -	- -	0.0007	- -
		Total	3E-07	- -	- -	- -	0.03	- -
	Surface Water Gully	Ingestion	3E-06	- -	- -	RDX	0.07	- -
		Dermal Contact	5E-06	- -	- -	PAHs	0.01	- -
		Total	8E-06	- -	- -	RDX, PAHs	0.07	- -
	Sediment Gully	Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	3E-08	- -	- -	- -	0.0003	- -
		Total	2E-07	- -	- -	- -	0.01	- -
Total Building 166 Surface Soil			**8E-07**				**NA**	
Total Building 166 Surface/subsurface Soil			**5E-07**				**0.002**	
Total Building 166 Surface Soil +Surface Water/Sediment			**9E-06**				**0.12**	
Total Building 171 Surface Soil			**3E-06**				**NA**	
Total Building 171 Surface/subsurface Soil			**2E-06**				**0.003**	
Total Building 171 Surface Soil +Surface Water/Sediment			**1E-05**				**0.12**	
Total Surface Water and Sediment			**8E-06**				**0.12**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Child Recreational User	Surface Soil Area near Bldg 166	Ingestion	6E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	3E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	8E-08	- -	- -	- -	0.01	- -
		Dermal Contact	6E-09	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-08	- -	- -	- -	0.01	- -
	Surface Soil Area near Bldg 171	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	8E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	1E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	4E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	9E-08	- -	- -	- -	0.02	- -
		Dermal Contact	7E-09	- -	- -	- -	0.0007	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-08	- -	- -	- -	0.02	- -
	Surface Water Mainstream	Ingestion	1E-08	- -	- -	- -	0.003	- -
		Dermal Contact	9E-10	- -	- -	- -	0.002	- -
		Total	2E-08	- -	- -	- -	0.005	- -
	Sediment Mainstream	Ingestion	6E-07	- -	- -	- -	0.33	- -
		Dermal Contact	5E-08	- -	- -	- -	0.004	- -
		Total	6E-07	- -	- -	- -	0.34	- -
	Surface Water Gully	Ingestion	3E-06	- -	- -	RDX	0.37	- -
		Dermal Contact	5E-06	- -	- -	PAHs	0.06	- -
		Total	8E-06	- -	- -	RDX, PAHs	0.4	- -
	Sediment Gully	Ingestion	3E-07	- -	- -	- -	0.11	- -
		Dermal Contact	3E-08	- -	- -	- -	0.002	- -
		Total	3E-07	- -	- -	- -	0.11	- -
	Groundwater	Ingestion	1E-05	- -	RDX	- -	2.6	RDX
		Dermal Contact	4E-08	- -	- -	- -	0.02	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	RDX	- -	2.6	RDX
Total Building 166 Surface Soil			**9E-07**				**NA**	
Total Building 166 Surface/subsurface Soil			**5E-07**				**0.01**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-05**				**3.5**	
Total Building 171 Surface Soil			**3E-06**				**NA**	
Total Building 171 Surface/subsurface Soil			**2E-06**				**0.02**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-05**				**3.5**	
Total Surface Water and Sediment			**9E-06**				**0.9**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Adult Recreational User	Surface Soil Area near Bldg 166	Ingestion	2E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	3E-08	- -	- -	- -	0.001	- -
		Dermal Contact	3E-09	- -	- -	- -	0.0001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-08	- -	- -	- -	0.001	- -
	Surface Soil Area near Bldg 171	Ingestion	8E-07	- -	- -	- -	NA	- -
		Dermal Contact	4E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	3E-08	- -	- -	- -	0.002	- -
		Dermal Contact	3E-09	- -	- -	- -	0.0001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-08	- -	- -	- -	0.002	- -
	Surface Water Mainstream	Ingestion	2E-09	- -	- -	- -	0.0001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.001	- -
		Total	4E-09	- -	- -	- -	0.001	- -
	Sediment Mainstream	Ingestion	2E-07	- -	- -	- -	0.04	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0006	- -
		Total	2E-07	- -	- -	- -	0.04	- -
	Surface Water Gully	Ingestion	5E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1E-05	- -	PAHs	- -	0.03	- -
		Total	1E-05	- -	PAHs	- -	0.05	- -
	Sediment Gully	Ingestion	1E-07	- -	- -	- -	0.012	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0002	- -
		Total	1E-07	- -	- -	- -	0.01	- -
	Groundwater	Ingestion	8E-06	- -	- -	RDX	0.6	- -
		Dermal Contact	7E-08	- -	- -	- -	0.01	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	8E-06	- -	- -	RDX	0.57	- -
Total Building 166 Surface Soil			**4E-07**				**NA**	
Total Building 166 Surface/subsurface Soil			**2E-07**				**0.001**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-05**				**0.67**	
Total Building 171 Surface Soil			**1E-06**				**NA**	
Total Building 171 Surface/subsurface Soil			**7E-07**				**0.002**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-05**				**0.67**	
Total Surface Water and Sediment			**1E-05**				**0.1**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Total Recreational Risks	Surface Soil Area near Bldg 166	Ingestion	9E-07	- -	- -	- -	NA	- -
		Dermal Contact	4E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	2E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-07	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	9E-09	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Surface Soil Area near Bldg 171	Ingestion	3E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	4E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	6E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	1E-07	- -	- -	- -	NA	- -
		Dermal Contact	1E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-07	- -	- -	- -	NA	- -
	Surface Water Mainstream	Ingestion	2E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-09	- -	- -	- -	NA	- -
		Total	2E-08	- -	- -	- -	NA	- -
	Sediment Mainstream	Ingestion	8E-07	- -	- -	- -	NA	- -
		Dermal Contact	7E-08	- -	- -	- -	NA	- -
		Total	9E-07	- -	- -	- -	NA	- -
	Surface Water Gully	Ingestion	4E-06	- -	- -	RDX	NA	- -
		Dermal Contact	2E-05	- -	PAHs	- -	NA	- -
		Total	2E-05	- -	PAHs	RDX	NA	- -
	Sediment Gully	Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	4E-08	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Groundwater	Ingestion	2E-05	- -	RDX	- -	NA	- -
		Dermal Contact	1E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	RDX	- -	NA	- -
Total Building 166 Surface Soil			**1E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**7E-07**				**NA**	
Total Building 166 Surface Soil + GW+SW+SED			**4E-05**				**NA**	
Total Building 171 Surface Soil			**4E-06**				**NA**	
Total Building 171 Surface/subsurface Soil			**2E-06**				**NA**	
Total Building 171 Surface Soil + GW+SW+SED			**4E-05**				**NA**	
Total Surface Water and Sediment			**2E-05**				**NA**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Future Child Resident	Surface Soil Area near Bldg 166	Ingestion	1E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	6E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	9E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	7E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	1E-06	- -	- -	Arsenic	0.21	- -
		Dermal Contact	5E-08	- -	- -	- -	0.004	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-06	- -	- -	Arsenic	0.22	- -
	Surface Soil Area near Bldg 171	Ingestion	4E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	6E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	3E-06	- -	- -	Aroclor-1248, PAHs	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	2E-06	- -	- -	Arsenic	0.34	- -
		Dermal Contact	5E-08	- -	- -	- -	0.005	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	0.35	- -
	Surface Water Mainstream	Ingestion	1E-08	- -	- -	- -	0.003	- -
		Dermal Contact	9E-10	- -	- -	- -	0.002	- -
		Total	2E-08	- -	- -	- -	0.005	- -
	Sediment Mainstream	Ingestion	6E-07	- -	- -	- -	0.33	- -
		Dermal Contact	4E-08	- -	- -	- -	0.00	- -
		Total	6E-07	- -	- -	- -	0.34	- -
	Surface Water Gully	Ingestion	3E-06	- -	- -	RDX	0.37	- -
		Dermal Contact	5E-06	- -	- -	PAHs	0.06	- -
		Total	8E-06	- -	- -	RDX, PAHs	0.4	- -
	Sediment Gully	Ingestion	3E-07	- -	- -	- -	0.11	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Total	3E-07	- -	- -	- -	0.11	- -
	Groundwater	Ingestion	6E-05	- -	RDX	Arsenic	15	RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
		Dermal Contact	3E-07	- -	- -	- -	0.16	- -
		Inhalation	NA	- -	- -	- -	NA	NA
		Total	6E-05	- -	RDX	Arsenic	16	RDX, Iron, Lithium, Manganese, Nitrate/Nitrite
Total Building 166 Surface Soil			**1E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**8E-06**				**0.22**	
Total Building 166 Surface Soil + GW+SW+SED			**9E-05**				**17**	
Total Building 171 Surface Soil			**5E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**2E-05**				**0.3**	
Total Building 171 Surface Soil + GW+SW+SED			**1E-04**				**17**	
Total Surface Water and Sediment			**9E-06**				**0.9**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Future Adult Resident	Surface Soil Area near Bldg 166	Ingestion	4E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	7E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	2E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	3E-07	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	5E-07	- -	- -	- -	0.02	- -
		Dermal Contact	2E-08	- -	- -	- -	0.0005	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	5E-07	- -	- -	- -	0.02	- -
	Surface Soil Area near Bldg 171	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	8E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-06	- -	- -	- -	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	6E-07	- -	- -	- -	0.04	- -
		Dermal Contact	2E-08	- -	- -	- -	0.001	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-07	- -	- -	- -	0.04	- -
	Surface Water Mainstream	Ingestion	2E-09	- -	- -	- -	0.0001	- -
		Dermal Contact	2E-09	- -	- -	- -	0.001	- -
		Total	4E-09	- -	- -	- -	0.001	- -
	Sediment Mainstream	Ingestion	2E-07	- -	- -	- -	0.04	- -
		Dermal Contact	1E-08	- -	- -	- -	0.0004	- -
		Total	2E-07	- -	- -	- -	0.04	- -
	Surface Water Gully	Ingestion	5E-07	- -	- -	- -	0.02	- -
		Dermal Contact	1E-05	- -	PAHs	- -	0.03	- -
		Total	1E-05	- -	PAHs	- -	0.05	- -
	Sediment Gully	Ingestion	1E-07	- -	- -	- -	0.01	- -
		Dermal Contact	9E-09	- -	- -	- -	0.0002	- -
		Total	1E-07	- -	- -	- -	0.01	- -
	Groundwater	Ingestion	1E-04	- -	RDX	Arsenic	7.0	RDX, Manganese
		Dermal Contact	6E-07	- -	- -	- -	0.09	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	1E-04	- -	RDX	Arsenic	7.1	RDX, Manganese
Total Building 166 Surface Soil			**5E-06**				**NA**	
Total Building 166 Surface/subsurface Soil			**3E-06**				**0.02**	
Total Building 166 Surface Soil + GW+SW+SED			**1E-04**				**7**	
Total Building 171 Surface Soil			**2E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**9E-06**				**0.04**	
Total Building 171 Surface Soil + GW+SW+SED			**1E-04**				**7**	
Total Surface Water and Sediment			**1E-05**				**0.1**	

TABLE 7-19

SUMMARY OF CANCER RISKS AND HAZARD INDICES - CENTRAL TENEDENCY EXPOSURE (CTE)
SWMU 13 MINE FILL B
NSWC CRANE, CRANE, INDIANA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 1E-4	Chemicals with Cancer Risks > 1E-5 and ≤ 1E-4	Chemicals with Cancer Risks > 1E-6 and ≤ 1E-5	Hazard Index	Chemicals with HI > 1
Total Residential Risks	Surface Soil Area near Bldg 166	Ingestion	2E-05	- -	Aroclor-1248	- -	NA	- -
		Dermal Contact	2E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-05	- -	Aroclor-1248	- -	NA	- -
	Surface and Subsurface Soil Area near Bldg 166	Ingestion	8E-06	- -	- -	Aroclor-1248	NA	- -
		Dermal Contact	1E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	9E-06	- -	- -	Aroclor-1248	NA	- -
	Surface and Subsurface Soil Bldg 166 Historical Data	Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	6E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
	Surface Soil Area near Bldg 171	Ingestion	6E-05	- -	Aroclor-1248	PAHs	NA	- -
		Dermal Contact	9E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	6E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Area near Bldg 171	Ingestion	3E-05	- -	Aroclor-1248	PAHs	NA	- -
		Dermal Contact	4E-06	- -	- -	Aroclor-1248	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	3E-05	- -	Aroclor-1248	PAHs	NA	- -
	Surface and Subsurface Soil Bldg 171 Historical Data	Ingestion	2E-06	- -	- -	Arsenic	NA	- -
		Dermal Contact	7E-08	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-06	- -	- -	Arsenic	NA	- -
	Surface Water Mainstream	Ingestion	2E-08	- -	- -	- -	NA	- -
		Dermal Contact	3E-09	- -	- -	- -	NA	- -
		Total	2E-08	- -	- -	- -	NA	- -
	Sediment Mainstream	Ingestion	8E-07	- -	- -	- -	NA	- -
		Dermal Contact	5E-08	- -	- -	- -	NA	- -
		Total	8E-07	- -	- -	- -	NA	- -
	Surface Water Gully	Ingestion	4E-06	- -	- -	RDX	NA	- -
		Dermal Contact	2E-05	- -	PAHs	- -	NA	- -
		Total	2E-05	- -	PAHs	RDX	NA	- -
	Sediment Gully	Ingestion	4E-07	- -	- -	- -	NA	- -
		Dermal Contact	3E-08	- -	- -	- -	NA	- -
		Total	4E-07	- -	- -	- -	NA	- -
	Groundwater	Ingestion	2E-04	RDX	- -	Arsenic	NA	- -
		Dermal Contact	1E-06	- -	- -	- -	NA	- -
		Inhalation	NA	- -	- -	- -	NA	- -
		Total	2E-04	RDX	- -	Arsenic	NA	- -
Total Building 166 Surface Soil			**2E-05**				**NA**	
Total Building 166 Surface/subsurface Soil			**1E-05**				**NA**	
Total Building 166 Surface Soil + GW+SW+SED			**2E-04**				**NA**	
Total Building 171 Surface Soil			**6E-05**				**NA**	
Total Building 171 Surface/subsurface Soil			**3E-05**				**NA**	
Total Building 171 Surface Soil + GW+SW+SED			**2E-04**				**NA**	
Total Surface Water and Sediment			**2E-05**				**NA**	

TABLE 7-20

COMPARISON OF MAINSTREAM AND ES/DI BOGGS CREEK SEDIMENT SAMPLES WITH HUMAN HEALTH SCREENING CONCENTRATIONS
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

		RFI DATA				ES/DI DATA					
CAS Number	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations [1]**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations [2]**	**EPA Region 9 PRG (Residential)[3]**	**IDEM Closure Level[4]**
Inorganics(mg/kg)											
7429-90-5	Aluminum	**11500** J	**13700** J	5/5	14400 J - 22100 J	4020 J	**9680** J	5/5	4370 - 10700	7600 N	NA
7440-36-0	Antimony	1.9 J	**4.7** J	5/5	1.8 J - 2.1 J	ND	ND	0/5	1.4	3.1 N	140
7440-38-2	Arsenic	**23.9** J	**56.9** J	5/5	25.6 J - 33.3 J	**5.9** J	**11.7** J	5/5	6.8 - 8.8	0.39 C	3.9
7440-39-3	Barium	77.4 J	207 J	5/5	90.8 J - 137 J	39.2 J	77.5 J	5/5	30.6 - 64.8	540 N	23000
7440-41-7	Beryllium	1.9 J	3.7 J	5/5	2 J - 2.3 J	0.52 J	0.99	5/5	0.48 - 1	15 N	680
7440-43-9	Cadmium	**9.4** J	**17.1** J	5/5	1.8 J - 4.3 J	0.61	**5.1**	5/5	0.12 - 0.31	3.7 N	12
7440-70-2	Calcium	1290 J	12200 J	5/5	2010 J - 2500 J	367 J	1980 J	5/5	1120 - 1090	NA	NA
7440-47-3	Chromium	51.7 J	192 J	5/5	49.1 J - 77.2 J	15.6 J	29.5 J	5/5	15.3 - 24.6	210 C	430
7440-48-4	Cobalt	19 J	29.9 J	5/5	20.4 J - 27.5 J	7.2 J	17.8 J	5/5	7.8 - 17.3	140 N	NA
7440-50-8	Copper	16.4 J	18.4 J	5/5	18.4 J - 22 J	4.7 J	13.3 J	5/5	5.9 - 10.8	310 N	13000
7439-89-6	Iron	**89600** J	**299000** J	5/5	120000 J - 121000 J	**16600** J	**33600** J	5/5	18700 - 25700	2300 N	NA
7439-92-1	Lead	25.6 J	45.6 J	5/5	20.6 J - 25.2 J	8.3 J	24.3 J	5/5	7.5 - 19.9	400	400
7439-95-4	Magnesium	610 J	2110 J	5/5	1490 J - 1940 J	336 J	913 J	5/5	386 - 913	NA	NA
7439-96-5	Manganese	**1450** J	**3960** J	5/5	1250 J - 1330 J	**456**	**1090**	5/5	490 - 380	180 N	NA
7439-97-6	Mercury	0.016 J	0.016 J	1/5	0.021 J	ND	ND	0/5	ND	2.3 N	100
7440-02-0	Nickel	35.8 J	47.8 J	5/5	41.5 J - 54.1 J	11.1 J	21.6 J	5/5	10.5 - 21.6	160 N	6900
7440-09-7	Potassium	452 J	1680 J	5/5	2080 J - 3190 J	456 J	1160 J	5/5	548 - 1140	NA	NA
7782-49-2	Selenium	0.62 J	1.5 J	5/5	0.48 J - 0.85 J	0.15 J	0.33 J	5/5	0.19 - 0.35	39 N	1700
7440-22-4	Silver	ND	ND	0/5	ND	0.06 J	1	4/5	1.9E+00	39 N	
7440-23-5	Sodium	91.1 J	298 J	3/5	92.3 J - 126 J	7.2 J	23.9 J	4/5	2.4E+01	NA	NA
7440-28-0	Thallium	ND	ND	0/5	ND	0.12 J	0.16 J	5/5	ND	0.52 N	
7440-32-6	Titanium	65.6 J	65.6 J	1/1	26.4 J	NA	NA	NA	NA	31000 N	NA
7440-62-2	Vanadium	**48.3** J	**101** J	5/5	47.6 J - 61.6 J	**16.4** J	**28.8** J	5/5	14.8 - 26.7	7.8 N	NA
7440-66-6	Zinc	121 J	195 J	5/5	73.1 J - 98.3 J	28.2 J	175 J	5/5	23.6 - 45.9	2300 N	100000

Shaded cell indicates that the concentration exceeds one or more human health screening concentration.

Footnotes

1 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).

2 - Concentrations at upgradient locations 13SD3601 and 13SD3701.

3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).

4 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:

C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.

TABLE 7-21

COMPARISON OF MAINSTREAM AND ES/DI TURKEY CREEK SEDIMENT SAMPLES WITH HUMAN HEALTH SCREENING CONCENTRATIONS
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

		RFI DATA				ES/DI DATA				
CAS Number	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations [1]**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**EPA Region 9 PRG (Residential)[2]**	**IDEM Closure Level[3]**
Inorganics(mg/kg)										
7429-90-5	Aluminum	**11500** J	**13700** J	5/5	14400 J - 22100 J	5360 J	**30500** J	3/3	7600 N	NA
7440-36-0	Antimony	1.9 J	**4.7** J	5/5	1.8 J - 2.1 J	ND	ND	0/3	3.1 N	140
7440-38-2	Arsenic	**23.9** J	**56.9** J	5/5	25.6 J - 33.3 J	**4.5** J	**10.5** J	3/3	0.39 C	3.9
7440-39-3	Barium	77.4 J	207 J	5/5	90.8 J - 137 J	51.6 J	127 J	3/3	540 N	23000
7440-41-7	Beryllium	1.9 J	3.7 J	5/5	2 J - 2.3 J	0.43 J	1.4	3/3	15 N	680
7440-43-9	Cadmium	**9.4** J	**17.1** J	5/5	1.8 J - 4.3 J	0.17 J	**8.4** J	3/3	3.7 N	12
7440-70-2	Calcium	1290 J	12200 J	5/5	2010 J - 2500 J	703 J	1920 J	3/3	NA	NA
7440-47-3	Chromium	51.7 J	192 J	5/5	49.1 J - 77.2 J	11.8 J	38.4 J	3/3	210 C	430
7440-48-4	Cobalt	19 J	29.9 J	5/5	20.4 J - 27.5 J	7 J	11.8 J	3/3	140 N	NA
7440-50-8	Copper	16.4 J	18.4 J	5/5	18.4 J - 22 J	6.3 J	245 J	3/3	310 N	13000
7439-89-6	Iron	**89600** J	**299000** J	5/5	120000 J - 121000 J	**14100** J	**36000** J	3/3	2300 N	NA
7439-92-1	Lead	25.6 J	45.6 J	5/5	20.6 J - 25.2 J	9.4 J	35.6 J	3/3	400	400
7439-95-4	Magnesium	610 J	2110 J	5/5	1490 J - 1940 J	565 J	2660 J	3/3	NA	NA
7439-96-5	Manganese	**1450** J	**3960** J	5/5	1250 J - 1330 J	**444**	**564**	3/3	180 N	NA
7439-97-6	Mercury	0.016 J	0.016 J	1/5	0.021 J	ND	ND	0/3	2.3 N	100
7440-02-0	Nickel	35.8 J	47.8 J	5/5	41.5 J - 54.1 J	10.7 J	31.7 J	3/3	160 N	6900
7440-09-7	Potassium	452 J	1680 J	5/5	2080 J - 3190 J	748 J	3740 J	3/3	NA	NA
7782-49-2	Selenium	0.62 J	1.5 J	5/5	0.48 J - 0.85 J	0.13 J	0.49 J	3/3	39 N	1700
7440-22-4	Silver	ND	ND	0/5	ND	0.78 J	0.78 J	1/3	39 N	1700
7440-23-5	Sodium	91.1 J	298 J	3/5	92.3 J - 126 J	61.9 J	61.9 J	1/3	NA	NA
7440-28-0	Thallium	ND	ND	0/5	ND	0.43 J	0.43 J	1/3	0.52 N	24
7440-31-5	Tin	NA	NA	NA	NA	3 J	3 J	1/3	4700 N	NA
7440-32-6	Titanium	65.6 J	65.6 J	1/1	26.4 J	NA	NA	0/3	31000 N	NA
7440-62-2	Vanadium	**48.3** J	**101** J	5/5	47.6 J - 61.6 J	**14** J	**46.8** J	3/3	7.8 N	NA
7440-66-6	Zinc	121 J	195 J	5/5	73.1 J - 98.3 J	27.2 J	262 J	3/3	2300 N	100000

Shaded cell indicates that the concentration exceeds one or more human health screening concentration.

Footnotes

1 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).

2 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).

3 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:

C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.

TABLE 7-22

COMPARISON OF GULLY AND ES/DI BOGGS CREEK SEDIMENT SAMPLES WITH HUMAN HEALTH SCREENING CONCENTRATIONS
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

		RFI DATA				ES/DI DATA					
CAS Number	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations[1]**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations [2]**	**EPA Region 9 PRG (Residential)[3]**	**IDEM Closure Level[4]**
Inorganics (mg/kg)											
7429-90-5	Aluminum	1480	**18500**	30/30	13400 J - 17100 J	4020 J	**9680** J	5/5	4370 - 10700	7600 N	NA
7440-36-0	Antimony	0.8 J	2.3 J	10/30	0.98 J - 1.1 J	ND	ND	0/5	1.4E+00	3.1 N	140
7440-38-2	Arsenic	**3.7** J	**58.2** J	29/30	22.2 J - 28.7 J	**5.9** J	**11.7** J	5/5	6.8 - 8.8	0.39 C	3.9
7440-39-3	Barium	28.5 J	**693** J	30/30	129 J - 199 J	39.2 J	77.5 J	5/5	30.6 - 64.8	540 N	23000
7440-41-7	Beryllium	0.53 J	4.3 J	26/30	2 J - 2.1 J	0.52 J	0.99	5/5	0.48 - 1	15 N	680
7440-43-9	Cadmium	0.41 J	**4.1** J	20/30	0.59 J - 0.63 J	0.61	**5.1**	5/5	0.12 - 0.31	3.7 N	12
7440-70-2	Calcium	766 J	89700 J	30/30	799 J - 845 J	367 J	1980 J	5/5	1120 - 1090	NA	NA
7440-47-3	Chromium	7.9 J	**228** J	30/30	38.7 J - 55 J	15.6 J	29.5 J	5/5	15.3 - 24.6	210 C	430
7440-48-4	Cobalt	1.8 J	107 J	30/30	31.3 J - 40.7 J	7.2 J	17.8 J	5/5	7.8 - 17.3	140 N	NA
7440-50-8	Copper	7 J	52.1 J	30/30	17.3 J - 27.8 J	4.7 J	13.3 J	5/5	5.9 - 10.8	310 N	13000
7439-89-6	Iron	1990 J	**195000** J	30/30	93700 J - 112000 J	**16600** J	**33600** J	5/5	18700 - 25700	2300 N	NA
7439-92-1	Lead	4.2 J	**521** J	30/30	35.7 J - 37.2 J	8.3 J	24.3 J	5/5	7.5 - 19.9	400	400
7439-93-2	Lithium	2.1 J	38.8 J	23/23	ND	NA	NA	NA	NA	160 N	NA
7439-95-4	Magnesium	292 J	7540 J	30/30	1470 J - 1580 J	336 J	913 J	5/5	386 - 913	NA	NA
7439-96-5	Manganese	65.3 J	**6130** J	30/30	2570 J - 3240 J	**456**	**1090**	5/5	490 - 380	180 N	NA
7439-97-6	Mercury	0.013 J	0.16 J	19/30	0.026 J	ND	ND	0/5	ND	2.3 N	100
7440-02-0	Nickel	7.9 J	83.9 J	30/30	33.5 J - 36.6 J	11.1 J	21.6 J	5/5	10.5 - 21.6	160 N	6900
7440-09-7	Potassium	252 J	2390 J	30/30	1340 J - 2000 J	456 J	1160 J	5/5	548 - 1140	NA	NA
7782-49-2	Selenium	0.18 J	1.1 J	22/30	0.56 J - 0.61 J	0.15 J	0.33 J	5/5	0.19 - 0.35	39 N	1700
7440-22-4	Silver	ND	ND	0/30	ND	0.06 J	1	4/5	1.9E+00	39 N	1700
7440-23-5	Sodium	31.7 J	334 J	5/30	31.6 J - 183 J	7.2 J	23.9 J	4/5	2.4E+01	NA	NA
7440-24-6	Strontium	4.1 J	77.1 J	23/23	ND	NA	NA	NA	NA	4700 N	NA
7440-28-0	Thallium	ND	ND	0/30	ND	0.12 J	0.16 J	5/5	ND	0.52 N	24
7440-31-5	Tin	0.52 J	12 J	9/30	ND	NA	NA	NA	NA	4700 N	NA
7440-32-6	Titanium	13.8 J	164 J	28/28	40.9 J	NA	NA	NA	NA	31000 N	NA
7440-62-2	Vanadium	**11.8** J	**144** J	30/30	46.2 J - 53.8 J	**16.4** J	**28.8** J	5/5	14.8 - 26.7	7.8 N	NA
7440-66-6	Zinc	7.9 J	541 J	25/30	72.8 J - 79.7 J	28.2 J	175 J	5/5	23.6 - 45.9	2300 N	100000

Shaded cell indicates that the concentration exceeds one or more human health screening concentration.

Footnotes

1 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).

2 - Concentrations at upgradient locations 13SD3601 and 13SD3701.

3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).

4 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:

C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.

TABLE 7-23

COMPARISON OF GULLY AND ES/DI TURKEY CREEK SEDIMENT SAMPLES WITH HUMAN HEALTH SCREENING CONCENTRATIONS
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

		RFI DATA				ES/DI DATA				
CAS Number	**Chemical**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**Upgradient Sample Concentrations [1]**	**Minimum Concentration**	**Maximum Concentration**	**Frequency of Detection**	**EPA Region 9 PRG (Residential)[2]**	**IDEM Closure Level[3]**
Inorganics										
7429-90-5	Aluminum	1480	**18500**	30/30	13400 J - 17100 J	5360 J	**30500** J	3/3	7600 N	NA
7440-36-0	Antimony	0.8 J	2.3 J	10/30	0.98 J - 1.1 J	ND	ND	0/3	3.1 N	140
7440-38-2	Arsenic	**3.7** J	**58.2** J	29/30	22.2 J - 28.7 J	**4.5** J	**10.5** J	3/3	0.39 C	3.9
7440-39-3	Barium	28.5 J	**693** J	30/30	129 J - 199 J	51.6 J	127 J	3/3	540 N	23000
7440-41-7	Beryllium	0.53 J	4.3 J	26/30	2 J - 2.1 J	0.43 J	1.4	3/3	15 N	680
7440-43-9	Cadmium	0.41 J	**4.1** J	20/30	0.59 J - 0.63 J	0.17 J	**8.4** J	3/3	3.7 N	12
7440-70-2	Calcium	766 J	89700 J	30/30	799 J - 845 J	703 J	1920 J	3/3	NA	NA
7440-47-3	Chromium	7.9 J	**228** J	30/30	38.7 J - 55 J	11.8 J	38.4 J	3/3	210 C	430
7440-48-4	Cobalt	1.8 J	107 J	30/30	31.3 J - 40.7 J	7 J	11.8 J	3/3	140 N	NA
7440-50-8	Copper	7 J	52.1 J	30/30	17.3 J - 27.8 J	6.3 J	245 J	3/3	310 N	13000
7439-89-6	Iron	1990 J	**195000** J	30/30	93700 J - 112000 J	**14100** J	**36000** J	3/3	2300 N	NA
7439-92-1	Lead	4.2 J	**521** J	30/30	35.7 J - 37.2 J	9.4 J	35.6 J	3/3	400	400
7439-93-2	Lithium	2.1 J	38.8 J	23/23	ND	NA	NA	0/3	160 N	NA
7439-95-4	Magnesium	292 J	7540 J	30/30	1470 J - 1580 J	565 J	2660 J	3/3	NA	NA
7439-96-5	Manganese	65.3 J	**6130** J	30/30	2570 J - 3240 J	**444**	**564**	3/3	180 N	NA
7439-97-6	Mercury	0.013 J	0.16 J	19/30	0.026 J	ND	ND	0/3	2.3 N	100
7440-02-0	Nickel	7.9 J	83.9 J	30/30	33.5 J - 36.6 J	10.7 J	31.7 J	3/3	160 N	6900
7440-09-7	Potassium	252 J	2390 J	30/30	1340 J - 2000 J	748 J	3740 J	3/3	NA	NA
7782-49-2	Selenium	0.18 J	1.1 J	22/30	0.56 J - 0.61 J	0.13 J	0.49 J	3/3	39 N	1700
7440-22-4	Silver	ND	ND	0/30	ND	0.78 J	0.78 J	1/3	39 N	1700
7440-23-5	Sodium	31.7 J	334 J	5/30	31.6 J - 183 J	61.9 J	61.9 J	1/3	NA	NA
7440-24-6	Strontium	4.1 J	77.1 J	23/23	NA	NA	NA	0/3	4700 N	NA
7440-31-5	Tin	0.52 J	12 J	9/30	ND	3 J	3 J	1/3	4700 N	NA
7440-32-6	Titanium	13.8 J	164 J	28/28	40.9 J	NA	NA	0/3	31000 N	NA
7440-28-0	Thallium	ND	ND	0/30	ND	0.43 J	0.43 J	1/3	0.52 N	24
7440-62-2	Vanadium	**11.8** J	**144** J	30/30	46.2 J - 53.8 J	**14** J	**46.8** J	3/3	7.8 N	NA
7440-66-6	Zinc	7.9 J	541 J	25/30	72.8 J - 79.7 J	27.2 J	262 J	3/3	2300 N	100000

Shaded cell indicates that the concentration exceeds one or more human health screening concentration.

Footnotes

1 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).

2 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).

3 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:

C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available
ND = Not detected.

TABLE 7-24

COMPARISON OF ES/DI SURFACE AND SUBSURFACE SOIL RESULTS WITH HISTORICAL DATA
SWMU 13 MINE FIELD B
NSWC CRANE
CRANE, INDIANA

		BIOREMEDIATION PROGRAM SAMPLES			ES/DI SURFACE SOIL			ES/DI SUBSURFACE SOIL			
CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Frequency of Detection	Minimum Concentration	Maximum Concentration	Frequency of Detection	Minimum Concentration	Maximum Concentration	Frequency of Detection	EPA Region 9 PRG (Residential)[1]
Energetics (mg/kg)											
99-35-4	1,3,5-TRINITROBENZENE	0.121 J	2.2	8/637	3	3	1/25	0.25 J	3.7 J	3/42	180 N
118-96-7	2,4,6-TRINITROTOLUENE	0.035 J	**57**	286/632	0.34 J	**250**	6/25	1.2 J	**22** J	5/42	3.1 N
121-14-2	2,4-DINITROTOLUENE	0.1 J	0.1 J	1/637	0.87 J	0.87 J	1/25	NA	NA	0/42	12 N
1321-12-6	2-AMINO-4,6-DINITROTOLUENE	0.052 J	**150** J	73/637	**100** J	**100** J	1/25	1.3 J	2.2 J	3/42	12 N
99-08-1	2-NITROTOLUENE	0.43	0.43	1/637	NA	NA	0/25	NA	NA	0/42	0.88 C
1321-12-6	4-AMINO-2,6-DINITROTOLUENE	0.045 J	**303**	94/637	0.25 J	**130** J	5/25	0.28 J	5.2	4/42	12 N
2691-41-0	HMX	0.081 J	**5390**	481/633	0.25 J	**350**	9/25	0.26 J	2.1	9/41	310 N
78-11-5	PETN	470	470	1/636	NA	NA	0/25	NA	NA	0/42	NA
121-82-4	RDX	0.039 J	**290**	464/634	0.33 J	**1800**	6/24	0.26	4	13/42	4.4 C
99-65-0	1,3-DINITROBENZENE	NA	NA	NA	**0.71** J	**0.71** J	1/25	NA	NA	3/42	0.61 N
6629-29-4	2,4-DIAMINO-6-NITROTOLUENE	NA	NA	NA	NA	NA	NA	0.29 J	0.36 J	2/25	NA
59229-75-3	2,6-DIAMINO-4-NITROTOLUENE	NA	NA	NA	NA	NA	NA	0.39 J	0.39 J	1/25	NA
618-87-1	3,5-DINITROANILINE	NA	NA	NA	NA	NA	NA	0.27 J	0.27 J	1/25	NA

Shaded cell indicates that the concentration exceeds one or more human health screening concentration.

Footnotes

1 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).

Definitions:

C = Carcinogen
J = Estimated value
N = Non-carcinogen
NA = Not Applicable/Not Available

TABLE 7-25

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT - DIRECT CONTACT
SWMU 13 MINE FIELD B - PCB DELINEATION
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Sediment

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Pesticides PCBs (ug/kg)															
12672-29-6	**AROCLOR-1248**	23 J	36000 J	ug/kg	13SD500012, 13SD570006	17/20	11 - 200	36000	NA	**220**	**C**	**1800**	IDEM	**Yes**	ASL
11096-82-5	**AROCLOR-1260**	1900	1900	ug/kg	13SD480612	1/20	11 - 30000	1900	NA	**220**	**C**	**1800**	IDEM	**Yes**	ASL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable.
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.
Chemicals selected as COPCs are indicated by shaded chemical names.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
NA = Not Applicable/Not Available
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

Associated Samples

13SD460024	13SD510024	13SD532436	13SD620012
13SD480006	13SD512448	13SD540006	13SD621224
13SD480612	13SD520024	13SD570006	13SD630006
13SD490012	13SD522448	13SD590012	13SD640006
13SD500012	13SD530024	13SD600012	13SD660006

TABLE 7-26

SUMMARY OF CONCLUSIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[(1)]	Impact on Human Receptors	Comments
Surface Soil - Building 166		
Aroclor-1248	Maintenance Worker ILCR = 5.9E-6 Occupational Worker ILCR = 6.2E-5 Trespasser ILCR = 4.6E-6 Total Recreational User ILCR = 2.3E-5 Total Residential ILCR = 2.1E-4	Risks for Aroclor-1248 exceeded 1E-4 for hypothetical future residents. Risks for other receptors were within the U.S. EPA's target risk range. Recommend further study in Corrective Measures Study.
Dioxins/Furans	Total Residential ILCR = 1.8E-6	The total residential cancer risk for dioxins/furans slightly exceeded 1E-6 and ILCRs were less than 1E-6 for all other receptors. 2,3,7,8-TCDD TEQs were within typical levels occurring U.S. soils and were less the 1 ug/kg preliminary remediation goal established by the U.S. EPA (U.S. EPA, 1998). Recommend no further action.
Surface/Subsurface Soil - Building 166		
Aroclor-1248	Construction Worker ILCR = 1.8E-6 Maintenance Worker ILCR = 3.0E-6 Occupational Worker ILCR = 3.1E-5 Trespasser ILCR = 2.3E-6 Total Recreational User ILCR = 1.2E-5 Total Residential ILCR = 1.0E-4	Risks for Aroclor-1248 exceeded 1E-4 for hypothetical future residents. Risks for other receptors were within the U.S. EPA's target risk range. Recommend further study in CMS.
Dioxins/Furans	Total Residential ILCR = 1.5E-6	The total residential cancer risk for dioxins/furans slightly exceeded 1E-6 and ILCRs were less than 1E-6 for all other receptors. 2,3,7,8-TCDD TEQs were within typical levels occurring U.S. soils and were less the 1 ug/kg preliminary remediation goal established by the U.S. EPA (U.S. EPA, 1998). Recommend no further action.
Arsenic	Occupational Worker ILCR = 4.7E-6 Total Recreational User ILCR = 1.6E-6 Total Residential ILCR = 1.9E-5	Risks for arsenic were within the U.S. EPA's target risk range for all receptors. Background analysis has shown that the concentrations of arsenic in soil are likely to be within naturally occurring levels. Recommend no further action.

TABLE 7-26

SUMMARY OF CONCLUSIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[(1)]	Impact on Human Receptors	Comments
Surface Soil - Building 171		
Aroclor-1248	Maintenance Worker ILCR = 2.1E-5 Occupational Worker ILCR = 2.2E-4 Trespasser ILCR = 1.6E-5 Total Recreational User ILCR = 8.1E-5 Total Residential ILCR = 7.2E-4	Risks for Aroclor-1248 exceeded 1E-4 for occupational workers and hypothetical future residents. Risks for other receptors were within the U.S. EPA's target risk range. Recommend further study in CMS.
PAHs	Occupational Worker ILCR = 7.0E-6 Total Recreational User ILCR = 2.6E-6 Total Residential ILCR = 2.4E-5	Risks from PAHs in soil were within the U.S. EPA's target risk range for occupational workers and future residents and less than 1.0E-6 for all other receptors. PAHs were infrequently detected and concentrations of PAHs in soil are within levels occurring in U.S. soils. Recommend no further action.
Dioxins/Furans	Total Residential ILCR = 3.9E-6	The total residential cancer risk for dioxins/furans slightly exceeded 1E-6 and ILCRs were less than 1E-6 for all other receptors. 2,3,7,8-TCDD TEQs were within typical levels occurring U.S. soils and were less the 1 ug/kg preliminary remediation goal established by the U.S. EPA (U.S. EPA, 1998). Recommend no further action.
Surface/Subsurface Soil - Building 171		
Aroclor-1248	Construction Worker ILCR = 6.1E-6 Maintenance Worker ILCR = 9.9E-6 Occupational worker ILCR = 1.0E-4, Trespasser ILCR = 7.7E-6 Total Recreational User ILCR = 3.9E-5 Total Residential ILCR = 3.5E-4	Risks for Aroclor-1248 exceeded 1E-4 for occupational workers and hypothetical future residents. Risks for other receptors were within the U.S. EPA's target risk range. Recommend further study in CMS.
PAHs	Occupational Worker ILCR = 7.0E-6 Total Recreational User ILCR = 2.6E-6 Total Residential ILCR = 2.4E-5	Risks from PAHs in soil were within the U.S. EPA's target risk range for occupational workers and future residents and less than 1.0E-6 for all other receptors. PAHs were infrequently detected and concentrations of PAHs in soil are within levels occurring in U.S. soils. Recommend no further action.
Dioxins/Furans	Total Residential ILCR = 1.4E-6	The total residential cancer risk for dioxins/furans slightly exceeded 1E-6 and ILCRs were less than 1E-6 for all other receptors. 2,3,7,8-TCDD TEQs were within typical levels occurring U.S. soils and were less the 1 ug/kg preliminary remediation goal established by the U.S. EPA (U.S. EPA, 1998). Recommend no further action.
Arsenic	Occupational Worker ILCR = 5.1E-6 Total Recreational User ILCR = 1.8E-6 Total Residential ILCR = 2.1E-5	Risks for arsenic were within the U.S. EPA's target risk range for all receptors. Background analysis has shown that the concentrations of arsenic in soil are likely to be within naturally occurring levels. Recommend no further action.

TABLE 7-26

SUMMARY OF CONCLUSIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[(1)]	Impact on Human Receptors	Comments
GROUNDWATER		
4-Amino-2,6-dinitrotoluene	Child resident HQ = 1.7	Explosives were detected in soil, groundwater, surface water, and sediment at SWMU 13. Elevated risks are based on the hypothetical future residential, industrial, and recreational use of groundwater. Risks under current land use, future industrial risks, and risks from other media are less than U.S. EPA benchmarks. Recommend further study in CMS.
2,4,6-Trinitrotoluene	Child resident HQ = 1.3 Residential ILCR = 3.7E-6	
RDX	Occupational Worker HI = 2.2 Child Recreational User HI = 2.1 Adult Resident HQ = 6.1 Child Resident HQ = 21 Occupational Worker ILCR = 2.6E-4 Total Recreational User ILCR = 1.1E-4 Total Residential ILCR = 1.3E-3	
Arsenic	Occupational Worker ILCR = 6.6E-6 Total Recreational User ILCR = 2.8E-6 Total Residential ILCR = 3.3E-5	Risks for arsenic are based on the hypothetical future residential use of groundwater. The average concentration in groundwater across the site (2.7 ug/L) is less than the U.S. EPA MCL (10 ug/L) and IDEM cleanup level (50 mg/L). No background or upgradient sample data for groundwater are available and it is likely that the concentrations of arsenic are within background levels. Recommend no further action.
Iron	Adult Resident HQ = 2 Child Resident HQ = 7	Risks for iron are based on the hypothetical future residential use of groundwater. Risks calculated for iron are not based on adverse health effects but rather on recommended daily allowances. No background or upgradient sample data for groundwater are available for SWMU 13. Iron was not used in processes and operations as SWMU 13. The concentrations of iron in goundwater are similar to levels detected at other sites at Crane. Recommend further study in CMS.
Lithium	Adult Resident HQ = 1.2 Child Resident HQ = 4.1	Risks for lithium are based on the hypothetical future residential use of groundwater. Concentrations of lithium in all samples were less than the U.S. EPA Region 9 PRG for Tap Water. No background or upgradient sample data for groundwater are available for SWMU 13. Lithium was not used in processes and operations as SWMU 13. Recommend further study in CMS.
Manganese	Adult Resident HQ = 2.2 Child Resident HQ = 7.4	Risks for manganese are based on the hypothetical future residential use of groundwater. No background or upgradient sample data for groundwater are available for SWMU 13. Manganese was not used in processes and operations as SWMU 13. The concentrations of manganese in goundwater are similar to levels detected at other sites at Crane. Recommend further study in CMS.
Nitrate/Nitrite-N	Adult Resident HQ = 1.8 Child Resident HQ = 6.5	Risks for nitrate/nitrite-N are based on the hypothetical future residential use of groundwater. The His are calculated based on the conservative assumption that the nitrate/nitrite is predominantly nitrite. If it is assumed to be nitrate, HIs are less than the goal of unity. Recommend further study in CMS.

TABLE 7-26

SUMMARY OF CONCLUSIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Concern[(1)]	Impact on Human Receptors	Comments
GULLY SURFACE WATER		
PAHs	Maintenance Worker ILCR = 1.3E-5 Trespasser ILCR = 1.4E-5 Total Recreational User ILCR = 1.5E-4 Total Residential ILCR = 1.5E-4	Total risks for PAHs in surface water exceeded 1.0E-4 for recreational users and future residents. The risks are based on a dermal absorption model which is known to greatly overestimate risks for PAHs in water. Exposure to gully surface water not always a complete exposure pathway because the water is not always present in the gullies. The presence of PAHs in gully surface water is probably due to particulate matter in the samples. Therefore, the risks for PAHs in surface water are not considered to be real. Recommend no further action.
RDX	Child Recreational User HI = 1.3 Child Resident HI = 1.3 Trespasser ILCR = 1.2E-5 Total Recreational User ILCR = 4.6E-5 Total Residential ILCR = 4.6E-5	ILCRs for RDX in surface water are within the U.S. EPA's target risk range for all potential receptors. HIs for child recreational users and future child residents slightly exceed unitry. are based on a very conservative future residential land use scenario. Exposure to gully surface water not always a complete exposure pathway because the water is not always present in the gullies. Since RDX is one of the main SWMU 13 contaminants, further study in the CMS is recommended.
Arsenic	Total Recreational User ILCR = 2.1E-6 Total Residential ILCR = 2.1E-6	Risks from exposure to arsenic in surface water are less than or within the U.S. EPA's target risk range for all receptors. Concentration in only 1 of 33 samples exceeded the MCL. Exposure to gully surface water not always a complete exposure pathway because the water is not always present in the gullies. Recommend no further action.
GULLY SEDIMENT		
Arsenic	Maintenance Worker ILCR = 1.5E-6 Trespasser ILCR = 1.2E-6 Total Recreational User ILCR = 5.5E-6 Total Residential ILCR = 5.3E-6	Risks from exposure to arsenic in sediment are within the U.S. EPA's target risk range for all receptors (slightly exceeding 1E-6). Concentrations of arsenic in gully sediment samples are similar to concentrations in the upgradient location. Recommend no further action.
MAINSTREAM SEDIMENT		
Arsenic	Maintenance Worker ILCR = 3.4E-6 Trespasser ILCR = 2.7E-6 Total Recreational User ILCR = 1.2E-5 Total Residential ILCR = 1.2E-5	Risks from exposure to arsenic in sediment are within the U.S. EPA's target risk range for all receptors. Concentrations of arsenic in mainstream sediment samples are similar to concentrations in the upgradient location. Recommend no further action.

1 Any carcinogenic chemical with a ILCR of greater than 1.0E-6 or a non-carcinogenic chemical contributing to target organ hazard indices (HI) greater than 1.0.

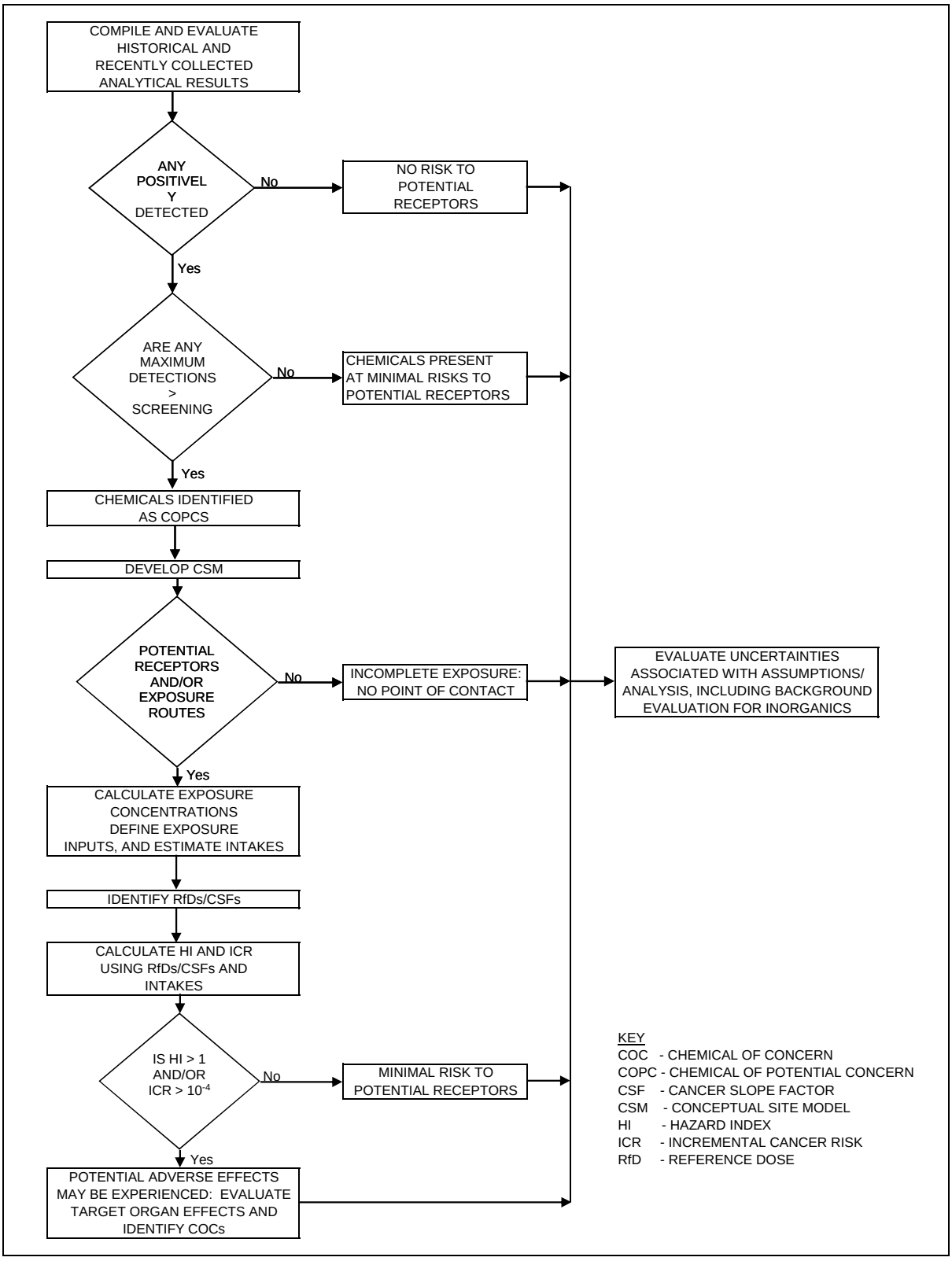
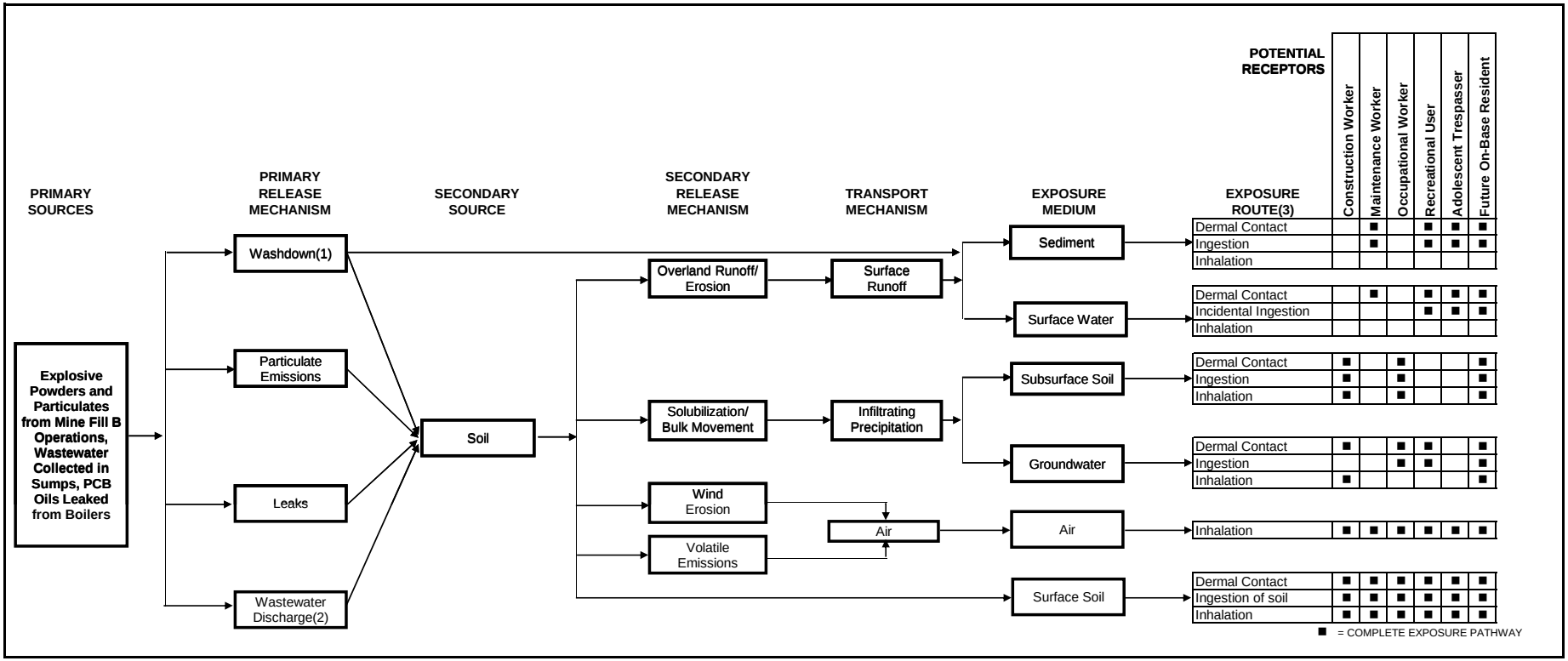


FIGURE 7-1

SUMMARY OF HUMAN HEALTH RISK ASSESSMENT PROCESS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

FIGURE 7-2

HUMAN HEALTH CONCEPTUAL SITE MODEL
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA



1. Washdown of powders and particulates from rooftops.
2. Wastewater containing explosives was collected in sumps which released the wastewater directly to surface drainage which flows into Boggs Creek.
3. Blank space indicates incomplete exposure pathway or relatively insignificant, or not applicable potential exposure.

8.0 ECOLOGICAL RISK ASSESSMENT

The goal of this SERA for SWMU 13 – MFB is to evaluate the potential for adverse ecological impacts of site-related contamination. The goal of this SERA was accomplished by identifying the COPCs detected at concentrations that exceed screening levels, identifying the locations of these exceedances, and concluding whether or not further investigation and/or remedial action at SWMU 13 at NSWC Crane is warranted from an ecological perspective.

8.1 INTRODUCTION

The SERA methodology used at NSWC Crane is in accordance with the following guidance documents:

- Department of Navy Environmental Policy Memorandum 97-04: Use of Ecological Risk Assessments dated May 16, 1997.
- Navy Policy for Conducting Ecological Risk Assessment (Navy, 1999).
- Final Guidelines for Ecological Risk Assessment (U.S. EPA, 1998).
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (U.S. EPA, 1997a).

This SERA consists of Steps 1, 2, and 3a of the 8 ecological risk evaluation steps required by U.S. EPA guidance (U.S. EPA, 1997a and 1998) and the Navy Policy for Conducting Ecological Risk Assessments (ERAs) (Navy, 1999). These eight steps consist of Steps 1 and 2, which constitute a SERA, followed by four additional steps, which constitute a Baseline ERA (BERA), and conclude with Step 8, a risk management evaluation. Step 3a is technically the first step of the BERA and it consists of a refinement of the conservative exposure assumptions but it is included in this SERA in accordance with Navy guidance. Steps 3b through 7 are conducted if additional evaluations or investigations are necessary. Aspects of Step 8, risk management, are addressed throughout the ERA process, in cooperation with the Region 5 regulators.

A schematic diagram of the general risk assessment process is provided in Figure 8-1. In addition, Figures 8-2, 8-3, and 8-4 are flow charts that summarize the ERA process that was used to evaluate risks

for ecological receptors exposed to chemicals in surface soil, sediment, and surface water, respectively. These flow charts are discussed later in this ERA.

8.2 SCREENING-LEVEL PROBLEM FORMULATION

The screening-level problem formulation is the first step of the SERA and includes identification of potential receptor groups, COPCs, and the mechanisms for contaminant fate, transport, and toxicity. Determination of the complete exposure pathways that exist at a site is accomplished at this point to facilitate receptor selection. The problem formulation process enables the risk assessor to identify the ecological resources to be protected (known as assessment endpoints); the measurements that will be used to evaluate risks to those resources (known as measures of effects); and the chemicals, geographic areas, and environmental media relevant to the risk assessment.

As part of receptor identification, site habitats and potential ecological receptors are described. These characteristics, as they apply to ecological risk, are described in the following subsections.

8.2.1 Environmental Setting

8.2.1.1 Basewide Environmental Setting

A biological characterization of NSWC Crane, including a list of plants and animals found at the facility, is presented in the Installation Assessment (IA) (Army, 1978) and the IAS [Naval Energy and Environmental Support Agency (NEESA), 1983] and is summarized in the Environmental Monitoring Reports (EMRs) (Halliburton NUS, 1992a and 1992b). A list of the species that may inhabit NSWC Crane and are protected under the United States Endangered Species Act, Indiana Department of Natural Resources Heritage Data Center, or the United States Fish and Wildlife Service is summarized in the RCRA Facility Permit and below. The following paragraphs briefly summarize the environmental setting at the base.

Eighty (80) percent of NSWC Crane's 63,000 acres is classified as Central Hardwoods Forest of the United States. In addition, some former agricultural fields are in various stages of succession. Open spaces on dry upland sites contain almost pure stands of grasses with some clumps of woody plants such as persimmon, sassafras, and sumac. Wetter sites have river birch, willow, sycamore, and cottonwood. Hillside communities have mostly hickory, white and black oak, red maple, sugar maple, tulip poplar, ash, and beech (NEESA, 1983).

The great variety of habitats at NSWC Crane (i.e., many stages of forest succession, streams, ponds, Lake Greenwood, grassy open spaces) lead to great diversity of animal species (NEESA, 1983). These

species include but are not limited to mammals such as white-tailed deer, beaver, coyote, hawks, red fox, rabbits, raccoons, and mice; birds such as ducks, geese, wild turkey, bobwhite quail, red-tailed hawks, and American robins; and various amphibians, reptiles, fish, and invertebrates.

Six main creeks receive drainage in five separate drainage basins at NSWC Crane: Furst Creek, Sulphur Creek, Little Sulphur Creek, Boggs Creek, Turkey Creek, and Seed Tick Creek. There also are many smaller streams, creeks, and drainage ditches located at the facility, along with several small man-made ponds and one large lake (Lake Greenwood). Lake Greenwood is the source of potable water for NSWC Crane. Surface water from the facility eventually discharges to the eastern fork of the White River, which is located south of the facility.

The drainage ditches at MFB (which is approximately 50 acres in size) eventually discharge to Boggs Creek and Turkey Creek. The Boggs Creek-Headwaters and Boggs Creek-Goldsberry Hollow waterbody segments designated state water uses are aquatic life support, fish consumption, and primary contact. These waterbody segments were not assessed as part of the 2004 Indiana Integrated Water Quality Monitoring and Assessment Report to determine if the waterbody was supporting those uses (IDEM, 2004). However, the Boggs Creek-Buzzard Run waterbody segment, located downstream of the Boggs Creek-Goldsberry Hollow waterbody segment, is fully supporting the aquatic life support and primary contact water uses; it was not assessed for the fish consumption water use. The Turkey Creek waterbody segment was included in the IDEM Assessment Report but was not assessed because insufficient data or no data was available to determine a designated use.

Threatened and Endangered Species

The Endangered Species Management Plan for NSWC Crane (Comarco, 2000) identified the federal and state threatened and endangered species and species of special concern potentially present at NSWC Crane. Information included in the Endangered Species Management Plan was obtained from studies and surveys conducted by the Navy and other agencies and groups such as universities and research institutions. A small subset of these studies include the Inventory of Neotropical Migratory Birds, Mist Net and Radiotelemetry Surveys for the Indiana bat, Bobcat Trapping, Rattlesnake Survey, Purdue University Wildlife Studies, and several fish surveys, and bird counts. These studies and others that were used in compiling the list of endangered species present at NSWC Crane are described in more detail in the Endangered Species Management Plan (Comarco, 2000) and below.

The Indiana bat and bald eagle are the only federally threatened or endangered species known to occur at NSWC Crane. The bald eagle is not likely present at SWMU 13 due to a lack of vast expanses of open

water (i.e., the preferred hunting habitat for the bald eagle). A mist net and radiotelemetry survey for the Indian bat has been conducted at the Crane Division (BHE Environmental, Inc, 1999). Two mist net sites were located in the mainstream tributary to Boggs Creek adjacent to SWMU 13; however, no Indiana bats were captured at these two locations between May 18 and July 11, 1998. Therefore, although Indiana bats have been captured at NSWC Crane, their presence surrounding SWMU 13 has not been documented.

In addition, a number of state endangered and federal and state species of concern have been listed for NSWC Crane (Comarco, 2000). The state endangered species list recorded (Comarco, 2000) for NSWC Crane includes two mammals (bobcat and Indiana bat), one reptile (timber rattlesnake), and several birds (bald eagle, osprey, loggerhead shrike, yellow-crowned night-heron, Virginia rail, king rail, and Henslow's sparrow. The Rare and Endangered Animals of Indiana list (DNR, 2004) was also reviewed to verify that no changes in the status of these species had occurred since October 2000. This list is much larger than that presented in Comarco (2000) and is not reiterated here. An internet search was conducted and it was verified that the species listed above did not experience a change in status.

Boggs Creek and Turkey Creek discharge off-site to the East Fork of the White River. River otters, a state endangered species, are being reintroduced to Indiana. The otters are expanding from their original release sites into other watersheds including the East Fork of the White River (Indiana DNR, 2000). Also, the East Fork of the White River is the site for an ongoing study of lake sturgeon populations, another state endangered species (DNR, 2000). Finally, spotted darters, a state endangered species, has been found in the East Fork of the White River (Indiana DNR, 2000). Note that other threatened, endangered, or special concern species also may be present in the water bodies just off-site of Crane, as well.

8.2.1.2 Site Specific Environmental Setting

Figure 8-5 is an aerial photograph of SWMU 13 and indicates the SWMU boundaries. Appendix J.1 presents the ecological assessment checklist.

SWMU 13 consists of buildings, roads, railroad lines, parking lots, grass-covered fields, and adjoining forested areas. The grass fields make up approximately half of the SWMU area while the other half of the SWMU is represented by heavily forested areas. Surface drainage at MFB is routed via ditches and culverts to intermittent drainageways transcending slopes on the northwestern and southeastern boundaries of the site. The majority of surface drainage is collected and drained toward the northwest. Surface drainage flowing toward the northwest enters a southwestward-flowing intermittent tributary to Boggs Creek. Boggs Creek continues to flow southward past the southern boundary of the base.

Surface drainage flowing down the slope southeast of MFB enters intermittent drainageways, which converge into two larger intermittent drainageways. These larger intermittent drainageways flow into Turkey Creek, which flows south-southwestward to merge with Boggs Creek.

8.2.2 Contaminants, Ecotoxicity, and Fate and Transport

Based on the historical site data and sampling, the following parameters are among the site-related chemical contaminants known to be present or potentially present in environmental media in SWMU 13:

- Explosives (e.g., TNT and HMX) and their degradation products (e.g., 2-amino-4,6-dinitrotoluene).
- Metals (e.g., selenium).
- PCBs (from PCB oils leaked from therminol boilers).

8.2.2.1 Physical and Chemical Characteristics

Physical and chemical characteristics of contaminants may affect their mobility, transport, and bioavailability in the environment. These characteristics include bioaccumulation factors (BAFs), organic carbon partition coefficients, and octanol-water partition coefficients. The physical and chemical characteristics of the different chemical classes present in SWMU 13 media are presented in Appendix J.2.

8.2.3 Potential Exposure Pathways

Section 1.2 of this RFI describes the operational history, deposition mechanisms, and potential contaminant migration patterns for SWMU 13. Section 1.3 presents detailed descriptions of previous investigations and the potential sources of contamination for SWMU 13. The contaminants from these sources may have migrated to soil, sediment, surface water, and/or groundwater via various transport pathways (e.g., particulate emissions, run-off, leaks, direct discharge, etc.).

8.2.3.1 Surface Soil

Several groups of terrestrial ecological receptors can be exposed to contaminants in surface soil. Invertebrates such as earthworms are exposed to contaminants as they move through the soil and ingest soil particles while searching for food. Plants are exposed to the contaminants via direct contact as contaminants are absorbed through the roots. Contaminants are then translocated to different parts of the plants (e.g., leaves, seeds). These pathways are evaluated in the SERA.

Small mammals may be exposed to contaminants in soil via several exposure routes. They may be exposed by direct contact as they search for food or burrow into the soil. Exposure of terrestrial wildlife to contaminants in the soil via dermal contact is unlikely to represent a major exposure pathway because fur, feathers, and chitinous exoskeletons are expected to minimize transfer of contaminants across dermal tissue. Therefore, the dermal pathway was not evaluated in the SERA. Small mammals also may be exposed to contaminants in the soil via incidental ingestion of soil and ingestion of plants and/or invertebrates that have accumulated contaminants from the soil. These pathways are evaluated in the SERA.

Larger predatory species such as the red fox and red-tailed hawk can be indirectly exposed to soil contaminants by ingesting small mammals that have accumulated contaminants from soil. These pathways are evaluated in the SERA.

8.2.3.2 Groundwater

Ecological receptors are not directly exposed to contaminants in groundwater at the site. Exposure to groundwater discharging as a seep or directly to a surface water body represents a complete exposure pathway and is evaluated as part of the surface water pathway.

8.2.3.3 Surface Water/Sediment

As mentioned above, contaminants in groundwater may discharge as a seep that flows into surface water or may discharge directly into a surface water body. Contaminants in soil may also enter the intermittent drainage channels at SWMU 13 via overland flow.

The aquatic habitat at SWMU 13 consists of small and intermittent gullies that drain SWMU 13 water run-off to Boggs Creek and Turkey Creek. Although the small tributaries are typically wet during rain events only, these gullies feed water and sediments to Turkey Creek and the mainstream channel at SWMU 13, which drains to Boggs Creek. Figure 4-4 shows the mainstream channel west of SWMU 13 as the "Unnamed Tributary to Boggs Creek." Boggs Creek and Turkey Creek are perennial streams that support benthic macroinvertebrates year-round. Therefore, it is likely that populations of benthic macroinvertebrates that inhabit Boggs Creek and Turkey Creek are able to repopulate portions of the intermittent drainage channels at SWMU 13 after heavy rain events. Although it is unlikely that enough water is present in the intermittent drainage channels to sustain benthic macroinvertebrates during all times of the year, it is possible that these receptors are present in the mainstream at SWMU 13 during wet seasons.

It is not likely that the drainageways sustain fish year-round; however, a 12-inch fish was observed near a culvert at SWMU 13 during the ecological site survey. Additionally, as previously mentioned, Boggs Creek and Turkey Creek are perennial streams that support aquatic organisms, including fish, year-round. It is possible that fish from Boggs Creek and Turkey Creek migrate upstream into the mainstream at SMWU 13 and are exposed to contaminants in surface water and sediment. The intermittent gullies are typically dry except during heavy rain events; however, during several site visits water was present. Therefore, the presence of small fish during at least some times of the year is possible. Fish could be exposed to chemical contamination by direct contact with, and ingestion of, contaminated surface water or sediments.

Piscivorous wildlife may consume fish that have accumulated chemicals from surface water and sediment; however, it is unlikely that piscivorous wildlife will obtain significant portions of their diet from these surface water sources. Therefore, this exposure pathway was not evaluated in this SERA.

8.2.3.4 Air

Although inhalation of particulates by mammals and birds may be a complete pathway, it is expected to be insignificant compared to other pathways such as ingestion of food items that have bioaccumulated contaminants from soil, particularly because exhaust emissions from ventilation systems ceased in 1973 with the discontinuation of ordnance assembly at SWMU 13. Also, inhalation pathways are not typically evaluated in SERAs because of the uncertainty inherent in estimating exposure levels and toxicological effects. Therefore, the air inhalation pathway is not evaluated in the SERA.

8.2.4 Endpoints

8.2.4.1 Assessment Endpoints

Assessment endpoints are an explicit expression of the environmental value that is to be protected (U.S. EPA, 1997a). The selection of these endpoints is based on the habitats present, the migration pathways of probable contaminants, and the relevant exposure routes for the receptors.

As already discussed in 8.2.1.2, the habitat in the central portion of SWMU 13 consists primarily of open areas with grasses and shrubs, surrounded by wooded areas. However, the SWMU is covered to some extent by roads and buildings (see Figure 8-5). The drainageways adjacent to the sites are intermittent, but they ultimately drain to larger water bodies. Based on the habitats at SWMU 13, the assessment endpoints

include protection of the following groups of receptors from adverse effects of contaminants on their growth, survival, and reproduction:

- Soil invertebrates
- Terrestrial vegetation
- Herbivorous birds and mammals
- Vermivorous birds and mammals
- Carnivorous birds and mammals
- Benthic macroinvertebrates
- Fish
- Amphibians and reptiles

The following paragraphs discuss the reasons that the above assessment endpoints were selected for evaluation in the SERA.

Soil Invertebrates: Soil invertebrates are expected to be present in the soil at SWMU 13. They aid in the formation of soil and the redistribution and decomposition of organic matter in the soil, and they serve as a food source for higher trophic-level organisms. They also can accumulate bioaccumulative contaminants that can then be transferred to the higher trophic-level organisms that consume soil invertebrates.

Terrestrial Vegetation: Terrestrial vegetation at SWMU 13 (where present) consists of grasses, shrubs, and trees. They serve as a food source and provide shade and cover for many organisms, and they help to prevent soil erosion, among other important functions. They also can accumulate some contaminants that can then be transferred to the higher trophic-level organisms that consume plants.

Herbivorous Birds and Mammals: Herbivorous birds and mammals (i.e., animals that consume only plant tissue) may be present in vegetative habitats at SWMU 13. Their role in the community is essential because, without them, higher trophic levels could not exist (Smith, 1966). They may be exposed to and accumulate contaminants present in the plants they consume.

Vermivorous Birds and Mammals: Vermivorous birds and mammals are present throughout the base in different terrestrial habitats (i.e., forested, open field) and are undoubtedly present at SWMU 13. These are considered first-level carnivores, and they serve as a food source for higher trophic-level carnivores. They may be exposed to and accumulate contaminants present in the food items they consume.

Carnivorous Birds and Mammals: Carnivorous birds and mammals consist of birds and mammals that consume other mammals and birds. Carnivorous birds and mammals that feed on other birds and mammals are at the top of the food chain. The top carnivores typically are less densely distributed than the herbivores and first-level carnivores because they require a larger area to hunt for their food. All of the carnivores may be exposed to and accumulate contaminants that are present in the food items they consume.

Benthic Macroinvertebrates: Benthic macroinvertebrates are similar to soil invertebrates in that they serve as a food source for higher trophic-level organisms (i.e., fish, amphibians, birds, mammals). Their presence in the intermittent drainageways will be ephemeral because of a lack of suitable habitat and water flow; however, these receptors are present in Boggs Creek and Turkey Creek year-round. Benthic macroinvertebrates can accumulate contaminants that can then be transferred to higher trophic-level organisms such as fish in Boggs Creek and Turkey Creek.

Fish: Fish are not present in the drainageways leading away from SWMU 13 because the drainageways are usually dry. However, SWMU 13 is located within the Boggs and Turkey Creek Drainage Basin, which is one of five drainage basins that carry surface water off the installation. Boggs Creek and Turkey Creek are perennial streams and support fish year-round. Fish in Boggs Creek and Turkey Creek may be exposed to and can accumulate contaminants from the food items they consume or from the surface water in which they live. Additionally, fish in Boggs Creek and Turkey Creek may swim upstream into the mainstream at SWMU 13 during higher flow periods. In fact, fish were found at surface water location 13SW035 in an 8-foot-wide pooled area (see Appendix C for the field sheets). Therefore, in order to be conservative, fish in Boggs Creek and Turkey Creek are evaluated as part of the SERA for the potential migration of SWMU 13 surface water and sediment concentrations and the potential migration of fish into the mainstream.

Amphibians and Reptiles: Amphibians are expected to inhabit water bodies and the surrounding areas, and reptiles can inhabit both aquatic environments and terrestrial habitats. Amphibians and reptiles feed primarily on invertebrates, plants, fish, and/or small mammals. They are exposed to and can accumulate contaminants from the food items they consume or from the surface water, sediment, or surface soil in which they live.

Not all of the potential assessment endpoints will be evaluated in the SERA. As indicated in U.S. EPA guidance (U.S. EPA, 1997a), “it is not practical or possible to directly evaluate risks to all of the individual components of the ecosystem at a site. Instead, assessment endpoints focus the risk assessment on

particular components of the ecosystem that could be adversely affected by contaminants from the site." Therefore, the SERA will focus on the endpoints that will tend to yield the highest risks, which should then account for endpoints that will have lower risks. For example, omnivores were not selected as assessment endpoints because exposure to contaminants in plants is greatest for herbivores and exposure to contaminants in invertebrates is greatest for insectivores. Therefore, omnivores will be protected by protecting herbivores and insectivores.

8.2.4.2 Measurement Endpoints

Measurement endpoints are estimates of measurable biological impacts (e.g., mortality, growth, and reproduction) that are used to evaluate the assessment endpoints. The following measures of effects were used to evaluate the assessment endpoints in the SERA:

- Soil screening values - Mortality, growth, and reproduction of plants and soil invertebrates will be evaluated by comparing the measured concentrations of chemicals in surface soil to screening values designed to be protective of ecological receptors.

- Wildlife toxicity reference values (TRVs) - Mortality, reproductive, and/or developmental effects of birds and mammals will be evaluated by comparing the estimated dose incurred (based on conservative and average assumptions) from ingestion of contaminants in surface water, sediment, surface soil, plants, invertebrates, and small mammals to wildlife TRVs.

- Sediment screening values - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of benthic macroinvertebrates will be evaluated by comparing the measured concentrations of chemicals in sediment to screening values designed to be protective of ecological receptors.

- Surface water screening values - Mortality and other adverse effects (e.g., growth, feeding rates, and behavioral changes) of aquatic organisms will be evaluated by comparing the measured concentrations of chemicals in the surface water to screening values designed to be protective of ecological receptors.

8.2.4.3 Selection of Receptor Species

Many receptors in the soil environments at SWMU 13 are typically grouped into general categories such as soil invertebrates and vegetation. This is a reflection of the nature of the threshold values, effects

values, or criteria typically used to characterize risk for such organisms. However, for vertebrate receptors selection of a representative species is required so that risks incurred by intake through eating and drinking can be estimated to these upper-level species.

Ingestion is the primary route of exposure for most mammals and birds. The selection of species used to represent the receptor groups identified in Section 8.2.4.1 was based on considerations of their preferred habitat, body size, sensitivity to contaminants, home range, abundance, commercial or sport utilization, legal status, and functional role (e.g., predators). The availability of exposure parameters such as body mass, feeding rate, and drinking rate may also be a factor in selecting surrogate species. The following surrogate species are proposed for use in food-chain modeling:

- Herbivorous mammal - meadow vole
- Herbivorous bird - bobwhite quail
- Insectivorous mammals - short tail shrew
- Insectivorous bird - American woodcock
- Carnivorous mammal – fox
- Carnivorous bird – hawk

Receptor profiles for each of the species above are presented in Appendix J.3.

8.2.4.4 Conceptual Model

A conceptual model in problem formulation is a written description and visual representation of predicted relationships between ecological entities and the stressors to which they may be exposed. The conceptual model consists of two primary components: predicted relationships among stressor, exposure, and assessment endpoint response and a diagram that illustrates the relationships (U.S. EPA, 1998).

The primary sources of known or potential contamination at SWMU 13 were identified based on past operational practices and the physical characteristics of the sites. As discussed in Section 1.0, the primary sources of contamination have been identified as explosive powders and particulates from MFB operations, wastewater collected in sumps, and PCBs that leaked from boilers. These contaminants have been released to environmental media via washdown of explosive powders and particulates from rooftops, particulate emissions, leaks, and wastewater discharge; therefore, the primary stressors to ecological receptors are contaminants in surface soil, surface water, and sediment. The primary

receptors for contaminants in surface soil are plants, invertebrates, amphibians and reptiles, and secondary receptors are birds and mammals. The primary receptors for contaminants in surface water and sediment are fish, if present, amphibians and reptiles, and aquatic/benthic invertebrates, and secondary receptors are birds and mammals. Figure 8-6 presents the conceptual site model for SWMU 13.

8.3 ECOLOGICAL EFFECTS EVALUATION/SELECTION OF COPCs

8.3.1 Ecological Effects Evaluation

The preliminary ecological effects evaluation is an investigation of the relationship between the magnitude of exposure to a chemical and the nature and magnitude of adverse effects resulting from exposure. In addition to being a toxicological evaluation, it may also include descriptions of apparent effects seen during the site visit (i.e., stressed vegetation). Toxicity thresholds are usually expressed in units of concentration when the medium of concern is in intimate contact with the receptor, such as surface water for aquatic organisms or soil for soil invertebrates. For other receptors, such as terrestrial vertebrates, toxicity data are typically available as doses, with units equal to mass of contaminant per unit of body mass per unit of time (usually mg/kg/day).

As the first step in the ecological effects evaluation, COPCs were selected by comparing contaminant concentrations in surface water, sediment, and surface soil samples to Region 5 ecological screening levels (ESLs) (U.S. EPA, 2003). U.S. EPA has developed Ecological SSLs (Eco SSLs) for a few chemicals. These values were used in place of the Region 5 ESLs because they are based on more recent data. Also, the Region 5 ESLs for surface water are the lowest water quality criteria for the various states in U.S. EPA Region 5. State of Indiana Water Quality Standards (WQSs) or U.S. EPA Water Quality Criteria (WQC) were considered in place of the Region 5 ESLs for surface water; however, no values from these sources were available for the chemicals detected in surface water samples. The following bullets present the rules used in the selection of COPCs:

- A contaminant was retained as a COPC for risks to plants and invertebrates, aquatic organisms, and benthic invertebrates and/or wildlife if the maximum detected concentration exceeded the associated ESL (or substituted screening level as described above) in surface soil, surface water, or sediment, respectively. Contaminants retained as COPCs are further evaluated as part of Step 3a of the eight-step ERA process.

- Calcium, magnesium, potassium, and sodium were not retained as COPCs in any medium because of their relatively low toxicity to ecological receptors and their high natural variability in concentrations. These metals are considered essential nutrients.

- Contaminants without ESLs (or substituted screening levels, as appropriate) were retained as COPCs for further evaluation as part of Step 3a of the eight-step ERA process.

An Ecological Effects Quotient (EEQ) approach was used to characterize the risk to ecological receptors. This approach characterizes the potential effects by comparing exposure concentrations with the effects data. The EEQs for terrestrial receptors were calculated as follows:

$$EEQ = \frac{Css}{SSSL}$$

where:

C_{ss} = Contaminant concentration in surface soil (µg/kg or mg/kg)

SSSL = Surface Soil Screening Level (µg/kg or mg/kg), as described above

The EEQs for the aquatic receptors were calculated as follows:

$$EEQ = \frac{C_{sw}}{SWSL} \text{ or } \frac{C_{sd}}{SDSL}$$

where:

C_{sw} = Contaminant concentration in surface water (µg/L)

C_{sd} = Contaminant concentration in sediment (µg/kg or mg/kg)

SWSL = Surface Water Screening Level (µg/L)

SDSL = Sediment Screening Level (µg/kg or mg/kg)

An EEQ of greater than 1.0 was considered to indicate potential risk. Such values do not necessarily indicate that an effect will occur but only that a low (i.e., conservative) threshold has been exceeded.

8.3.2 Selection of Contaminants of Potential Concern at SWMU 13

Surface soil samples were collected as a part of the remedial activities at SWMU 13. These samples were biased around the buildings in order to evaluate pre-remedial activities and post-remediation conditions associated with the identification, removal, and treatment through bioremediation of

explosives-contaminated soils. Surface soil samples collected as a part of the remedial activities were analyzed for explosives, metals, and VOCs. As discussed in Section 2.5, surface soil samples were also collected during three rounds as part of the SWMU 13 RFI. Samples were analyzed for PCBs, dioxins, PAHs, and VOCs, and were biased for collection in areas where PCB contamination was expected to be greatest. Both sets of data, samples collected as a part of the remedial operations and samples collected as a part of the RFI, were combined into one data set for the initial ecological COPC selection.

Sediment and surface water samples were collected from intermittent streams, drainageways, and surface run-off locations at SWMU 13 during the three rounds of sampling for the RFI. These data were separated into gully samples and mainstream samples. Because SWMU 13 sits atop a ridge, gully samples were collected to evaluate contaminants migrating from the SWMU into the mainstream that is located at the base of the ridge. The mainstream samples were collected in order to evaluate contaminant concentrations that have already migrated from the SWMU and their impacts on aquatic receptors.

8.3.2.1 Surface Soil

Table 8-1 is the ecological surface soil screening table for SWMU 13. Historical explosives, VOCs, and metals data collected as a part of the remedial activities at SWMU 13 and other organic data (dioxins, PCBs, SVOCs) collected as a part of the RFI are included on Table 8-1. The maximum concentrations detected in all SWMU 13 samples were used for the initial screening. Chemicals that were selected as COPCs for plants/invertebrates and wildlife have been highlighted in Table 8-1.

Although samples were analyzed for individual dioxins, the TEQ was used to evaluate risks in surface soil. This was done because individual congeners have been found to cause toxic responses similar to those caused by TCDD and the TEQ accounts for the cumulative effects of the individual congeners. Dioxins were retained as COPCs because the TEQ value exceeded the 2,3,7,8-TCDD ESL. One PCB, one explosive, and seven metals were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, six explosives were selected as COPCs for further evaluation in the Step 3a because no criteria are available.

All selected COPCs in surface soil were included in the food-chain model (Section 8.4.2), except for barium, because they are considered bioaccumulative chemicals (U.S. EPA, 2000) (see Table 8-1). Although explosives were not included in the U.S. EPA list of important bioaccumulative chemicals, explosives were included in the food-chain model in order to be conservative.

8.3.2.2 Sediment

As stated above, gully samples were collected to evaluate contaminants migrating from the SWMU into the mainstream. Table 8-2 is the ecological sediment screening table for gully samples collected at SWMU 13. Twelve (12) SVOCs and eight metals were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, two explosives and 12 metals were selected as COPCs for further evaluation in Step 3a because no criteria are available.

The mainstream samples were collected to evaluate contaminant concentrations that have already migrated from the SWMU. Table 8-3 is the ecological sediment screening table for mainstream samples collected at SMWU 13. Six metals were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, nine metals were selected as COPCs for further evaluation in Step 3a because no criteria are available.

8.3.2.3 Surface Water

Table 8-4 is the ecological surface water screening table for the gully samples collected at SWMU 13. Three SVOCs, nine unfiltered metals, and six filtered metals were selected as COPCs because the maximum detected concentrations exceeded associated ESLs. Additionally, two SVOCs, all explosives, four unfiltered metals, and two filtered metals were selected as COPCs for further evaluation in Step 3a because no criteria are available for comparison to the maximum concentrations.

Table 8-5 is the ecological surface water screening table for mainstream samples collected at SWMU 13. One filtered metal (barium, filtered) was selected as a COPC because the maximum detected concentrations exceeded associated ESLs. Additionally, all detected explosives, two unfiltered metals, three filtered metals, and nitrite/nitrate-N were selected as COPCs for further evaluation in Step 3a because no criteria are available.

8.3.2.4 Summary

Historical data collected as part of the SWMU 13 remedial activities was combined with more recent data in order to conduct a conservative ecological screening on surface soils at SWMU 13. As presented in Sections 8.3.2.1, 8.3.2.2, and 8.3.2.3, some contaminants detected in surface soil, sediment, and surface water were retained as COPCs for further evaluation because the maximum detected concentrations exceeded the conservative screening values or screening values were not available for comparison to the maximum detected concentrations. These chemicals are evaluated further in the Step 3a evaluation.

In summary, a SERA was performed for SWMU 13. Based on the results of the evaluation, adequate information exists to determine that potential risks are possible for receptors exposed to the selected COPCs. Also, sampling locations were biased towards areas where the contamination, if present, should be detected. Therefore, the SERA is advancing to the Step 3a of the BERA – the refinement of the site-related COPCs.

8.4 STEP 3A -REFINEMENT OF CONSERVATIVE EXPOSURE ASSUMPTIONS

Step 3a consists of refining the conservative exposure assumptions/concentrations when evaluating potential risks to ecological receptors (i.e., plants, invertebrates, and wildlife receptors) and re-evaluating the analytical data using benchmarks that may be more appropriate for the assessment endpoints. The objective of the Step 3a refinement was to better define those chemicals that contribute to potentially unacceptable levels of ecological risk, and to identify and eliminate from further consideration those COPCs that were retained because of the use of very conservative exposure scenarios. The Step 3a evaluation is designed to eliminate chemicals from further evaluation for certain groups of receptors. For example, a chemical may not be retained as a COPC in soil based on risks to soil invertebrates but may be retained for evaluating risks to plants or wildlife. Therefore, chemicals are evaluated during Step 3a in order of plants/invertebrates, aquatic receptors, and wildlife.

Figures 8-2, 8-3, and 8-4 are flow charts that present the ERA process that is used to evaluate risks to ecological receptors from chemicals in the soil, sediment, and surface water, respectively. The following sections describe the process for further evaluating chemicals initially selected as COPCs in soil, sediment, and surface water.

Surface Soil

Chemicals that were initially selected as COPCs in surface soil were carried through three independent flow paths: 1) to further evaluate risks to plants, 2) to further evaluate risks to invertebrates, and 3) to further evaluate risks to wildlife (i.e., mammals and birds). This evaluation was conducted to determine whether there are potential risks to all three receptor groups (i.e., plants, invertebrates, and wildlife), or to only one or two of the receptor groups. This is important because if the site proceeds further in a BERA, the studies in the BERA should only focus on the receptors that are at potential risk. Because most of the Region 5 soil screening levels are based on risks to mammals or birds, potential risks to plants and invertebrates cannot be determined using these values. Therefore, the first step in the Step 3a evaluation was to compare the maximum chemical concentration in the soil to "no-effects benchmarks" for plants and invertebrates such as the U.S. EPA Eco-SSLs. Although some of the alternate benchmarks may be

based on effects concentrations such as EC_{20}s, samples with chemical concentrations less than the "no-effects benchmarks" are not expected to have significant effects. The following bullets outline decisions that were made based on this comparison:

- If the concentration was less than the no-effects benchmark, it was concluded that the chemical is not causing an unacceptable risk to that receptor group and the chemical was not evaluated further in Step 3a.

- If the chemical concentration was greater than the no-effects benchmark (or the chemical does not have a no-effects benchmark), the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations [i.e., proceed to a BERA, develop cleanup levels, proceed to a corrective measures study (CMS), etc.].

- If the concentration was greater than the no-effects benchmark (or the chemical does not have a no-effects benchmark), but is less than background concentrations, it was concluded that the chemical is not causing an unacceptable site-related risk to that receptor group and the chemical was not evaluated further in Step 3a.

Concurrent with the evaluation of risks to plants and invertebrates, bioaccumulative chemicals that were selected as COPCs were evaluated to determine if there are unacceptable risks to wildlife. Even though the conservative COPC screening level may have been based on risks to wildlife, risks to wildlife were further evaluated in Step 3a to determine potential risks under an average exposure scenario. The first step in the process was to determine whether the COPC is bioaccumulative. A chemical was considered to be bioaccumulative, and thus carried through the food-chain model, if it was included in the list of important bioaccumulative chemicals in U.S. EPA (2000). Also, some chemicals, such as energetics, that are not typically considered to be very bioaccumulative were included in the food-chain models to be conservative. Non-bioaccumulative chemicals were not carried through the food-chain model and it was concluded that they were not causing an unacceptable risk to wildlife. The following bullets outline decisions that were made based on the results of the food-chain model:

- If the EEQ is less than 1.0 using average contaminant concentrations and exposure factors and the No Observable Adverse Effects Level (NOAEL) as the TRV, it was concluded that the chemical is not causing an unacceptable risk to wildlife and the chemical was not evaluated further in Step 3a.

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the concentration of the chemical is less than background, it was concluded that the chemical is not causing an unacceptable site-related risk to wildlife and the chemical was not evaluated further in Step 3a.

For chemicals evaluated further in Step 3a, the other Step 3a factors described below were used to determine if the risks were great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Sediment

Chemicals initially selected as COPCs in sediment were carried through one single flow path, i.e., to further evaluate risks to invertebrates. Because many of the Region 5 sediment screening levels are based on equilibrium partitioning, the maximum contaminant concentration was compared to an alternate lower effects level following the order of preference listed below:

- Canadian Sediment Guidelines (OMOE, 1993) Lowest Effects Levels
- Long and Morgan (1991) Effects-Range Low
- Long et al. (1995) Effects-Range Low
- Other values, as necessary and available

The following bullets outline decisions that were made based on this comparison:

- If the concentration was less than the lower-effects benchmark, it was concluded that the chemical is not causing an unacceptable risk to invertebrates and the chemical was not evaluated further in Step 3a.

- If the concentration was greater than the lower-effects benchmark, the chemical was further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the concentration was greater than the lower-effects benchmark but the chemical concentration was less than upgradient concentrations, it was concluded that the chemical is not causing an unacceptable site-related risk to invertebrates and the chemical was not evaluated further in Step 3a.

For chemicals evaluated further in Step 3a, the other Step 3a factors described below were used to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Surface Water

Chemicals selected as COPCs in surface water were carried through two independent flow paths: 1) to further evaluate risks to aquatic organisms, and 2) to further evaluate risks to terrestrial wildlife (i.e., mammals and birds). This further evaluation was conducted to determine if there are potential risks from that chemical to both receptor groups (i.e., invertebrates and wildlife), or to only one of the receptor groups. This is important because if the site proceeds further in a BERA, the studies in the BERA should only focus on the receptors that are at potential risk. Organic chemicals that are initially selected as COPCs were evaluated in Step 3a. However, for metals, the following decisions were made:

- If the metal was either not detected in the filtered samples, or was detected at a concentration less than the screening level in the filtered samples, it was concluded that the chemical is not causing an unacceptable risk to aquatic organisms and the chemical was not evaluated further in Step 3a.

- If the metal was detected in the filtered samples at a concentration greater than the screening level, and the chemical concentration was greater than upgradient concentrations, it was concluded that the chemical may be causing an unacceptable risk to aquatic organisms and the chemical was evaluated further in Step 3a.

- If the metal was detected in the filtered samples at a concentration greater than the screening level, but the chemical concentration was less than upgradient concentrations, it was concluded that the chemical is not causing an unacceptable risk to aquatic organisms and the chemical was not evaluated further in Step 3a.

Concurrent with the evaluation of risks to aquatic organisms, chemicals that are retained as site-related COPCs were further evaluated to determine if there are unacceptable risks to terrestrial wildlife. The following bullets outline decisions that were made based on the results of the food-chain model:

- If the EEQ (see Section 8.5) is less than 1.0 (based on the surface water portion of the food-chain model) using average contaminant concentrations and exposure factors and the NOAEL as the TRV, it was concluded that the chemical is not causing an unacceptable risk to terrestrial wildlife.

- If the EEQ is greater than 1.0 (based on the surface water portion of the food-chain model) using average contaminant concentrations and exposure factors and the NOAEL as the TRV, and the chemical concentration is greater than background (or upgradient concentrations) the chemical will be further evaluated in Step 3a to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

- If the EEQ is greater than 1.0 using average contaminant concentrations and exposure factors and the NOAEL as the TRV, but the chemical concentration is less than background (or upgradient concentrations), it will be concluded that the chemical is not causing an unacceptable site-related risk to terrestrial wildlife.

For chemicals evaluated further in Step 3a, the other Step 3a factors described below were used to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS, etc.).

Other Step 3a Factors

For chemicals that are evaluated further in Step 3a, the following factors were evaluated, as appropriate, to determine if the risks are great enough to warrant additional evaluations (i.e., proceed to a BERA, develop cleanup levels, proceed to a CMS). Note that all of these factors may not be discussed for each chemical and/or receptor group.

- Magnitude of criterion exceedance: Although the magnitude of the risks may not relate directly to the magnitude of a criterion exceedance, the magnitude of the criterion exceedance may be one item used in a lines-of-evidence approach to determine the need for further site evaluation. The greater the criterion exceedance, the greater the probability and concern that an unacceptable risk exists.

- Frequency of chemical detection and spatial distribution: Assuming adequate detection limits, a chemical detected at a low frequency typically is of less concern than a chemical detected at higher frequency if toxicity and concentrations and spatial areas represented by the data are similar. All else being equal, chemicals detected frequently were given greater consideration than those detected

relatively infrequently. In addition, the spatial distribution of a chemical may be evaluated to determine the area that a sample represents.

- Contaminant bioavailability: Many contaminants (especially metals) are present in the environment in forms that are typically not bioavailable, and the limited bioavailability was considered when evaluating the exposures of receptors to site contaminants. Contaminants with generally less bioavailability are considered to be less toxic than the more bioavailable contaminants, all other factors being equal.

- Habitat: Although exceedances of criteria may occur, potential risks to ecological receptors may be minimal if there is little habitat for those receptors. Therefore, the extent of habitat was used qualitatively when considering additional evaluation. Areas with little habitat were less of a concern than areas with suitable habitat to support the receptors of interest.

- Alternate benchmarks: These benchmarks are used to further evaluate risks to specific groups of ecological receptors (e.g., plants, invertebrates) because while ESLs are useful for initial screening they are the most conservative values available for soil, sediment, and surface water evaluation. The use of alternate benchmarks ensures that more realistic exposure assumptions are evaluated. However, some of the alternate benchmarks are overly protective for some receptors and may not be applicable in some cases. For example, the ESLs for soil may be based on risks to small mammals. Therefore, an exceedance of that ESL does not necessarily indicate that potential risks to plants or invertebrates exist, so other more appropriate benchmarks were used to evaluate potential risks to those receptors. The use of these alternate benchmarks was case-specific.

In addition to the general Step 3a factors above, other factors were evaluated in Step 3a for each receptor group. The following sections discuss the other factors that were used, including the specific alternate benchmarks that may be used in Step 3a.

Terrestrial Plants and Invertebrates: The alternate benchmarks that were used to further evaluate risks to plants and invertebrates are listed below. The ecological endpoint for each benchmark that was used in this step was provided in the ERA. For example, if a benchmark is based on a 25 percent reduction in growth to a lettuce plant, that information was presented.

- Canadian Soil Quality Guidelines [Canadian Counsel of Ministers of the Environment (CCME), 1997].

- Oak Ridge National Laboratory (ORNL) Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision (Efroymson, et al., 1997a).

- ORNL Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision (Efroymson, et al., 1997b).

Additional sources of toxicity data from the literature were used to evaluate potential risks to terrestrial vegetation and invertebrates from contaminants in the surface soil not included in the above documents.

Sediment: In addition to the Step 3a factors presented above, additional evaluations for sediment included comparing the chemical concentrations in the sediment to higher effects levels to show the probability of a range of possible effects. The higher effects levels that were used to further evaluate risks to benthic invertebrates were from the same sources listed in order of preference in the sediment subsection. A description of what the higher effects levels that are used in this step represent is provided in the Step 3a. For example, the probable effects concentrations (PECs) were intended to identify contaminant concentrations above which harmful effects on sediment-dwelling organisms were expected to occur frequently (MacDonald et al., 2000).

Also, emphasis is placed on average sediment concentrations because the aquatic organisms are exposed to average chemical concentrations as they swim in the water or as the sediment is transported downstream.

Surface Water: In addition to the Step 3a factors presented above, additional evaluations for surface water include comparing the chemical concentrations in the surface water to acute water quality standards/criteria to show a range of possible effects. Also, emphasis was placed on average surface water concentrations because the aquatic organisms are exposed to average chemical concentrations as they swim in the water or the water flow over them (for organisms that are relatively sessile). More emphasis was placed on the dissolved metals concentrations (compared to total metals concentrations) because dissolved metals are a better indicator of potential bioavailability than are total recoverable metals.

8.4.1 Terrestrial Plants, Terrestrial and Aquatic Invertebrates, and Fish

Potential risks to terrestrial plants, terrestrial and aquatic invertebrates, and fish from exposure to chemicals initially selected as COPCs were further evaluated as discussed above. The following subsections discuss whether COPCs are retained for further evaluation for soil invertebrates and terrestrial vegetation (Section 8.4.1.1), benthic invertebrates (Section 8.4.1.2), and aquatic organisms (Section 8.4.1.3). COPCs based on risk to upper level receptors via the food-chain are discussed in Section 8.4.2.

8.4.1.1 Soil Invertebrates and Terrestrial Vegetation – Surface Soil Risk

Risks to terrestrial plants and invertebrates resulting from exposure to the COPCs in surface soil are evaluated using the methodologies described above (Section 8.4). Table 8-6 presents a summary of some of the common alternate benchmarks available for surface soil COPCs, along with a summary of the Step 3a evaluation. The toxicological basis of the alternate benchmarks is presented below.

An evaluation of maximum concentrations across all of SWMU 13 was first conducted. In cases where contaminant concentrations at the individual buildings were significantly different (i.e., concentrations at one building were greater than the alternate benchmarks while concentrations at other buildings were less than alternate benchmarks), the differences in the contaminant concentrations were discussed separately. The evaluation of individual buildings was not conducted for each contaminant; rather, it was conducted on a chemical-specific basis and is discussed below, where appropriate.

An emphasis was placed on average concentrations for the chemicals initially selected as COPCs. This was done because of the uncertainty involved with the data collection and analysis. As a part of the 2002 remedial activities at SWMU 13, ICS were collected in 1998 and 1999 and analyzed for explosives, the eight RCRA metals plus aluminum, and six VOCs. Based on the ICS results, areas surrounding Buildings 166, 167/168/2500, 171, and 172/173/2501 were excavated based on high concentrations of explosives, mainly RDX. The excavated areas were subsequently backfilled with bioremediated soil that met human health cleanup goals. Bioremediated soil was analyzed for explosives only. For historical samples, a weighted average was calculated because the concentrations of the historical samples represent different volumes of material left in place after remediation. Additionally, concentrations of bioremediated soil, which constitutes a large portion of the soil volume, are averages of windrows calculated in the IMR (TT, 2002). Bioremediated soil from different windrows was placed in the same excavated grid area; therefore, windrow data represented by average concentrations were mixed with other windrows in the same excavated grid. The grid sizes varied at the individual buildings and from one building to the next;

however, the average grid size ranged from 400 square feet to approximately 1,000 square feet. Additionally, PES were collected, analyzed, and are included in the ecological soil screening. See Section 7.3.3 for a more detailed discussion of how the averages for the ICS samples were calculated and the weighting approach that was used.

Dioxins

Dioxins were initially selected as COPCs because the maximum total TEQ exceeded the 2,3,7,8-TCDD ESL. However, the ESL is based on risks to wildlife (i.e., the masked shrew) and not risks to invertebrates and plants; therefore alternate toxicological data was used to further evaluate risks to plants and soil invertebrates.

One study reported in the literature demonstrated that two species of earthworms showed no adverse effects when exposed for 85 days to soil containing levels of 5 mg/kg of 2,3,7,8-TCDD, but both species died at 10 mg/kg (Eisler, 1986a). The reason dioxins are not harmful to invertebrates at dioxin levels considered "high", is that many, if not all, invertebrates lack the aryl hydrocarbon (Ah) receptor, or a comparably sensitive receptor for dioxins. For example, in U.S. EPA (1993), it is noted that the Ah receptor has not been detected in plants or nine species of invertebrates, representing eight classes of four phyla. The document further notes that aquatic invertebrates are much less sensitive to TCDD than fish, this is perhaps due to the absence of the Ah receptor, or a comparably sensitive receptor for dioxins U.S. EPA (1993). The Ah receptor is important because the dioxins need to bind to the receptor in order to cause toxicity. Also, Van den Berg, (1998) states that "At this time, development of TEFs for invertebrates is not recommended because there is limited evidence for ligand activation of Ah receptor or for TCDD-like toxicity in invertebrates". For this reason, the potential for risks to invertebrates from dioxins in the soil are unlikely. Also, because the Ah receptor has not been detected in plants, it is not likely plants at SWMU 13 will be impacted by the detected levels of dioxins in the soil. Therefore, risks to plants and invertebrates from dioxins in the soil are acceptable so dioxins are not retained as COPCs for risks to these receptors. However, because dioxins are bioaccumulative chemicals, risks to wildlife from dioxins are evaluated in Section 8.4.2 to be conservative.

Aroclor-1248

Aroclor-1248 was initially selected as a COPC because the maximum soil concentration of 160 mg/kg exceeded the ESL of 0.332 mg/kg. Because the ESL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, Aroclor-1248 concentrations were compared to the following alternate benchmark for soil invertebrates and plants to evaluate risks to these receptors.

- Canadian soil quality guideline (SQG) – 33 mg/kg (EC, 2001)

The Canadian SQG for PCBs is based on a 30 percent reduction in corn growth observed within the first 5 days after seedling emergence at a soil concentration of 100 mg/kg (EC, 2001). An uncertainty factor of 3 was applied to the 100 mg/kg concentration to account for a lack of acceptable invertebrate toxicity data.

The average PCB concentration (16.89 mg/kg) at SWMU 13 is less than the SQG. PCB data was collected from two areas at SWMU 13: 1) southwest of Building 166 (northern area) and 2) surrounding Building 171 (southern area). Concentrations in samples collected from the northern area (0.05 mg/kg to 46 mg/kg) were generally less than concentrations in samples collected from the southern area (0.042 mg/kg to 160 mg/kg). Only the maximum concentration in northern samples exceeds the SQG and is bounded (within 50 feet) by surrounding samples that are less than the SQG (see Figure 5-1). Concentrations exceeded the SQG in six samples collected from the southern area; therefore, the greatest concentrations (and risks to soil invertebrates and plants) exist in the southern area, surrounding Building 171 (see Figure 5-1). Therefore, risks to plants and invertebrates in the northern area are acceptable; however, the elevated Aroclor-1248 concentrations with respect to the SQG surrounding Building 171 warrant further evaluation (see Summary of Surface Soil Risk). Because PCBs are bioaccumulative chemicals, risks to wildlife from Aroclor-1248 are evaluated in Section 8.4.2 of this ERA.

1,3,5-Trinitrobenzene

1,3,5-Trinitirobenzene was initially selected as a COPC because the maximum soil concentration of 1.7 mg/kg was greater than the ESL of 0.376 mg/kg. 1,3,5-Trinitrobenzene was detected in only 2 of 371 samples across all of SWMU 13 and the only other detection (0.164 mg/kg) was less than the ESL. The ESL is based on exposure to wildlife (meadow vole) and not risks to invertebrates and plants, no other alternate toxicity data for plants and invertebrates exposed to 1,3,5-trinitrobenzene are available. Despite the uncertainties that exist in evaluating risks to invertebrates and plants because an alternate benchmark for these receptors could not be located, the one detection at SWMU 13 at a concentration greater than the ESL does not warrant retaining 1,3,5-trinitrobenzene as a COPC. Although 1,3,5-trinitrobenzene is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

TNT

TNT was initially selected as a COPC because a Region 5 screening level is not available. The following toxicity information for TNT was located in the literature:

- Low observed effects concentration (LOEC) for Plants – 2.4 mg/kg (Best et al., 2004)
- LOEC for Soil invertebrates (earthworms) – 1.2 mg/kg (Best et al., 2004)

The LOECs from Best et al., 2004 were based on EC20 values derived by linear regression of ln-transformed biomass to TNT concentrations in soil. The LOEC for plants is based on a 55-day study in which the EC50 was 7.3 mg/kg and the EC20 was 2.4 mg/kg. The values were derived from *L. perenne* linear regression of ln-transformed plant biomass to TNT soil concentrations. The LOEC for soil invertebrates were derived similarly from E. fetida by linear regression of ln-transformed earthworm biomass to TNT soil concentrations. The EC50 from the E. fetida 28-day was 3.6 mg/kg and the EC20 was 1.2 mg/kg.

The maximum detected TNT concentration (57 mg/kg) was in a surface soil sample from Building 166 and is greater than the LOECs for plants and soil invertebrates from Best et al. (2004). Also, maximum concentrations of TNT at all buildings are greater than LOEC values above. LOEC values are the lowest concentrations at which effects have been observed while no observed effects concentration (NOEC) values are defined as the highest concentration at which effects are not observed. Typically, concentrations between NOEC and LOEC values represent a range where the actual effects concentration (i.e., the concentration where effects on the test organism are first observed) is uncertain. In cases where only a LOEC is reported, it is common practice to divide the LOEC value by an uncertainty factor of 10 in order to estimate a NOEC value. Only LOEC values were reported in Best et al. (2004); therefore, estimated NOEC values for plants and soil invertebrates are 0.24 mg/kg and 0.12, respectively. The average concentrations of TNT are greater than the estimated NOEC values at all buildings at SWMU 13, except Building 174, where explosives were not detected.

Based on a comparison to the alternative toxicity information, risks to plants and invertebrates at SWMU 13 cannot be ruled out and further evaluation of TNT is necessary (see Summary of Surface Soil Risk). Although, TNT is not considered a bioaccumulative chemical by U.S. EPA (2000), risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

2-Amino-4,6-dinitrotoluene

2-amino-4,6-dinitrotoluene (2-ADNT) was initially selected as a COPC because a Region 5 screening level is not available. The following toxicity information for 2-ADNT was located in the literature:

- Plants – 80 mg/kg (Talmage et al., 1999)
- Soil microbial processes – 80 mg/kg (Talmage et al., 1999)

The plant value is based on a study in which soil amended with 80 mg/kg of 2-ADNT was not toxic to yellow nutsedge over a 42 day period (Talmage et al., 1999). No studies based on toxicity of 2-ADNT were located, but a soil microbial processes value of 80 mg/kg was reported as nontoxic. Talmage et al., (1999) indicated that confidence in this value is low and the value unlikely to be conservative because the organisms were probably acclimated to the test compound.

2-ADNT was detected at a maximum concentration of 150 mg/kg at Building 165 at SWMU 13. 2-ADNT was detected in only 3 of 32 samples collected at Building 165 and the average in this area was significantly lower at 4.99 mg/kg. Maximum 2-ADNT concentrations at all other buildings were 1.03 mg/kg or less so it appears that the maximum concentration of 150 mg/kg at Building 165 is an isolated occurrence and that overall elevated 2-ADNT concentrations at SWMU 13 do not exist. Therefore, risks to plants and earthworms are acceptable and 2-ADNT is not retained as a COPC for risks to plants and invertebrates. Although, 2-ADNT is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

2-Nitrotoluene

2-Nitrotoluene was initially selected as a COPC because a Region 5 screening level is not available. 2-Nitrotoluene was detected in only 1 of 371 samples at SWMU 13. Uncertainties exist for evaluating risks to invertebrates and plants because toxicity information for these receptors could not be located, but the single detection across all of SWMU 13 does not warrant retaining 2-nitrotoluene as a COPC. Although, 2-nitrotoluene is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

4-Amino-2,6-dinitrotoluene

4-Amino-2,6-dinitrotoluene (4-ADNT) was initially selected as a COPC because a Region 5 screening level is not available. Alternate benchmarks for 4-ADNT are not available; therefore, 2-ADNT is used as a surrogate for comparison of toxicity information to 4-ADNT concentrations (see above).

The frequency of detections and magnitude of concentrations of 4-ADNT are similar to those of 2-ADNT. The maximum concentration of 4-ADNT of 303 mg/kg at Building 171 exceeds the 2-ADNT benchmarks; however, maximum concentrations at all other buildings at SWMU 13 were 2.95 mg/kg or less. The average concentration at Building 171 of 7.97 mg/kg is an order of magnitude less than 2-ADNT alternate benchmarks so it appears that the maximum concentration of 303 mg/kg at Building 171 is an isolated occurrence and that overall elevated 4-ADNT concentrations at SWMU 13 do not exist. Therefore, risks are possible to plants and invertebrates in the vicinity of the maximum concentration, but the risks to the overall plant and invertebrate communities at SWMU 13 are not great enough to warrant retaining 4-ADNT as a COPC for further evaluation in a BERA. Although, 4-ADNT is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

HMX

HMX was initially selected as a COPC because a Region 5 screening level is not available. The following alternate toxicity information for HMX was located:

- LOEC (280 mg/kg) for earthworm reproduction (Robidoux et al., 2001)

The LOEC was based on the number of juveniles hatching per cocoon being significantly reduced by HMX at 280 mg/kg in soil; a NOEC was not generated from the study (Robidoux et al., 2001). Also, productivity of cocoons and juveniles as well as total biomass of juveniles were significantly reduced by HMX at >280 mg/kg in soil (Robidoux et al., 2001).

HMX was detected in over half of the surface soil samples collected at SWMU 13 with the maximum HMX concentration of 5,390 mg/kg detected at Building 171. As mentioned previously, average concentrations are better indicators of surface soil conditions at SWMU 13 given the nature of the remediated soil. The average concentration at Building 171 was 212 mg/kg, which is less than the LOEC for earthworm reproduction but is greater than the estimated NOEC of 28 mg/kg (i.e., if the LOEC is divided by an uncertainty factor of 10).

Maximum concentrations of HMX at the other buildings at SWMU 13 were 100 mg/kg and less. Average concentrations at the other buildings at SWMU 13 were even lower at 2.02 and less; therefore, elevated levels and potential risks to terrestrial invertebrates appear to be isolated to the vicinity of Building 171. No toxicological data for plants could be located. Therefore, although risks to invertebrates appear to be acceptable at SWMU 13 buildings other than Building 171, the elevated concentrations in samples surrounding Building 171 and the lack of toxicity data for plants warrant further evaluation of HMX (see Summary of Surface Soil Risk). Although, HMX is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

RDX

RDX was initially selected as a COPC because a Region 5 screening level is not available. The following alternate toxicity information for RDX was located:

- Plants – 100 mg/kg (Talmage et al., 1999)
- LOEC (95 mg/kg) for earthworm reproduction (Robidoux et al., 2000)

The plant benchmark of 100 mg/kg from Talmage et al. (1999) is from a study in which an RDX concentration of 100 mg/kg significantly reduced the biomass of cucumber plants. The LOEC for earthworm reproduction was based on the productivity of juveniles (total number of juveniles, biomass, and number of juveniles per hatched cocoon) being significantly reduced by RDX at 95 mg/kg in soil; a NOEC was not generated from the study (Robidoux et al., 2000).

RDX was detected in over half of the samples collected at SWMU 13 with a maximum concentration of 29 mg/kg at Buildings 168/2500 and Building 173. The maximum RDX concentration is less than the alternate benchmarks for plants and invertebrates but is greater than the earthworm estimated NOEC of 9.5 mg/kg (i.e., if the LOEC is divided by an uncertainty factor of 10). Average concentrations at the buildings, which are better indicators of surface soil conditions at SWMU 13 given the nature of the remediated soil, were 3.19 and less. Therefore, risks to invertebrates and plants from RDX in the soil are acceptable and RDX is not retained as a COPC for risks to plants and invertebrates. Although, RDX is not considered a bioaccumulative chemical, risks to wildlife are evaluated in Section 8.4.2 of this ERA to be conservative.

Arsenic

Arsenic was initially selected as a COPC because the maximum surface soil concentration of 30.5 mg/kg exceeded the ESL of 5.7 mg/kg. However, the ESL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates; therefore, arsenic concentrations were compared to the Canadian SQG for soil invertebrates and plants to evaluate risks to these receptors.

- Canadian SQG – 17.1 mg/kg (EC, 1999)

The Canadian SQG for soil contact is the geometric mean of effects concentrations for reduction in spinach yields and is the 25th percentile of 46 data points (EC, 1999). The maximum arsenic concentration was detected in surface soils near Buildings 168 and 2500. The average concentration at these buildings was 7.94 mg/kg, which is less than the Canadian SQG of 17.1 mg/kg. Maximum concentrations at all other buildings at SWMU 13 were less than the SQG. Therefore, although there may be a risk to plants and invertebrates in some areas surrounding Buildings 168/2500, these risks are not great enough to warrant retaining arsenic for further investigation in a BERA. However, because arsenic is a bioaccumulative chemical, risks to wildlife from arsenic in the surface soil are further evaluated in Section 8.4.2.

Barium

Barium was initially selected as a COPC because the maximum soil concentration of 1,160 mg/kg detected in Building 165 surface soil exceeded the U.S. EPA Eco-SSL for soil invertebrates of 330 mg/kg (U.S. EPA, 2003).

The U.S. EPA Eco-SSL of 330 mg/kg for soil invertebrates was developed after a review of over 152 technical studies. Of these, three studies were accepted for inclusion in the development of the Eco-SSL based on a ranking that followed U.S. EPA Study Acceptance Criteria. The Eco-SSL is the geometric mean of the EC20 values (based on reproduction) reported for each of three test species under three separate test conditions of pH (U.S. EPA, 2003). The ORNL plant benchmark of 500 mg/kg is based on a study that found a 38 percent reduction in shoot growth of barley 14 days after the addition of 500 mg/kg barium, which was the lowest concentration tested (Efroymson et al., 1997a).

The maximum concentrations of barium at SWMU 13 (Building 165) and Building 173 (567 mg/kg) exceeded the Eco-SSL for soil invertebrates (330 mg/kg) and the plant benchmark from Efroymson et al. (1997a) (500 mg/kg); however, average concentrations were 120 mg/kg at Building 165 and less than

120 mg/kg at other buildings. Therefore, although potential risks from barium are possible in some areas surrounding Buildings 165 and 173, the overall risks to plants and invertebrates across SWMU 13 are acceptable and barium is not retained as a COPC for risks to these receptors.

Cadmium

Cadmium was initially selected as a COPC because the maximum soil concentration of 1.7 mg/kg detected at Building 165 exceeded the U.S. EPA Eco-SSL for mammals of 0.38 mg/kg. Because the Eco-SSL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, cadmium concentrations were compared to the U.S. EPA Eco-SSLs for soil invertebrates and plants to evaluate risks to these receptors.

- U.S. EPA Eco-SSL for soil invertebrates – 140 mg/kg (U.S. EPA, 2003)
- U.S. EPA Eco-SSL for plants – 32 mg/kg (U.S. EPA, 2003)

The U.S. EPA Eco-SSL for soil invertebrates of 140 mg/kg was developed after a review of over 239 technical studies. Of these, 10 studies were accepted for inclusion in the development of the Eco-SSL. The Eco-SSL is the geometric mean of the Maximum Acceptable Toxicant Concentration (MATC) or Effects Concentration for 10 percent of the test population (EC_{10}) values (based on growth, population, or reproduction) reported for each of three test species evaluated under six separate test conditions of pH (U.S. EPA, 2003). The U.S. EPA Eco-SSL for plants (32 mg/kg) was developed after a review of over 716 technical studies. Of these, 14 studies were accepted for inclusion in the development of the Eco-SSL. The Eco-SSL is the geometric mean of the MATC (based on growth) reported for 14 test species under six separate test conditions of pH and percent organic matter (US EPA, 2003).

The maximum cadmium detection is less than the Eco-SSLs for plants and soil invertebrates. Additionally, the maximum concentration of cadmium is within the range of background detections for NSWC Crane surface soils (0.05 mg/kg – 3.6 mg/kg). Therefore, risks to plants and invertebrates from cadmium are acceptable and cadmium is not retained as a COPC for risks to these receptors. However, because cadmium is a bioaccumulative chemical, risks to wildlife from cadmium are evaluated in Section 8.4.2 of this ERA.

Chromium

Chromium was initially selected as a COPC because the maximum soil concentration of 95.8 mg/kg exceeded the ESL of 0.4 mg/kg. However, even though the ESL is based on risks to invertebrates, the following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 64 mg/kg (EC, 1999a)

As presented in the supporting document for the Canadian SQG for chromium (EC, 1999a), the Canadian guideline for total chromium (64 mg/kg) is the geometric mean of the threshold effects concentration (TEC) of 78 mg/kg for risks to plants and invertebrates and the nutrient and energy cycling check value (NECC) of 52 mg/kg. The TEC is the 6th of 22 data points associated with the no observable effects and observable effects data for plants and invertebrates and corresponds to the average radish germination EC25. As detailed in the supporting document, no effects concentrations for earthworms (235 mg/kg to 900 mg/kg) were greater than the no effects concentrations for plants (10 mg/kg to 230 mg/kg) indicating invertebrates are less sensitive to total chromium than plants. Additionally, the Canadian SQG is based on total chromium (for which soil samples at this site were analyzed). Chromium toxicity is due primarily to hexavalent chromium, and other forms of chromium are much less toxic (Eisler, 2000). It is unlikely that chromium in SWMU 13 soil is completely hexavalent chromium. Trivalent chromium is the predominant form of this metal in most soils and is not bioavailable (Eisler, 1986b).

The maximum concentration of chromium was detected in Building 171 surface soil; however, maximum concentrations at all other buildings at SWMU 13 were 50.9 mg/kg or less. Average concentrations at all the buildings at SWMU 13, including Building 171, were 20.6 mg/kg and less.

In view of the above discussion, potential risk from chromium appears to be limited to a small area in the vicinity of Building 171 and potential risks throughout the remainder of the site are acceptable. Therefore, chromium is not retained as a COPC for risks to plants and invertebrates. However, because chromium is a bioaccumulative chemical, risks to wildlife from chromium are evaluated in Section 8.4.2 of this ERA.

Lead

Lead was initially selected as a COPC because the maximum soil concentration of 69 mg/kg exceeded the U.S. EPA Eco-SSL for birds of 16 mg/kg. Because the Eco-SSL used in the conservative COPC screening is based on risks to wildlife and not risks to plants and invertebrates, lead concentrations were compared to the U.S. EPA Eco-SSLs for soil invertebrates and plants to evaluate risks to these receptors.

- Eco-SSL for plants – 115 mg/kg (U.S. EPA, 2003)
- Eco-SSL for soil invertebrates – 1,700 mg/kg (U.S. EPA, 2003)

The Eco-SSL for plants is the geometric mean of the MATC values for four test species under three different test conditions (pH of 4.0 to 6.3). The ecological endpoint for the derivation of the Eco-SSL for plants was growth. The Eco-SSL for soil invertebrates is the geometric mean of the MATC values for one test species (*Folsomia candida*) under three different test conditions (pH of 4.5 to 6.0) and is based on a reproductive endpoint.

The maximum lead concentration at SWMU 13 is less than the U.S. EPA Eco-SSLs for plants and soil invertebrates. Therefore, risks to plants and invertebrates from lead are acceptable and lead is not retained as a COPC for risks to these receptors. However, because lead is a bioaccumulative chemical, risks to wildlife from lead are evaluated in Section 8.4.2 of this ERA.

Mercury

Mercury was initially selected as a COPC because the maximum soil concentration of 3.6 mg/kg exceeded the ESL of 0.1 mg/kg. The ESL of 0.1 mg/kg is based on risks to earthworms; however, even though the derivation of the ESL is based on earthworms, the following alternate benchmark was used to further evaluate risks to plants and soil invertebrates:

- Canadian SQG – 12 mg/kg (CCME, 1997)

As presented in the supporting document for the Canadian SQG for mercury (EC, 1999b), the Canadian guideline of 12 mg/kg for mercury is based on the 25th percentile of effects and no effects data distribution for plants and invertebrates. The 25th percentile is the 6th of 22 data points and corresponds to an EC50 for turnip seedling emergence (50 mg/kg). The EC50 value of 50 mg/kg was then divided by an uncertainty factor of 4 considering the importance of definitive effects data. In Appendix VIII of the supporting document, NOECs for earthworm survival were reported at 96 mg/kg and 100 mg/kg in soils of pH 4.0 to 4.2 and 7.4, respectively.

Although the ESL is based on exposure to earthworms, the derivation and exposure endpoint of the ESL cannot be verified. The ESL appears overly conservative when compared to the SQG, which incorporates NOEC data at much higher concentrations for earthworm survival; therefore the SQG appears to be a more appropriate value for comparing to mercury concentrations at SWMU 13. The

maximum detected mercury concentration is less than the SQG; therefore risks to plants and soil invertebrates are acceptable. Mercury is not retained as a COPC for risks to plants and invertebrates; however, because mercury is a bioaccumulative chemical, risks to wildlife from mercury are evaluated in Section 8.4.2.

Selenium

Selenium was initially selected as a COPC because the maximum surface soil concentration of 12.4 mg/kg exceeded the ESL of 0.0276 mg/kg. However, the ESL is based on risks to wildlife and not plants and invertebrates. Therefore, selenium concentrations were compared to alternate benchmarks to evaluate risks to these receptors.

- Canadian SQG – 1 mg/kg (EC, 2001)

The SQG is based on an approximately 60 percent reduction in sorgrass (*Sorghum vulgare*) shoot growth over 42 days. Although there is no reason to suspect that selenium is present in surface soils at SWMU 13 as a result of historical activities, the maximum concentration of selenium is greater than the background maximum selenium concentration of 0.64 mg/kg. Average concentrations at the individual buildings were greater than the maximum background concentration except at Building 174 (0.237 mg/kg). Additionally, 22 out of 57 positive detections for selenium exceeded the SQG. Therefore, although the source of selenium in surface soils at SWMU 13 is unknown, the elevated concentrations with respect to the SQG warrant further evaluation of selenium (see Summary of Surface Soil Risk). Because selenium is a bioaccumulative chemical, risks to wildlife from selenium are evaluated in Section 8.4.2.

Summary of Surface Soil Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on soil invertebrates and plants) for the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate. Four chemicals initially selected as COPCs were retained for further evaluation (Aroclor-1248, 2,4,6-TNT, HMX, and selenium) because concentrations at multiple locations were greater than alternate toxicity thresholds.

Surface soil samples for analysis of explosives and metals were collected in areas immediately surrounding the buildings at SWMU 13 (see Figures 1-5 through 1-8) which are maintained grassy areas

to allow access to the buildings at SWMU 13. Therefore, significant plant diversity is not expected to exist in these areas. The areas in the middle of SWMU 13 and the areas along the boundary of the ridge top are heavily vegetated (see photographs in Appendix A), so the potentially impacted areas adjacent to the buildings only represent a small percentage of habitat at SWMU 13. Although localized impacts from Aroclor-1248, TNT, HMX, and selenium in the surface soil are expected in some areas, risks to the plant and invertebrate populations as defined by the SWMU boundaries are acceptable.

8.4.1.2 Benthic Invertebrates – Sediment Risk

As presented in Sections 8.3.2.2 and 8.3.2.3, several sediment and surface water samples were collected in the intermittent drainage ditches/gullies leading from SWMU 13, and several chemicals detected in the samples were initially selected as COPCs because they were detected at concentrations that exceeded screening levels. Although surface water samples were collected from many of these locations, most of the samples were taken from small pools of standing water as recorded in the sample log sheets (see Appendix C) and the photographs (see Appendix A). In fact, during the Round 3 sampling event, many of the surface water locations were dry during the first attempt to collect samples so the water samples were collected after a rain event when water was present. There is very little ecological habitat in these drainage ditches throughout most of the year (see photographs in Appendix A). Therefore, although some of the chemical concentrations in the sediment and surface water samples exceeded the screening levels for aquatic receptors, there is very little exposure so any risks would not be significant. For that reason, none of the chemicals in the drainage ditch/gully samples are retained as COPCs for further evaluation of risks to aquatic organisms. However, the chemical data in these samples is used in the Step 3a evaluation of the mainstream samples (in Sections 8.4.1.2 and 8.4.1.3) to determine whether the chemicals may be related to site activities.

Table 8-7 presents a summary of the common alternate benchmarks used in refining the list of COPCs in sediment, along with a summary of the Step 3a evaluation. The upgradient sediment concentration range is also presented.

Aluminum

Aluminum was initially selected as a COPC because an ESL was not available. The alternate benchmark selected for aluminum is the Threshold Effects Level (TEL) of 25,500 mg/kg (Buchman, 1999). The TEL represents the concentration below which adverse effects on survival or growth of the amphipod *Hyalella azteca* are expected to occur only rarely in 28-day tests (MacDonald et al., 2000).

The maximum concentration of 13,700 mg/kg is less than the TEL; therefore, risks to sediment-dwelling biota are acceptable and aluminum is not retained as a COPC.

Antimony

Antimony was initially selected as a COPC because an ESL was not available. The alternate benchmark selected for antimony is the Effects Range Low (ER-L) of 2 mg/kg (Long and Morgan, 1991). The Effects Range Median (ER-M) for antimony is 25 mg/kg. The maximum detected concentration of 4.7 mg/kg exceeds the conservative ER-L but is less than the ER-M. It is noted in Long et al. (1995) that concentrations greater than the ER-L but less than the ER-M represent the range within which effects "would occasionally occur".

Antimony was detected in all five sediment samples collected in mainstream samples with an average concentration of 2.58 mg/kg. The average antimony concentration only slightly exceeds the conservative ER-L and only exceeds the ER-L because of the maximum concentration (4.7 mg/kg). The maximum concentration was detected during Round 2; however, the concentration of antimony at the same location (13SD30) was 2 mg/kg during Round 3 (see Figure 5-6). Antimony concentrations at the background location were 2.1 mg/kg during Round 2 and 1.8 mg/kg during Round 3; therefore, antimony concentrations in SWMU 13 sediment samples do not appear elevated relative to background concentrations. Although potential risks may exist in the area of the maximum detection, these risks do not appear to be related to SWMU 13. Site-related risks to benthic organisms are acceptable and antimony is not retained as a COPC.

Arsenic

Arsenic was initially selected as a COPC because the maximum detected sediment concentration of 56.9 mg/kg exceeded the Region 5 ESL of 9.79 mg/kg, which is based on the Consensus-based TEC. The TEC is the geometric mean of the threshold effect level (TEL; Smith et al., 1996), ER-L (Long and Morgan, 1991), lowest effect level (LEL; Persaud et al., 1993), minimal effect threshold (MET; EC and MENVIQ, 1992), and sediment quality advisory levels (SQALs; US EPA, 1997) for arsenic. These individual effect levels for each of the studies cited above were calculated using slightly different methods, but they all represent concentrations below which impacts to sediment invertebrates are either unlikely or not expected. For that reason, the TEC is intended to identify contaminant concentrations below which harmful effects on sediment dwelling organisms are not expected.

The maximum arsenic concentration is greater than the TEC and therefore, was compared to the consensus-based PEC to provide an estimate of the overall risk range. The PEC is 33 mg/kg (MacDonald et al., 2000). The PEC was derived similarly to the TEC but is the geometric mean of the probable effect levels (PELs; Smith et al., 1996), effect range median values (ER-Ms; Long and Morgan, 1991), severe effect levels (SELs; Persaud et al., 1993) and Toxic Effect Thresholds (TETs; EC and MENVIQ, 1992). The PEC is the level above which harmful effects on sediment dwelling organisms are expected to frequently occur (MacDonald, et al., 2000). Both the maximum concentration (56.9 mg/kg) and the average concentration (40.6 mg/kg) exceed the consensus-based PEC.

Overall, arsenic concentrations in the sediment are greater in mainstream samples than gully samples; therefore, the source of the arsenic concentrations is unlikely surface run-off from the SWMU. In addition, based on historical operations at SWMU 13 and the relatively low arsenic concentrations in the surface soil, a definitive link of arsenic in the sediment to SWMU 13 cannot be made. Concentrations are greater than the PEC in downstream sediment samples, indicating the extent of elevated arsenic concentrations with respect to the PEC is unknown (see Figure 5-7). Although the source of arsenic in mainstream sediments is unclear, the elevated concentrations with respect to the TEC and PEC and the lack of bounding the concentrations warrant retaining arsenic as a COPC in sediment for further evaluation.

Barium

Barium was initially selected as a COPC because an ESL was not available. The only available alternate benchmark for barium is the Apparent Effects Threshold (AET) of 48 mg/kg (Buchman, 1999). Based on the Navy's agreement with U.S. EPA, if a chemical only has a higher effects level such as an AET, the chemical will not be eliminated as a COPC even if the maximum detection is below the higher effects level, unless other Step 3a factors can be used to justify the chemical's elimination as a COPC.

Barium was detected in all five mainstream sediment samples at SWMU 13 with concentrations ranging from 77.4 mg/kg to 207 mg/kg; background concentrations were 90.7 mg/kg during Round 2 and 137 mg/kg during Round 3. Concentrations in gully samples ranged from 28.5 mg/kg to 693 mg/kg. The paucity of toxicity data inhibits a complete evaluation of risks posed by barium. However, barium is a common element in sediments and it is not generally associated with significant toxicity (ATSDR, 1997). Additionally, detections of barium are somewhat sporadic across the SWMU with concentrations similar to the upstream concentrations. Although the maximum concentration (207 mg/kg at 13SD30 during Round 3) was greater than the upstream concentrations, the concentration at this location during Round 2 was 125 mg/kg, which is similar to the background concentrations. Therefore, barium concentrations in SWMU 13 sediment samples do not appear elevated relative to upstream concentrations. Although

potential risks may exist in the area of the maximum detection, these risks do not appear to be related to SWMU 13. Site-related risks to benthic organisms are acceptable and barium is not retained as a COPC.

Beryllium

Beryllium was initially selected as a COPC because an ESL is not available. No alternate benchmarks are available for beryllium.

Beryllium was detected in all five samples collected at SWMU 13 at similar concentrations (1.9 to 3.7 mg/kg). Background concentrations of beryllium were slightly lower than mainstream sediment samples ranging from 2 mg/kg to 2.3 mg/kg. Beryllium was not detected in mainstream surface water samples at SWMU 13 and was not analyzed for in surface soil samples. Beryllium concentrations in gully samples that drain to the mainstream were low. With the exception of a beryllium concentration of 4.3 mg/kg at 13SD22, beryllium concentrations were less than 2 mg/kg. Given the past operations that occurred at SWMU 13 (i.e., production and manufacture of explosives and leaking of PCBs from boilers), it is unlikely that the low beryllium concentrations are related to former SWMU activities. Therefore, although risks to benthic invertebrates cannot be ruled out because of the lack of toxicity data, any potential site-related risks from beryllium are not great enough to warrant carrying beryllium further through the BERA process. Risks to sediment dwelling invertebrates are acceptable and beryllium is not retained as a COPC.

Cadmium

Cadmium was initially selected as a COPC because the maximum concentration of 17.1 mg/kg in mainstream sediment samples exceeded the ESL of 0.99 mg/kg which is based on the TEC. Therefore, cadmium concentrations were compared to the PEC to further evaluate risks to sediment invertebrates from exposure to cadmium in the sediment. The consensus-based PEC is 4.98 mg/kg (MacDonald et al. 2000). Background concentrations were less than the PEC and ranged from 1.8 mg/kg to 4.3 mg/kg. Cadmium was detected in all five mainstream sediment samples collected at concentrations greater than the PEC and greater than background concentrations. Cadmium was not detected in most gully sediment samples. In samples where cadmium was detected, concentrations were typically less than 1 mg/kg, but the maximum concentration in gully samples that drain to the mainstream was 4.1 mg/kg. Overall, cadmium concentrations in the sediment are greater in mainstream samples than gully samples; therefore, the source of the cadmium concentrations is unlikely surface run-off from the SWMU. However, based on historical operations at SWMU 13 and the relatively low cadmium concentrations in the surface soil, a definitive link of cadmium in the sediment to SWMU 13 cannot be made.

As mentioned previously, the PEC is the level above which harmful effects on sediment dwelling organisms are expected to frequently occur (MacDonald, et al., 2000); therefore, despite the uncertainty of the source of cadmium in the mainstream sediments, the elevated concentrations with respect to the PEC indicate risks to sediment invertebrates are possible. Additionally, concentrations are greater than the PEC in downstream sediment samples, indicating the extent of elevated cadmium concentrations with respect to the PEC is unknown (see Figure 5-7). For these reasons, risks to sediment invertebrates from cadmium are not acceptable and cadmium is retained as a COPC for these receptors.

Chromium

Chromium was initially selected as a COPC because the maximum concentration of 192 mg/kg exceeded the ESL of 43.4 mg/kg, which is based on the TEC. Therefore, chromium concentrations were compared to the PEC to further evaluate risks to sediment invertebrates from exposure to chromium in the sediment. The consensus-based PEC is 111 mg/kg (MacDonald et al., 2000). Maximum (192 mg/kg) and average (123 mg/kg) chromium concentrations exceed the PEC and background concentrations which ranged from 49.1 mg/kg to 77.2 mg/kg.

Overall, chromium concentrations in the sediment are greater in mainstream samples than gully samples; therefore, the source of the chromium concentrations is unlikely surface run-off from the SWMU. However, based on historical operations at SWMU 13 and the relatively low chromium concentrations in the surface soil, a definitive link of chromium in the sediment to SWMU 13 cannot be made. Nevertheless, the elevated chromium concentrations with respect to the PEC indicate risks to benthic invertebrates from chromium are not acceptable and chromium is retained as a COPC for risks to sediment dwelling invertebrates.

Iron

Iron was initially selected as a COPC because an ESL is not available. Because an ESL and a consensus based TEC are not available for the screening, iron concentrations are compared to the Canadian SQGs.

- Canadian Sediment Guidelines LEL – 20,000 mg/kg (OMOE, 1993)
- Canadian Sediment Guidelines SEL – 40,000 mg/kg (OMOE, 1993)

The LEL indicates the level of sediment contamination which has no effect on and can be tolerated by the majority of sediment-dwelling organisms. The Canadian sediment guidelines were developed by first calculating the 90th percentile of the concentrations evaluated in toxicity studies where a species was present, and then plotting the 90th percentile concentrations for all of the species considered to develop the guideline. The 5th percentile of the plot was selected as the LEL for metals.

The maximum detected concentration of iron (299,000 mg/kg) is greater than the LEL. Therefore, concentrations of iron are compared to the SEL in order to further evaluate potential risks to benthic organisms. The SEL is the level in which sediment is considered heavily polluted and detrimental to the overall health of the majority of sediment-dwelling organisms. The SEL is 40,000 mg/kg. Iron was detected in all five mainstream sediment samples collected and concentrations in every sample exceeded the SEL. However, upstream concentrations also exceeded the SEL and ranged from 120,000 mg/kg to 121,000 mg/kg. Iron was not analyzed for in surface soil samples; therefore, although risks to benthic invertebrates are possible, it is unclear whether SWMU 13 is the source of elevated iron concentrations in mainstream samples or whether concentrations are attributable to background conditions. Despite elevated concentrations with respect to the alternate benchmarks, there is no reason to suspect that iron concentrations in surface soil at SWMU 13 are also elevated and/or contributing to sediment concentrations given the history of SWMU operations.

Iron was detected in mainstream surface water samples, but was not retained as a COPC because it was detected at a concentration less than the ESL. Overall, iron concentrations in the sediment are greater in mainstream samples than gully samples; therefore, the source of the iron concentrations is unlikely surface run-off from the SWMU. In addition, based on historical operations at SWMU 13, a definitive link of iron in the sediment to SWMU 13 cannot be made. Nevertheless, the elevated iron concentrations with respect to the SEL and upstream sample concentrations warrant retaining iron as a COPC.

Lead

Lead was initially selected as a COPC because the maximum mainstream sediment concentration (45.6 mg/kg) exceeded the ESL of 35.8 mg/kg, which is based on the TEC. Therefore, concentrations of lead in the sediment are compared to the consensus-based PEC to further evaluate potential risks to benthic organisms. The maximum lead concentration is greater than the TEC, but less than the PEC of 128 mg/kg. Lead was detected in all five mainstream sediment samples collected with an average concentration (38 mg/kg) only slightly greater than the TEC. Therefore, although concentrations in some samples are between the TEC and the PEC, impacts to benthic invertebrates are possible, but not probable. Upstream concentrations of lead (20.6 mg/kg to 25.2 mg/kg) were within the same range of

detections as mainstream samples. Additionally, lead concentrations were low in surface soil samples (i.e., maximum concentration of 69 mg/kg in 227 samples) and concentrations were less than the ESL is most gully sediment samples that drain to the mainstream. Therefore, although risks to sediment invertebrates from lead in the sediment are possible, the potential risks from lead are not great enough to warrant retaining it as a COPC.

Manganese

Manganese was initially selected as a COPC because an ESL is not available. Because an ESL and a consensus based TEC are not available for the screening, manganese concentrations are compared to the Canadian SQGs.

- Canadian Sediment Guidelines LEL – 460 mg/kg (OMOE, 1993)
- Canadian Sediment Guidelines SEL – 1,100 mg/kg (OMOE, 1993)

As mentioned previously, the LEL indicates the level of sediment contamination which has no effect on and can be tolerated by the majority of sediment-dwelling organisms and the SEL is the level in which sediment is considered detrimental to the health of the majority of sediment-dwelling organisms. Manganese was detected in all five mainstream sediment samples collected at SWMU 13 and manganese concentrations exceeded the SEL in all five samples. It should be noted; however, that upstream concentrations, although less than site sample concentrations, were also greater than the SEL. Manganese was detected in all 30 gully samples collected with concentrations that ranged from 65.3 mg/kg to 6,130 mg/kg. Additionally, concentrations are greater than the SEL in downstream sediment samples, indicating the extent of elevated manganese concentrations with respect to the SEL is unknown (see Figure 5-12). For these reasons, risks to sediment invertebrates from manganese are not acceptable and manganese is retained as a COPC for these receptors.

Nickel

Nickel was initially selected as a COPC because the maximum detected sediment concentration of 47.8 mg/kg exceeded the ESL of 22.7 mg/kg which is based on the TEC. Because the maximum concentration exceeds the TEC, nickel concentrations were compared to the consensus-based PEC to further evaluate risks to sediment invertebrates.

The consensus-based PEC is 48.6 mg/kg (MacDonald et al. 2000). The maximum concentration exceeds the TEC but not the PEC. Uncertainties exist with concentrations between the TEC and the

PEC because the TEC and PEC are not intended to provide toxicity guidance within this range of concentrations (MacDonald et al. 2000). Additionally, mainstream sediment concentrations are within the range of background sediment concentrations (41.5 mg/kg to 54.1 mg/kg). Therefore, although it is possible that the nickel concentrations in the sediment are adversely impacting benthic invertebrates at some locations, the nickel in the sediment does not appear to be related to site activities. For that reason, site-related risks to benthic invertebrates from nickel are acceptable so nickel is not retained as a COPC for risks to sediment dwelling invertebrates.

Selenium

Selenium was initially selected as a COPC because an ESL is not available. No alternate benchmarks are available for selenium so other Step 3a factors, as discussed in Section 8.4.1, are used to evaluate risks to sediment invertebrates.

Selenium was detected in all five mainstream sediment samples collected at SWMU 13; concentrations were similar among all samples and ranged from 0.62 mg/kg to 1.5 mg/kg. Selenium was also detected in the majority of gully sediment samples with concentrations (0.18 mg/kg to 1.1 mg/kg) similar to those seen in mainstream samples. Concentrations in mainstream samples were also similar to the range of upstream detections (0.48 mg/kg to 0.85 mg/kg). Therefore, although the paucity of data precludes a complete evaluation of selenium concentrations in sediment, the selenium in the sediment does not appear to be related to site activities. For that reason, site-related risks to benthic invertebrates from selenium are acceptable so selenium is not retained as a COPC for risks to sediment dwelling invertebrates.

Titanium

Titanium was initially selected as a COPC because an ESL is not available. Only one sample was analyzed for titanium and so concentrations in other areas of the mainstream are unknown. Alternate screening levels for titanium are not available; however, titanium is generally poorly soluble, poorly bioavailable, and non-toxic. Additionally, there is no reason to suspect that titanium is present in media at SWMU 13 as a result of former activities at SWMU 13 (i.e., production and manufacture of explosives and leaking of PCBs from boilers). Although the paucity of data precludes a thorough risk evaluation of titanium in sediment, the uncertainties are not great enough to warrant retaining titanium for further evaluation in a BERA and titanium is not retained as a COPC for sediment-dwelling organisms.

Vanadium

Vanadium was initially selected as a COPC because an ESL is not available. The only available alternate benchmark for vanadium is the AET of 57 mg/kg (Buchman, 1999), which is based on marine organisms. Based on the Navy's agreement with U.S. EPA, if a chemical only has a higher effects level such as an AET, the chemical will not be eliminated as a COPC even if the maximum detection is below the higher effects level, unless other Step 3a factors can be used to justify the chemicals elimination as a COPC.

Vanadium was detected in all five mainstream sediment samples; concentrations ranged from 48.3 mg/kg to 101 mg/kg. The average concentration was 73.5 mg/kg, which is greater than the AET for vanadium. Concentrations of vanadium in the gully sediment samples were comparable to those detected in mainstream samples and ranged from 11.8 mg/kg to 144 mg/kg. Upstream vanadium concentrations were similar overall to mainstream sediment samples and ranged from 47.6 mg/kg to 61.6 mg/kg. Although the maximum concentration (101 mg/kg at 13SD30 during Round 2) was greater than the upstream concentrations, the concentration at this location during Round 3 was 67.5 mg/kg, which is similar to the upstream concentrations. Therefore, vanadium concentrations in SWMU 13 sediment samples do not appear elevated relative to upstream concentrations. Although potential risks may exist in the area of the maximum detection, these risks do not appear to be related to SWMU 13. Site-related risks to benthic organisms are acceptable and vanadium is not retained as a COPC.

Zinc

Zinc was initially selected as a COPC because the maximum concentration of 195 mg/kg exceeded the ESL of 121 mg/kg, which is based on the TEC. Because the maximum concentration exceeds the TEC, zinc concentrations were compared to the PEC to further evaluate risks to sediment invertebrates.

The consensus-based PEC is 459 mg/kg (MacDonald et al. 2000). As mentioned previously, uncertainties exist with concentrations between the TEC and the PEC because the TEC and PEC are not intended to provide toxicity guidance within this range of concentrations (MacDonald et al. 2000). Additionally, zinc concentrations are closer to the TEC than they are to the PEC. However, zinc concentrations in gully samples ranged from 7.9 mg/kg to 541 mg/kg indicating that possible sources to the mainstream exist. Additionally, zinc concentrations in all mainstream sediment samples were greater than those detected at upstream locations (73.1 mg/kg to 98.3 mg/kg; see Table 8-3). Concentrations are greater than the TEC in downstream sediment samples, indicating the extent of elevated zinc concentrations with respect to the TEC is unknown. For these reasons, risks to sediment invertebrates from zinc are not acceptable and zinc is retained as a COPC for these receptors.

Acid Volatile Sulfides/Simultaneously Extracted Metals

Seven sediment samples in the drainage ditch/gully samples were analyzed for acid volatile sulfides (AVS) and simultaneously extracted metals (SEM). AVS binds, on a molar basis, a number of cationic metals of environmental concern (cadmium, copper, lead, nickel, silver, and zinc) (U.S. EPA, 2005). In sediment samples where the AVS molar concentrations are greater than SEM molar concentrations, the SEM metals are not expected to be bioavailable or directly toxic to benthic invertebrates. However, in sediment samples where the AVS molar concentrations are less than SEM molar concentrations, the SEM metals are not necessarily bioavailable or directly toxic to benthic invertebrates, because other parameters such as TOC may reduce the bioavailability and toxicity of metals in the sediment. Sediments that are anoxic typically have greater AVS concentrations than sediments that are well aerated.

The metals included in the SEM analysis at SWMU 13 included cadmium, copper, lead, mercury, nickel, and zinc. As presented in U.S. EPA (2005), other metals such as mercury can be included in the SEM analysis if they may be a concern at a site. Silver was not included in the list of analytes because it was not expected to be a metal of concern, as supported by the fact that it was not detected in any of the sediment samples.

As discussed above, because of the poor habitat in the drainage ditches/gullies, it is not likely that benthic invertebrates will be present for significant periods of time, if at all. Therefore, although the utility of the AVS/SEM measurements in samples from these areas may be somewhat limited, the results do provide some useful insight into the potential bioavailability of these metals in this area. In three of the sediment samples analyzed for AVS and SEM, the ratio of AVS to SEM was greater than 1.0, with values ranging from 1.5 to 3.6 (see Table 3-22). The SEM metals that have the greatest molar concentrations are zinc in samples from 13SD02 and 13SD11 and copper from 13SD08. The bulk sediment concentrations of copper and zinc in those samples are not particularly elevated, as can be see from Table 3-22, so the slightly elevated AVS/SEM ratios may just be an artifact of the variability observed at low concentrations of AVS and SEM. Similar low concentrations of AVS would be expected in the sediment samples collected from the mainstream because the stream is dry for a majority of the year and sediments in the stream would not be expected to become anoxic.

Summary of Sediment Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on sediment invertebrates) for

the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate. Six chemicals initially selected as COPCs were retained as COPCs for further evaluation: arsenic, cadmium, chromium, iron, manganese, and zinc.

Although the mainstream at SMWU 13 is typically wet only during and following heavy rain events and the presence of sediment invertebrates is likely sporadic; concentrations of COPCs retained for further evaluation exceed upper-effects levels in downstream samples. Concentrations of these COPCs; therefore, have the potential to migrate to Boggs Creek where aquatic habitat is permanent. Because samples from Boggs Creek were not collected, the extent of the elevated concentrations is unknown. Therefore, because concentrations of some chemicals are greater than the upper-effects levels and the extent of contamination is unknown, risks are not acceptable to sediment invertebrates at SWMU 13.

8.4.1.3 Aquatic Organisms – Surface Water Risk

Table 8-8 presents a summary of some of the common alternate benchmarks that were used in refining the list of COPCs in the mainstream surface water samples, along with a Step 3a evaluation. The summary of upgradient surface water comparisons is presented in Appendix G.

WQS for surface water have been developed for Indiana (IDEM, 1998). In addition, U.S. EPA has established AWQC for several contaminants (U.S. EPA, 2002). The IDEM WQS and AWQC were reviewed; however, values for the chemicals initially selected as COPCs are not available. Therefore, other, non-regulatory surface water screening values were used to evaluate the data, where necessary. The following sections discuss these values, as appropriate.

HMX, MNX, and RDX

These explosives were initially selected as COPCs because no Region 5 surface water screening levels were available. The maximum detections of HMX (3.2 µg/L) and RDX (9.9 µg/L) were less than the secondary chronic values (SCVs) of 330 µg/L and 190 µg/L, for HMX, and RDX, respectively, developed in Talmage et al. (1999). No screening benchmarks are available for MNX, but the maximum detection of 0.31 µg/L is likely below concentrations that would cause a risk to aquatic receptors, based on the screening benchmarks for the other energetic compounds. Therefore, the explosives in the surface water are not likely to cause adverse effects to aquatic receptors and risks are considered acceptable; explosives are not retained as COPCs for risks to aquatic receptors.

Barium

Barium was initially selected as a COPC in filtered mainstream surface water samples because the maximum concentration of 280 µg/L was greater than the ESL of 220 µg/L. Barium was not retained as a COPC in unfiltered mainstream samples because the maximum concentration was 57.8 µg/L, which is less than the ESL. Typically, concentrations in filtered samples are less than concentrations in unfiltered samples because filtered samples represent only the bioavailable portion of chemical concentrations in the surface water column while unfiltered samples represent the bioavailable portion plus sediment particulate concentrations. The barium concentrations in filtered and unfiltered samples therefore, are somewhat perplexing. The maximum barium concentration in unfiltered samples is within the range of upstream concentrations (53.7 µg/L to 62.7 µg/L). Also, the average concentration in filtered samples (181 µg/L) is less than the ESL. Overall risks to aquatic organisms from barium in the surface water are acceptable and barium is not retained as a COPC.

Cobalt

Cobalt was initially selected as a COPC in filtered mainstream surface water samples because an ESL for cobalt is not available. Because an ESL and AWQC are not available for cobalt, concentrations in surface water are compared to the following benchmark:

- ORNL SCV for aquatic life - 23 µg/L (Suter and Tsao, 1996)

The ORNL chronic benchmark was developed using the Tier II method described in the U.S. EPA's Proposed Water Quality Guidance for the Great Lakes System in U.S. EPA (1993b) (Suter and Tsao, 1996). Tier II values were developed so that aquatic benchmarks could be established with fewer data than are required for the AWQC. Tier II values are concentrations expected to be higher than AWQC in no more than 20 percent of cases (Suter and Tsao, 1996).

The maximum filtered cobalt concentration is less than the SCV. Additionally, the maximum concentration (2.8 µg/L) was within the upstream range of cobalt filtered concentrations (0.16 µg/L to 3.2 µg/L). For these reasons, risks to aquatic receptors in the mainstream at SWMU 13 are acceptable and cobalt is not retained as a COPC for these receptors.

Manganese

Manganese was initially selected as a COPC in unfiltered and filtered mainstream surface water samples because an ESL is not available. Because an ESL and AWQC are not available for manganese, concentrations in the surface water are compared to the following benchmark:

- ORNL SCV for aquatic life - 120 µg/L (Suter and Tsao, 1996)

Also, the U.S. EPA 1986 Quality Criteria for Water (the Gold Book) indicates that ions of manganese are found rarely at concentrations above 1 mg/L and, because the tolerance values reported range from 1.5 mg/L to over 1000 mg/L, manganese is not considered to be a problem in fresh waters (U.S. EPA, 1986). For manganese in mainstream surface water samples, the maximum detected concentration was 7.9 µg/L (unfiltered samples) and 23 µg/L (filtered samples); these concentrations are less than the SCV. Because the SCV for manganese is very conservative (Suter and Tsao, 1996), risks to aquatic life from manganese are acceptable and manganese is not retained as a COPC for these receptors.

Titanium

Titanium was initially selected as a COPC in unfiltered and filtered samples because an ESL is not available. Alternate screening levels for titanium are not available; however, titanium is generally poorly soluble, poorly bioavailable, and non-toxic. Additionally, there is no reason to suspect that titanium is present in surface water as a result of former activities at SWMU 13 (i.e., production and manufacture of explosives and leaking of PCBs from boilers). Although the paucity of data precludes a thorough risk evaluation of titanium in surface water, the uncertainties are not great enough to warrant retaining titanium for further evaluation in a BERA and titanium is not retained as a COPC for aquatic organisms.

Nitrite/Nitrate-N

Nitrite/Nitrate-N was initially selected as a COPC in unfiltered and filtered samples because an ESL is not available. The form of N that is present in surface waters is based on the amount of oxygen present (CCME, 2003). In well oxygenated (i.e., aerated) waters, anionic species of nitrogen such as nitrate are easily transported and stable (USGS, 1992). Nitrate, on the other hand, is considered unstable in well oxygenated (and shallow) surface waters (USGS, 1992). In fact, nitrite is rapidly oxidized to nitrate in well oxygenated waters, such as typical surface water bodies. Surface water bodies at SWMU 13 are well oxygenated with DO concentrations ranging from 8.72 mg/L to 11.45 mg/L. Therefore, nitrate is the

predominant form of nitrogen available to aquatic organisms at SWMU 13 and is the more appropriate nitrogen species for evaluating toxicity to these receptors.

The Canadian water quality guideline for freshwater aquatic life (CCME, 2003) for nitrate is 13 mg/L. This value is based on a 10-day chronic study where toxicity of nitrate as sodium nitrate to the Pacific treefrog (P. regilla) was studied. A significant decrease in larval weight was observed at 133 mg/kg. The water quality guideline for freshwater aquatic life of 13 mg/L was derived by multiplying the LOEC from this study by a safety factor of 0.1. Other literature studies based on other freshwater aquatic life were reviewed in deriving the water quality guideline (i.e., invertebrates, amphibians, and fish); however, amphibians were identified as the most sensitive species. The maximum concentration of 0.28 mg/L in mainstream samples is less than the Canadian water quality guideline for freshwater species; therefore, risks to aquatic organisms is acceptable. Nitrate (and the N-complex) is not retained as a COPC for aquatic organisms.

Summary of Surface Water Risk

In summary, the list of chemicals initially selected as COPCs were further evaluated in Step 3a, the first step of the BERA. After a review of alternate toxicity information (based on aquatic organisms) for the initial COPCs was conducted, maximum and average concentrations were compared to the alternate toxicity information, as appropriate. No chemicals initially selected as COPCs were retained as COPCs for further evaluation because concentrations were less than alternate toxicity information or background concentrations.

8.4.2 Food-Chain Modeling

Most of the above-mentioned alternate benchmark values are not designed to evaluate risks to terrestrial wildlife via the ingestion of the soil, surface water, plants, and invertebrates. Therefore, a terrestrial intake model was used to estimate exposure of terrestrial receptors to COPCs. As presented in Figures 8-2 and 8-4, food-chain modeling was conducted on chemicals that are considered to be bioaccumulative [i.e., included in the list of important bioaccumulative chemicals in U.S. EPA (2000)] and also exceeded the Region 5 ESL, which do take into account risks to wildlife. Although explosives are not included in the U.S. EPA list of bioaccumulative chemicals (U.S. EPA, 2000), they were included in the food-chain model in order to be conservative. If the chemical was less than the ESL or is not bioaccumulative, it was not carried through the food-chain model. It was concluded that these chemicals are not causing an unacceptable risk to wildlife at SWMU 13. Tables 8-1 (surface soil) and 8-5 (surface water) list the chemicals that were retained for food-chain modeling.

8.4.2.1 Food-Chain Modeling Methodology

Risk to terrestrial receptors as a result of exposure to COPCs in the soil and surface water were determined by estimating the chronic daily intake (CDI) (see below) and comparing the total CDI to TRVs representing acceptable daily doses in mg/kg/day. The TRVs were developed from NOAELs and lowest-observed-adverse-effect levels (LOAELs) obtained from wildlife studies, when available. The majority of the TRVs came from the ORNL Toxicological Benchmarks for Wildlife: 1996 Revision (Sample, et al., 1996).

For avian species, the NOAEL (or LOAEL) for the test species was used as the NOAEL (or LOAEL) for the surrogate species in accordance with Sample et al. (1996) or other sources that were used. For mammalian species, the NOAEL (or LOAEL) from one species was adjusted to a NOAEL (or LOAEL) for the surrogate species using the following modified body weight scaling equation (from Sample et al., 1996):

$$NOAEL_w = NOAEL_t * (bw_t / bw_w)$$

Where:
$NOAEL_w$ = no-observed-adverse-effect level for the surrogate wildlife species
$NOAEL_t$ = no-observed-adverse-effect level for the test species
bw_t = body weight of the test species
bw_w = body weight of the surrogate test species

Note that based on more recent publications [Sample, B. and C. Arenal 1999, Allometric Models for Interspecies Extrapolation of Wildlife Toxicity Data (Bull Environ Contam Toxicol 62: 653-663)], U.S. EPA Region 5 indicated that the use of the metabolic scaling factor may not be appropriate for toxicity/body weight extrapolation factors. Therefore, U.S. EPA recommended that the toxicity/body weight equation be performed without the use of the scaling factor of 0.25. The body weight scaling is performed because studies have shown that, for mammals, numerous physiological functions such as metabolic rate, as well as responses to toxic chemicals, are a function of body size (Sample et al., 1996).

Appendix J.4 presents the derivation of the TRVs. Table J.4-1 in Appendix J.4 presents the TRVs as they were used in the food-chain modeling. If a subchronic study was used to develop the TRV, the final value was multiplied by a factor of 0.1 to account for uncertainty between subchronic and chronic effects. If a LOAEL study was used to develop the NOAEL TRV, the LOAEL was multiplied by a factor of 0.1 to obtain the NOAEL.

Terrestrial soil invertebrates and plants are exposed to contaminants in surface soil through direct contact and/or ingestion. Aquatic organisms are exposed to contaminants in surface water and sediment through direct contact and/or ingestion.

COPC intake for wildlife exposed to the COPCs in surface soil and surface water were estimated as daily dose (mg/kg-day) using exposure equations. The contaminant concentrations in surface soil and surface water were used to calculate CDI doses. The following equations presents the CDI equations that were used in calculating a total daily dose for the surrogate species selected for modeling:

$$\text{Dose, surface soil (mg/kg - day)} = \frac{(SC * SI)}{BW}$$

$$\text{Dose, surface water (mg/kg - day)} = \frac{(SW * WI)}{BW}$$

$$\text{Dose, food (mg/kg - day)} = \frac{(FC * FI)}{BW}$$

$$\text{Total CDI (mg/kg - day)} = [\text{Dose (surface soil)} + \text{Dose (surface water)} + \text{Dose (food)}] * H$$

Where:

	FI	= Food ingestion rate (kg/day)
	FC	= Food concentration (mg/kg)
	WI	= Surface water ingestion rate (L/day)
	SW	= Surface water concentration (mg/L)
	BW	= Body weight (kg)
	SI	= Incidental soil ingestion rate (kg/day)
	SC	= Soil concentration (mg/kg)
	H	= Home Range/Contaminated Area (assume = 1 for maximum exposure)

For organic constituents and metals in surface soil, the contaminant concentration of prey items for the insectivorous and herbivorous species (e.g., earthworms and vegetation) is calculated using the following equation:

$$FC = SC * BAF$$

Where: FC = Contaminant concentration in food (e.g., earthworms and vegetation, kg/day)
SC = Contaminant concentration in surface soil (mg/kg)
BAF = Soil to plant or soil to invertebrate bioaccumulation factor (unitless)

For dioxins, Aroclor-1248, and metals in surface soil, the contaminant concentration of prey items for the carnivorous species (e.g., small mammals) is calculated using the following equation:

$$FC = SC * BAF_{mammal}$$

Where: FC = Contaminant concentration in food (e.g., small mammal, kg/day)
SC = Contaminant concentration in surface soil (mg/kg)
BAF_{mammal} = Soil to mammal bioaccumulation factor (unitless)

For explosives in surface soil, the contaminant concentration of prey items for the carnivorous species (e.g., small mammals) is calculated using the following equation:

$$FC = SC * BAF_{inv} * BAF_{mammal}$$

Where: FC = Contaminant concentration in food (e.g., small mammal, kg/day)
SC = Contaminant concentration in surface soil (mg/kg)
BAF_{inv} = Soil to invertebrate bioaccumulation factor (unitless)
BAF_{mammal} = Invertebrate to mammal bioaccumulation factor (unitless)

Contaminant concentrations in food items were calculated using BAFs from published sources. The following sources of BAFs were used in the SERA:

- Plant BAFs (Organics): Toxicity and Chemical-Specific Factors Database (ORNL, 2002).
- Plant BAFs (Inorganics): Empirical Model for the Uptake of Inorganic Chemicals from Soil by Plants (ORNL, 1998).

- Soil Invertebrate BAFs: Development and Validation of Bioaccumulation Models for Earthworms (Sample et al., 1998a).

- Small Mammal BAFs: Development and Validation of Bioaccumulation Models for Small Mammals (Sample et al., 1998b).

Table J.2-1 in Appendix J.2 presents chemical specific BAFs and other BAF data from the literature that were used in this SERA. A default value of 1.0 was used for the BAF if chemical-specific data were not available in the above sources.

The lower bound of the threshold effects is based on consistently conservative assumptions and NOAEL toxicity values (U.S. EPA, 1997). This bound presents the greatest potential risks. The upper bound is based on observed impacts or predictions that ecological effects could occur and is developed using assumptions consistent with those used in the lower bound, site-specific data, LOAEL toxicity values, and/or an impact evaluation (U.S. EPA, 1997). This bound presents the average potential risk. A variety of exposure scenarios have been evaluated in the SERA in order to represent the lower and upper bounds (and exposures in between the lower and upper bounds) at SWMU 13 overall and at the individual buildings at SWMU 13, where potential risks exist. These conservative and less conservative exposure scenarios were calculated, respectively, to provide the overall range of potential risks to all levels of potential ecological receptors.

The exposure assumptions (e.g., ingestion rates and body weight) were obtained from the Wildlife Exposure Factors Handbook (U.S. EPA, 1993) or other literature sources, as necessary. Studies conducted in or surrounding states of Indiana were used, when available, to estimate the exposure factors. If only one value was available for a given exposure parameter, the value was used regardless of where the study was conducted in developing the value. The exposure parameters from U.S. EPA (1993) are wet weight values; however, the BAFs presented in the above sources estimate the tissue concentrations in dry weight. Therefore, the exposure parameters from U.S. EPA, 1993 were converted to dry weight values for the food-chain model calculations. Table 8-9 presents the exposure parameters that were used in the SERA and Appendix J.3 presents the values that were used to calculate the exposure parameters and a discussion of how they were calculated.

An EEQ approach was used to characterize the risk to terrestrial receptors. This approach characterizes the potential effects by comparing exposure concentration with the effects data. An EEQ of greater than 1.0 is considered indicative of a potential risk. The EEQ is not an expression of probability, and the

meaning of values greater than 1.0 must be interpreted in light of attendant uncertainties in risk management.

The EEQ for the terrestrial wildlife model was calculated as follows:

$$EEQ = \frac{\text{Total CDI}}{\text{TRV}}$$

Where: EEQ = Ecological effects quotient (unitless)
Total CDI = Total daily intake dose (mg/kg-day)
TRV = Toxicity reference value (NOAEL or LOAEL) (mg/kg-day)

8.4.2.2 Results and Discussion

Appendix J.5 presents the calculations of the food-chain modeling. Similar to the surface soil screening for plants and soil invertebrates, an evaluation of maximum concentrations across all of SWMU 13 was first conducted. Two scenarios were considered including: 1) maximum detected concentration in surface soil, conservative exposure factors, and 90th percentile BAFs and 2) maximum detected concentration in surface soil, less conservative exposure factors, and average BAFs. EEQs for all bioaccumulative chemicals initially selected as COPCs were greater than 1.0 in at least one of the receptors models; therefore, no chemicals were eliminated as COPCs for food-chain modeling under these conservative scenarios. Table 8-10 presents the NOAEL-based EEQs for both scenarios for herbivorous and insectivorous receptors.

Food-chain modeling was not conducted for the individual herbivorous and insectivorous representative receptors at each of the individual buildings at SWMU 13. This was done because concentrations at the individual buildings varied significantly for some COPCs and the areas represented by the individual buildings were large enough to comprise the entire home range for some of these species. An average exposure scenario was determined to be most appropriate for estimating exposure at the individual buildings for this step in the refinement and included the average chemical concentration at each building, less conservative exposure factors, and average BAFs. The results of these calculations are provided in Appendix J.5.

Upper-level carnivorous birds and mammals were chosen as assessment endpoints because persistent and bioaccumulative chemicals have been detected in SWMU 13 media. SWMU 13 and the surrounding area likely support large enough numbers of small mammals to comprise a significant portion of the diet

for upper-level carnivorous birds and mammals, although it is unlikely that the small mammals that upper-level carnivores are feeding on, are actually living and feeding in the contaminated portions of SWMU 13 only. Therefore, food-chain modeling at the individual buildings would not be appropriate because the potentially contaminated areas at SWMU 13 represent only a very small fraction of these large carnivores' home ranges. The ridge top at SWMU 13 covers approximately 50 acres although actual SWMU boundaries extend beyond the ridge top (see Figure 8-5). The home ranges of the red fox and red-tailed hawk are approximately 1,300 acres and 1,000 acres, respectively (U.S. EPA, 1993), so the areas surrounding the buildings (less than 10 acres total) represents only a fraction (i.e., approximately 0.71 and 1 percent for the fox and hawk, respectively) of these species' feeding areas. Therefore, food-chain modeling was conducted for these receptors assuming two scenarios: 1) average chemical concentration at SWMU 13 overall, less conservative exposure parameters, average BAFs, and an area use factor (AUF) of 100 percent, and 2) average chemical concentration at SMWU 13 overall, less conservative exposure parameters, average BAFs, and AUFs of 0.0077 (0.0021 for PCBs and dioxins) and 0.0098 (0.0027 for PCBs and dioxins) for the fox and hawk, respectively. NOAEL and LOAEL-based EEQs were calculated under both scenarios to provide a range of estimated risks. Table 8-11 presents the worst case scenario (i.e., maximum detected concentration in surface soil, conservative exposure factors, 90th percentile BAFs, and AUF of 100 percent) as well as NOAEL and LOAEL-based EEQs for both scenarios discussed above for the carnivorous receptors.

A food-chain model assuming the maximum background concentrations and less conservative exposure factors was also prepared for the metals to determine what proportion of risks could be attributable to background conditions (Table 8-12). Tables 8-10 and 8-11 present a summary of the food-chain model results under the conservative and average exposure scenarios, for the herbivorous/insectivorous and carnivorous receptors, respectively. Table 8-13 presents a summary of the Step 3a evaluation for terrestrial wildlife.

Separate discussions are provided below for evaluations of potential risk to herbivorous receptors, insectivorous receptors, and carnivorous (upper-level terrestrial) receptors.

Background Risks

A food-chain model was conducted for the representative wildlife receptors (herbivorous, insectivorous, and carnivorous) using maximum NSWC Crane Soil Group 3 concentrations, average BAFs, and less conservative exposure parameters for metal COPCs. NOAEL-based EEQs for all metal COPCs were less than 1.0 for the herbivorous receptors (vole and quail). Additionally, no NOAEL-based EEQs exceeded 1.0 for the carnivorous bird (red-tailed hawk). However, NOAEL-based EEQs for some metal

COPCs exceeded 1.0 for the insectivorous species and the carnivorous mammal. In particular, EEQs were greater than 1.0 for arsenic in the shrew (NOAEL-based EEQ only) and fox (NOAEL and LOAEL-based EEQs) models. NOAEL-based EEQs for cadmium, chromium, and mercury were also greater than 1.0 in the insectivorous bird model (woodcock) (Table 8-10).

These results are discussed in conjunction with results from the SWMU 13 food-chain models, where appropriate.

Herbivorous Receptors

Under the conservative food-chain scenario (i.e., maximum concentrations, average BAFs, and less conservative exposure parameters), COPCs with EEQs greater than 1.0 for representative herbivorous receptors included HMX and arsenic for the vole, and Aroclor-1248 and mercury for the quail (Table 8-10). EEQs for these chemicals in the herbivorous receptors models using background concentrations were less than 1.0 (Table 8-12).

At Buildings 165 and 174 and the northern and southern exposure areas (for dioxins and PCBs only), EEQs for all chemicals were less than 1.0 for the herbivorous receptors.

At Buildings 166, 168/2500, and 173 NOAEL-based EEQs for HMX in the vole food-chain model exceeded 1.0 at 1.3, 1.4, and 1.5, respectively. The LOAEL-based EEQs for HMX were less than 1.0. No EEQs exceeded 1.0 in the quail food-chain model.

At Building 171, NOAEL and LOAEL-based EEQs exceeded 1.0 for HMX in the vole food-chain model (150 and 61, respectively). No EEQs exceeded 1.0 in the quail food-chain model.

The TRV for HMX is based on a study in which no significant increase in mortality was observed among mice consuming 30 mg/kg/day HMX, but a significant increase in mortality was noted at a concentration of 75 mg/kg/day. Although the NOAEL-based EEQs exceed 1.0 at Buildings 166, 168/2500, and 173, the low EEQ exceedances, and the relatively small area that the samples represent (i.e., so the numbers of voles, if any, obtaining a significant amount of food from this area is expected to be very low) do not warrant retaining HMX as a COPC for herbivorous mammals in the areas of these buildings. However, the EEQs in the vicinity of Building 171 are elevated in part because of the two greatest HMX concentrations in this area. The two greatest HMX concentrations were detected in Grids 125 (5,390 mg/kg) and 129 (2,950 mg/kg). The average concentration at Building 171 without these two samples is an order of magnitude lower at 2.7 mg/kg. The calculated risks are significantly lower

assuming a concentration of 2.7 mg/kg; the LOAEL-based EEQ is less than 1.0 and the NOAEL-based EEQ is 1.95. Although the two grids with the highest HMX concentrations (approximately 1,350 ft^2) represent only approximately 5 percent of the total potentially contaminated area at Building 171 (approximately 25,200 ft^2), these areas present unacceptable risks to herbivorous mammals and HMX is retained as a COPC for further evaluation in the vicinity of Building 171.

Insectivorous Receptors

Under the conservative food-chain scenario (i.e., maximum concentrations, average BAFs, and less conservative exposure parameters), COPCs with EEQs greater than 1.0 for representative insectivorous receptors included HMX, Aroclor-1248, and arsenic for the shrew, and dioxin TEQ, TNT, RDX, Aroclor-1248, arsenic, cadmium, chromium, lead, mercury, and selenium for the woodcock (Table 8-10). Under the background scenario, the arsenic NOAEL-based EEQ exceeded 1.0 for the shrew, and cadmium, chromium, and mercury NOAEL-based EEQs exceeded 1.0 for the woodcock (Table 8-12).

At Building 165, the NOAEL-based EEQ exceeded 1.0 for arsenic at 1.5. The arsenic NOAEL-based EEQ under the background scenario was 1.8; therefore, it appears that any risks to insectivorous mammals are attributable to background. The NOAEL-based EEQ in the woodcock model for mercury exceed 1.0 at 2.7. However, the NOAEL-based EEQ for mercury in the background scenario was 2.6; therefore, it appears that risks to insectivorous birds are mostly, if not all, attributable to background concentrations.

At Buildings 166 and 168/2500 the NOAEL-based EEQs exceeded 1.0 for arsenic at 1.3, and 1.4 respectively in the shrew food-chain models. Similar to the EEQ at Building 165, the NOAEL-based background EEQ was greater than those at Buildings 166 and 168/2500 indicating that risks to insectivorous mammals are attributable to background concentrations. NOAEL-based EEQs were greater than 1.0 and greater than background EEQs for mercury and selenium in the woodcock model.

At Building 171, NOAEL-based EEQs exceeded 1.0 for HMX and arsenic in the shrew food-chain model. The arsenic EEQ was less than the background arsenic EEQ for the shrew and so risks to insectivorous mammals at Building 171 appear to be related to background concentrations. NOAEL-based EEQs were greater than 1.0 and greater than background EEQs for mercury and selenium in the woodcock model; the LOAEL EEQ for selenium was also greater than 1.0.

At Building 173, NOAEL-based EEQs exceeded 1.0 for arsenic at 1.4 in the shrew food-chain model and mercury and selenium in the woodcock food-chain model; the LOAEL EEQ for selenium was also greater

than 1.0 in the woodcock model. NOAEL-based EEQs were less than background EEQs for arsenic (shrew model) and mercury (woodcock model) indicating that risks to insectivorous receptors from these metals are attributable to background concentrations. However, selenium EEQs in the woodcock model were greater than background EEQs.

Only the NOAEL-based EEQ for mercury in the woodcock model exceeded 1.0 at Building 174; however, the background NOAEL-based EEQ for mercury was greater than that calculated at Building 174. Therefore, risks to insectivorous birds are expected to be related to background concentrations. No EEQs exceeded 1.0 in the shrew food-chain model.

The NOAEL-based EEQ for Aroclor-1248 was greater than 1.0 for the shrew in the northern and southern exposure areas. NOAEL and LOAEL-based EEQs for Aroclor-1248 were greater than 1.0 in the woodcock models (northern and southern exposure areas). Dioxin TEQ NOAEL-based EEQs were less than 1.0.

Overall, potential risks to insectivorous receptors appear to be isolated to mercury and selenium in the vicinity of Buildings 166, 168/2500, 171 (insectivorous birds only), selenium in the vicinity of Building 173 (insectivorous birds only), HMX in the vicinity of Building 171 (insectivorous mammals only), and Aroclor-1248 in the northern and southern exposure areas (insectivorous mammals and birds).

The bird TRV for mercury was derived from a study using the Mallard duck as the test species. Significant effects (fewer eggs and ducklings were produced) were observed at a dose level of 0.5 mg/kg. Because the study considered exposure over three generations, the dose was considered a chronic LOAEL and was multiplied by an uncertainty factor of 0.1 to develop a chronic NOAEL. The avian TRV for selenium was based on a study in which 8 mg/kg selenium administered through the diet reduced Mallard duck duckling survival as compared to 4 mg/kg dose level that produced no effect. The 4 mg/kg was considered a chronic NOAEL because it was the highest dose over the 100 day study which produced no effect during a critical lifestage (i.e., reproduction). The 8 mg/kg was considered the chronic LOAEL. The mammalian TRV for HMX is discussed above under the herbivorous receptors. The bird TRV for Aroclor-1254 is based on a study in which 12.5 mg/kg/day dose significantly reduced egg hatchability in ring-necked pheasants. The study lasted for 17 weeks and so the 12.5 mg/kg/day dose was considered a chronic LOAEL value. A chronic NOAEL was estimated by multiplying the chronic LOAEL by an uncertainty factor of 0.1.

Since the majority of risks to insectivores were for the insectivorous bird (i.e., woodcock), the food-chain model was reevaluated considering an AUF of 20 percent at the buildings where EEQs for mercury and

selenium were greater than 1.0 (Buildings 166, 168/2500, 171, and 173) and for the northern and southern exposure areas for Aroclor-1248. The AUF of 0.2 is expected to be a conservative number for the woodcock because the acreage of the excavated areas surrounding the buildings is estimated to be approximately 2 acres, or less, at each building/area. However, the AUF of 0.2 was selected to ensure protection of other insectivorous birds that may have a smaller home range than the woodcock, such as the American robin. For the reasons discussed below, and because it is unlikely that a bird would only feed around a particular building, given the poor habitat immediately surrounding each building, it was assumed that birds would not obtain more than 20 percent of their food from a building. Also, because each building is separated from each other by hundreds or thousands of feet, a bird with a relatively small home range feeding near one building is not likely to feed near another building.

- The American robin is not solely an invertebrate feeder. The American robin's diet consists of soft-bodies invertebrates and fruit (Sallabanks and James, 1999), and so the diet of this smaller bird is not adequately represented by 100 percent invertebrates, which is assumed in the woodcock food-chain model.

- The American robin has a small home range (average of 0.61 acres); however, these small birds frequent forests, woodlands, and garden and breed where lawns and other short-grass areas are interspersed with shrubs and trees (Sallabanks and James, 1999). Therefore, although the American robin is likely present at SWMU 13, their presence is most likely surrounding the outer boundaries of SWMU 13 (i.e., along the forested boundaries) and not the wide open areas represented by the contaminated portions of the SWMU (i.e., surrounding buildings).

NOAEL and LOAEL-based EEQs were less than 1.0 for mercury and selenium at Buildings 168/2500 and 173 and less than 1.0 for selenium at Buildings 166 and 171 after using an AUF of 20 percent (see Appendix J.5). The NOAEL-based EEQ for mercury was slightly greater than 1.0 at Buildings 166 and 171 at 1.55 and 1.25; however, these EEQs are less than the background NOAEL-based EEQ for mercury of 2.57. LOAEL-based EEQs were less than 1.0.

NOAEL-based EEQs (northern area) and NOAEL and LOAEL-based EEQs (southern area) were greater than 1.0 for the woodcock after using an AUF of 20 percent (Appendix J.5); however, EEQs were greater based on concentrations of Aroclor-1248 in the southern exposure area. Therefore, risks to insectivorous birds are not acceptable and Aroclor-1248 is retained as a COPC.

The average HMX concentration at Building 171 is high due to the two highest concentrations at this building. The maximum concentration of 5,390 mg/kg was detected in a sample collected from Grid 125

and the second greatest HMX concentration of 2,950 mg/kg was detected in a sample collected from Grid 129. Soil from these two grids was not excavated for bioremediation during remedial activities at the SMWU and therefore represents hot spots at this building for insectivorous mammals. If these two sample concentrations are removed from the average concentration calculation, both NOAEL and LOAEL-based EEQs are less than 1.0 for the shrew. Nevertheless, the two greatest concentrations at Building 171 represent unacceptable risks to insectivorous small mammals and HMX is retained for further evaluation at this building.

Carnivorous Receptors (upper-level species)

Under the less conservative food-chain scenario (i.e., average concentrations, average BAFs, less conservative exposure parameters, AUF of 100 percent), COPCs with EEQs greater than 1.0 for representative carnivorous receptors included Aroclor-1248 for the hawk, and dioxin TEQ (NOAEL-based EEQ only), HMX, RDX (NOAEL-based EEQ only), Aroclor-1248, and arsenic for the fox (Table 8-11). Under the background scenario, only arsenic EEQs exceeded 1.0 for the fox. No EEQs exceeded 1.0 for the hawk under the background scenario (Table 8-12).

As previously discussed, food-chain modeling for the carnivorous receptors was not conducted at the individual buildings because the home range of these species is much larger than the SWMU. It was estimated that the potentially contaminated area surrounding each of the buildings totaled less than 10 acres. It was also estimated that the area where the samples for PCB and dioxin analysis were collected totals less than 3 acres (approximately 2 acres for the area surrounding Building 171 and approximately 0.7 acres for the area southwest of Building 166. The home ranges of the fox and hawk were assumed to be approximately 1300 acres and 1000 acres, respectively. Therefore, it was assumed that the fox and hawk would obtain approximately 0.8 percent and 1 percent, respectively, of their food from around the buildings, and approximately 0.2 percent and 0.3 percent of their food from the area where the samples for PCB and dioxin analysis were collected.

Under these scenarios, all NOAEL-based EEQs were less than 1.0 for the hawk. The NOAEL-based EEQs were less than 1.0 for dioxins and metals for the fox; however, the NOAEL-based EEQ for Aroclor-1248 exceeds 1.0 under the entire exposure area scenario (EEQ = 1.47) and the southern exposure area (i.e., surrounding Building 171) (EEQ = 1.37). Risks to carnivorous mammals from PCBs in the northern exposure area account for only a negligible portion of the total risks at SWMU 13 and the NOAEL-based EEQ was less than 1.0. Overall it is unlikely that the fox is obtaining significant portions of its diet from animals that feed and live in the areas surrounding the buildings only. For this reason and because the

NOAEL-based EEQs only slightly exceed 1.0 and LOAEL-based EEQs were less than 1.0, risks to carnivorous mammals are acceptable and Aroclor-1248 is not retained as a COPC for further evaluation.

Summary of Food-Chain Modeling Risks

Overall, risks to terrestrial receptors from HMX in the vicinity of Building 171 and Aroclor-1248 in the vicinity of Building 171 and southwest of Building 166 are unacceptable. EEQs for all other chemicals in the surface soil were less than background EEQs or were less than 1.0; risks to terrestrial receptors are acceptable from all other chemicals detected in surface soil at SWMU 13.

8.5 ECOLOGICAL RISK UNCERTAINTY ANALYSIS

This section discusses some of the uncertainties associated with the SWMU 13 ERA.

8.5.1 Measurement and Assessment Endpoints

Measurement endpoints are used to evaluate the assessment endpoints selected for the SERA. For the SERA, the measures of effects are not the same as the assessment endpoints. Therefore, the measures are used to predict effects to the assessment endpoints by selecting surrogate species that were evaluated. For example, a decrease in reproduction of a shrew is used to assess a decrease in reproduction of the small mammal population. However, predicting a decrease in reproduction of a shrew may either underprotect or overprotect the small mammal population based on differences in ingestion rates, toxicity, food preferences, home ranges, etc. between different species.

Risks to reptiles and amphibians are not quantitatively evaluated because exposure factors are not established for most species and toxicity data are very limited. Using aquatic organisms as a surrogate species, risks to amphibians exposed to sediment are possible; however, risks from surface water contaminants are expected to be low based on the Step 3a evaluations. Potential risks to reptiles cannot be evaluated in this ERA because of a lack of toxicity and exposure data (see below for a discussion of potential risks to the timber rattlesnake).

As discussed in Section 8.2.1.1, several endangered and threatened species or species of special concern are present at NSWC Crane, and potentially may inhabit SWMU 13. Risks to these species were not specifically calculated so the uncertainties of not calculating risks to these species are presented here. As discussed above, risks to carnivorous mammals and birds are not expected from exposure to chemicals at SWMU 13; therefore, unacceptable risks to the bobcat, bald eagle, Northern harrier, and osprey, and to carnivorous reptiles such as the timber rattlesnake are also not expected. Loggerhead

shrikes and the sedge wren consume mostly aboveground insects such as caterpillars, beetles, spiders, and flies, as opposed to the worms that are consumed by the American woodcock in the food-chain model. Because worms are in direct contact with exposure to the soil, it is expected that they would have greater levels of contaminants at SWMU 13 than aboveground insects; therefore, risks to the woodcock from consuming worms are expected to be greater than risks to the loggerhead shrike and sedge wren from consuming aboveground insects. Risks to the worm eating American woodcock from chemicals in the surface soil and surface water were not acceptable for Aroclor-1248; therefore, risks to the loggerhead shrike and sedge wren are also considered possible if these species are present at SWMU 13. The American bittern is a marshland loving bird that feeds on fish, frogs, eels, insects, and water snakes. Although there is some aquatic habitat, it is not suitable for supporting piscivorous wildlife such as the bittern. As mentioned in Section 8.2.1.1, the presence of the Indiana bat has not been documented at or surrounding SWMU 13; therefore, risks to this endangered mammal from SWMU 13 are acceptable.

Finally, there are uncertainties in risks to reptiles because there is a lack of exposure factors for reptiles and a lack of reptile toxicity data for the detected chemicals. As discussed in Section 8.2.1.1, one threatened reptilian species is listed as potentially present at NSWC Crane. Based on the preferred habitat of the timber rattlesnake and the ecology of SWMU 13 (i.e., located on a ridge top), this species may potentially inhabit areas of SWMU 13. Risks to carnivorous reptiles were not specifically calculated; however, risks are unlikely when using carnivorous birds and mammals as surrogates (see above).

8.5.2 Exposure Characterization

The contaminant dose to terrestrial wildlife is calculated using an equation that incorporates ingestion rates, body weights, BAFs, and other exposure factors. These exposure factors are obtained from literature studies or predicted using various equations. Ingestion rates and body weights vary among species, especially among species inhabiting different areas. This was taken into account when selecting exposure parameters from U.S. EPA (1993) and an attempt was made to minimize the uncertainties associated with the exposure characterization by selecting exposure parameters from studies conducted in and surrounding states of Indiana.

Bioaccumulation of contaminants into various biological media (e.g., plants, invertebrates, small mammals) depends on characteristics of the media such as pH, organic carbon, etc. Therefore, actual BAFs at the sites may be different than those used in the SERA and obtained from the literature. BAFs for estimating concentrations of explosives in earthworm and small mammal tissue were not available so a BAF of 1.0 was used for the food-chain models for the shrew, woodcock, hawk, and fox. As presented

on Table 6-1, explosives have relatively high water solubility values and low Koc values so they are not expected to accumulate to any significant degree in animal tissue. Therefore, using a BAF of 1.0 is likely causing the concentrations of the explosive in the animal tissue to be overestimated in the food-chain model.

Also, the bioavailability of contaminants reported in toxicity studies is typically greater than the contaminants in environmental media. Typically, high bioavailable forms of the chemicals are used when conducting toxicity tests and or conducting dosing studies for wildlife. For example, many of the toxicity tests used to develop screening levels for metals use highly bioavailable forms of the metal, such as metal salts, which in many cases are much more toxic than equivalent concentrations of the metals in field collected soils (Allen, 2002).

There is uncertainty in the chemical data collected at the site. Measured levels of chemicals are only estimates of the true site chemical concentrations. At SWMU 13, samples were deliberately biased toward known or suspected high concentrations (e.g., surface soil samples collected surrounding buildings at SWMU 13) so predicted doses are higher than actual doses. Whereas this is a conservative approach in predicting exposure concentrations, actual exposure of ecological receptors to chemical concentrations at SWMU 13 is likely overestimated, in particular, wildlife which typically roam over multiple sample locations and unlikely that wildlife will obtain all their food from within the most contaminated areas at SMWU 13. This overestimation of exposure was taken into account for wildlife by using AUFs in the food-chain model calculations. Also, because the areas immediately surrounding the buildings only occupies a very small portion of the overall ecological habitat at SWMU 13, a discussion of the overall risks to ecological receptors was included in the ERA.

The exposure of and potential risks to ecological receptors to chemicals in the gullies were only evaluated in the conservative COPC screening table. In the first part of the Step 3a refinement, it was determined that risks to aquatic receptors from chemicals in the gully were low because the intermittent nature of the gullies precludes a significant aquatic community from being present, and therefore exposed to chemicals. There is some uncertainty in not further evaluating risks to aquatic receptors in the gullies, but the overall conclusion of the ERA is not likely to be impacted because the lack of exposure would limit the ecological significance of any potential risks.

There is uncertainty involved with the collection of samples and therefore, sample concentrations, as a result of the historical remedial activities at SWMU 13 as discussed in Section 8.4.1.1. Recent surface soil was collected from the 0- to 2-foot bgs depth interval, but the exact depth of some of the historic samples is not known. Some of the samples may have been as deep as 3 feet. The uncertainty in the

sampling depth is not expected to be significant because as described in Section 7.3.3, a much greater weight was given to the samples collected from the remediated soil, because they comprised a majority of the immediately adjacent to each building. The samples collected from the remediated soil represent the soil concentrations in the top 2 feet of soil.

Finally, there is uncertainty in the concentrations of explosives in the soil. The samples were taken from the remediated soil prior to it being placed back around each building. It is expected that the explosive concentrations in the soil are continuing to decrease through bioremediation. It is likely that the concentrations of explosives around each building are now lower than the concentrations used in the ERA so risks to ecological receptors will continue to decrease.

8.5.3 Ecological Effects Data

Toxicological data for a few of the chemicals are limited or do not exist. This occurred for several COPCs in the surface soil, sediment, and surface water, but it did not affect the outcome of the risk assessment because the chemicals without toxicity data were evaluated using the other Step 3a factors discussed in Section 8.4.

Several alternative benchmark values were used to gain a better understanding of the relationship between the maximum concentration values of the selected COPCs to the overall ecological assessment of the site. There is some uncertainty involved when using these alternative benchmarks; however, attempts have been made to lessen the uncertainties by providing the toxicological basis of the alternate benchmarks when they were used.

8.5.4 Risk Characterization

Risks are possible if an EEQ is greater than or equal to 1.0 regardless of the magnitude of the EEQ. However, the magnitude of effects to ecological receptors cannot be inferred based on the magnitude of the EEQ. Rather, an EEQ greater than 1.0 simply indicates that the dose used to derive the toxicity reference value was exceeded.

Finally, there is uncertainty in how the predicted risks to a species at a site translate into risk to the population in the area as a whole.

8.6 CONCLUSIONS

A SERA was performed for SWMU 13, Mine Fill B. Several chemicals were retained as COPCs as a result of the initial screening of surface water, sediment, and surface soil. These chemicals were further evaluated and data were scrutinized as a part of the Step 3a refinement. Tables 8-6, 8-7, 8-8, and 8-13 present summaries of the Step 3a evaluation including the overall conclusion of whether chemicals initially selected as COPCs are retained as COPCs after the refined evaluation.

Based on the SERA and the Step 3a refinement, the following conclusions were made:

Terrestrial Plants and Invertebrates

After the surface soil screening, several chemicals were initially selected as COPCs. Potential risks to terrestrial vegetation and soil invertebrates, associated with all the COPCs in surface soil were further evaluated to determine whether site-related risks from the chemicals were acceptable or whether risks were great enough to warrant retaining the chemicals as COPCs and proceeding further into the BERA.

Toxicity data in the literature were found for the chemicals initially selected as COPCs to evaluate potential risks to plants and soil invertebrates from the detected concentrations of these chemicals in the surface soil. After the Step 3a refinement, several chemicals initially selected as COPCs were further evaluated, including Aroclor-1248, TNT, HMX, and selenium because impacts to plants and invertebrates were possible based solely on a comparison of detected concentrations to toxicity values. The surface soil samples for analysis of explosives and metals were collected in areas immediately surrounding the buildings at SWMU 13 (see Figures 1-5 through 1-8) which are maintained grassy areas to allow access to the buildings at SWMU 13. Therefore, significant plant diversity is not expected to exist in these areas. The areas in the middle of SWMU 13 and the areas along the boundary of the ridge top are heavily vegetated (see photographs in Appendix A), so the potentially impacted areas adjacent to the buildings only represent a small percentage of habitat at SWMU 13. Although localized impacts from Aroclor-1248, TNT, HMX, and selenium are expected in some areas, impacts to the plant and invertebrate populations at SMWU 13 overall are acceptable.

In summary, no chemicals were retained as COPCs for risks to plants or invertebrates. However, bioaccumulative chemicals that were detected at maximum concentrations exceeding the Region 5 ESLs were further evaluated by food-chain modeling for risks to herbivorous, insectivorous, and carnivorous wildlife. The summary of the results from the food-chain modeling are discussed below.

Benthic Invertebrates

After the initial sediment screening, several chemicals were selected as COPCs. The potential risks to benthic invertebrates associated with all the COPCs in the sediment were further evaluated to determine whether site-related risks from the chemicals were acceptable or whether the risks were great enough to warrant retaining the chemicals as COPCs and proceeding further into the BERA.

In sediment, several chemicals initially selected as COPCs were retained as COPCs for further evaluation including arsenic, cadmium, chromium, iron, manganese, and zinc because concentrations of the chemicals are greater than the upper-effects levels and the extent of contamination is unknown. Although the mainstream at SMWU 13 is typically only wet during and following heavy rain events and the presence of sediment invertebrates is likely ephemeral; concentrations of COPCs retained for further evaluation exceed upper-effects levels in the furthest downstream samples. Concentrations of these COPCs; therefore, have the potential to migrate to Boggs Creek where aquatic habitat is permanent.

In summary, arsenic, cadmium, chromium, iron, manganese, and zinc were retained as COPCs for risks to benthic invertebrates.

Aquatic Organisms

After the initial surface water screening, several chemicals were selected as COPCs. Potential risks to aquatic invertebrates associated with all the COPCs in the surface water were further evaluated to determine whether site-related risks from the chemicals were acceptable or whether the risks were great enough to warrant retaining the chemicals as COPCs and proceeding further into the BERA.

No chemicals initially selected as COPCs were retained as COPCs for further evaluation in surface water, because concentrations were less than alternate toxicity information or background concentrations.

Summary of Food-Chain Modeling

After the initial screening, dioxin TEQs, several explosives, Aroclor-1248, and several inorganics were initially selected as COPCs in surface soil for potential risks to herbivorous, insectivorous, and carnivorous mammals and birds. Potential risks to mammals and birds associated with the COPCs in surface soil were further evaluated to determine whether site-related risks to these receptors from the chemicals were acceptable or whether the risks were great enough to warrant retaining the chemicals as COPCs and proceeding further into the BERA.

In summary, HMX was retained as a COPC for potential risks to herbivorous and insectivorous small mammals (Building 171 only), and Aroclor-1248 was retained as a COPC for potential risks to insectivorous birds (Buildings 166 and 171 only) and small mammals (Building 171 only). No chemicals were retained as COPCs in surface soil for potential risks to upper-level carnivorous birds and mammals.

TABLE 8-1

ECOLOGICAL COPC SELECTION - COMBINED SURFACE SOIL DATA
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA
PAGE 1 OF 2

CHEMICAL[5]	Frequency of Detection	Minimum Concentration	Maximum Concentration	Region 5 ESL	EEQ	COPC[3]		Rationale[4]
						Plants/ Invertebrates	Wildlife	
Dioxins (ng/kg)								
TEQ BIRD	12/12	0.0894	44.5	0.199	224	YES	YES	ASL/BIO
TEQ BIRD HALFND	12/12	0.439	44.7	0.199	225	YES	YES	ASL/BIO
TEQ MAMMAL	12/12	0.162	14.9	0.199	75	YES	YES	ASL/BIO
TEQ MAMMAL HALFND	12/12	0.447	15	0.199	76	YES	YES	ASL/BIO
Semivolatile Organics (ug/kg)								
Acenaphthene	1/12	52	52	682000	0.0001	NO	NO	BSL
Anthracene	2/12	5	210	1480000	0.0001	NO	NO	BSL
Benzo(a)anthracene	7/12	4	1100	5210	0.21	NO	NO	BSL
Benzo(a)pyrene	6/12	6	1000	1520	0.66	NO	NO	BSL
Benzo(b)fluoranthene	7/12	7	1100	59800	0.02	NO	NO	BSL
Benzo(g,h,i)perylene	6/12	6	750	119000	0.01	NO	NO	BSL
Benzo(k)fluoranthene	7/12	5	640	148000	0.004	NO	NO	BSL
Bis(2-ethylhexyl)phthalate	7/12	91	140	925	0.15	NO	NO	BSL
Chrysene	7/12	7	1100	4730	0.23	NO	NO	BSL
Dibenzo(a,h)anthracene	1/12	200	200	18400	0.01	NO	NO	BSL
Fluoranthene	9/12	6	1800	122000	0.01	NO	NO	BSL
Fluorene	1/12	50	50	122000	0.0004	NO	NO	BSL
Indeno(1,2,3-cd)pyrene	6/12	4	650	109000	0.006	NO	NO	BSL
Naphthalene	1/12	5	5	99.4	0.05	NO	NO	BSL
Phenanthrene	7/12	4	1000	45700	0.02	NO	NO	BSL
Pyrene	9/12	6	2400	78500	0.03	NO	NO	BSL
Pesticides/PCBs (ug/kg)								
Aroclor-1248	26/35	42	160000	0.332	481928	YES	YES	ASL/BIO
Explosives (mg/kg)								
1,3,5-Trinitrobenzene	2/371	0.164	1.7	0.376	4.52	YES	YES	ASL/BIO
2,4,6-Trinitrotoluene	216/368	0.12	57	--	NA	YES	YES	NC/BIO
2,4-Dinitrotoluene	1/371	0.1	0.1	1.28	0.08	NO	NO	BSL
2-Amino-4,6-dintrotoluene	35/370	0.1	150	--	NA	YES	YES	NC/BIO
2-Nitrotoluene	1/371	0.43	0.43	--	NA	YES	YES	NC/BIO
4-Amino-2,6-dintrotoluene	57/371	0.1	303	--	NA	YES	YES	NC/BIO
HMX	289/368	0.081	5390	--	NA	YES	YES	NC/BIO
RDX	273/368	0.039	29	--	NA	YES	YES	NC/BIO
Inorganics (mg/kg)								
Aluminum	231/231	4050	58500	pH[1][2]	NA	NO	NO	BSL
Arsenic	167/231	1.7	30.5	5.7	5.35	YES	YES	ASL/BIO
Barium	231/231	26.3	1160	330[1]	3.52	YES	NO	ASL/NONBIO
Cadmium	54/231	0.04	1.7	0.38[1]	4.47	YES	YES	ASL/BIO

TABLE 8-1

ECOLOGICAL COPC SELECTION - COMBINED SURFACE SOIL DATA
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA
PAGE 2 OF 2

CHEMICAL[5]	Frequency of Detection	Minimum Concentration	Maximum Concentration	Region 5 ESL	EEQ	COPC[3]		Rationale[4]
						Plants/ Invertebrates	Wildlife	
Chromium	231/231	6.3	95.8	0.4	240	YES	YES	ASL/BIO
Lead	225/227	7.5	69	16[1]	4.31	YES	YES	ASL/BIO
Mercury	183/230	0.006	3.6	0.1	36	YES	YES	ASL/BIO
Selenium	57/231	0.51	12.4	0.0276	449	YES	YES	ASL/BIO
Silver	3/231	0.38	0.95	4.04	0.24	NO	NO	BSL
VOCs (mg/kg)								
Acetone	148/228	0.005	0.32	2.5	0.13	NO	NO	BSL
Methyl Ethyl Ketone	27/228	0.005	0.085	89.6	0.001	NO	NO	BSL
Methylene Chloride	27/228	0.001	0.035	4.05	0.01	NO	NO	BSL
Methyl Isobutyl Ketone	1/228	0.014	0.014	443	0.00003	NO	NO	BSL
Toluene	23/228	0.001	0.03	5.45	0.01	NO	NO	BSL
Xylenes	13/228	0.001	1.3	10	0.13	NO	NO	BSL
Trans-1,2-dichloroethene	1/2	2	2	784	0.003	NO	NO	BSL
Trichlorofluoromethane	2/2	2	3	16400	0.0002	NO	NO	BSL
Miscellaneous Parameters								
Cation exchange capacity (MEQ/1)	2/2	14	15	NA	NA	NO	NO	NZ
pH (S.U.)	2/2	5.1	7.4	NA	NA	NO	NO	NZ

Acronyms:

COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
NA = Not Available or Not Applicable
PCB = Polychlorinated Biphenyl
SWMU = Solid Waste Management Unit
VOC = Volatile Organic Chemical

Footnotes:

1 - USEPA Ecological Soil Screening Level
2- Aluminum is only considered a COPC when the soil pH is less than 5.5. Average soil sample collected at SWMU 13 was 6.25 S.U.
3 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.4).
4 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Non-bioaccumulative chemical
NC = No Criteria available
NZ = Field parameters not selected as COPCs
5 - The data from samples collected as part of the external sump/drainage investigation and PCB delineation investigation are not included on this table.

TABLE 8-2

ECOLOGICAL COPC SELECTION - GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
										Sediment Invertebrates	Wildlife	
Semivolatile Organics (ug/kg)												
2-METHYLNAPHTHALENE	1/5	6 J	6 J	2.87	6.00	13SD2501	NA	20.2	0.30	NO	NO	BSL
ACENAPHTHENE	2/5	24	43 J	14.7	33.5	13SD0501	NA	6.71	6.41	YES	YES	ASL/BIO
ANTHRACENE	2/5	72	88	33.3	80.0	13SD0501	NA	57.2	1.54	YES	YES	ASL/BIO
BENZO(A)ANTHRACENE	5/5	10	330	132	132	13SD0501	NA	108	3.06	YES	YES	ASL/BIO
BENZO(A)PYRENE	5/5	12	390 J	160	160	13SD0601	NA	150	2.6	YES	YES	ASL/BIO
BENZO(B)FLUORANTHENE	5/5	18	460 J	190	190	13SD0601	NA	10,400	0.04	NO	NO	BSL
BENZO(G,H,I)PERYLENE	5/5	10	380 J	138	138	13SD0601	NA	170	2.24	YES	YES	ASL/BIO
BENZO(K)FLUORANTHENE	5/5	7 J	250 J	97.4	97.4	13SD0501	NA	240	1.04	YES	YES	ASL/BIO
CHRYSENE	5/5	15	430 J	177	177	13SD0601	NA	166	2.59	YES	YES	ASL/BIO
DI-N-BUTYL PHTHALATE	1/3	86 J	86 J	57.0	86.0	13SD0601	NA	1114	0.08	NO	NO	BSL
DI-N-OCTYL PHTHALATE	1/3	100 J	100 J	61.7	100	13SD0601	NA	40,600	0.002	NO	NO	BSL
DIBENZO(A,H)ANTHRACENE	2/5	66 J	74 J	29.3	70.0	13SD0601	NA	33	2.24	YES	YES	ASL/BIO
FLUORANTHENE	5/5	29	860	363	363	13SD0501	NA	423	2.03	YES	YES	ASL/BIO
FLUORENE	2/5	33	42 J	16.3	37.5	13SD0501	NA	77.4	0.54	NO	NO	BSL
INDENO(1,2,3-CD)PYRENE	5/5	8 J	290 J	109	109	13SD0601	NA	200	1.45	YES	YES	ASL/BIO
NAPHTHALENE	2/5	6 J	6 J	3.68	6.00	13SD0501, 13SD0601	NA	176	0.03	NO	NO	BSL
PHENANTHRENE	5/5	17	620	252	252	13SD0601	NA	204	3.04	YES	YES	ASL/BIO
PYRENE	5/5	25	1300 J	482	482	13SD0601	NA	195	6.67	YES	YES	ASL/BIO
Energetics (mg/kg)												
HMX	2/28	0.8 J	1.9 J	0.213	1.35	13SD1101	ND	NA	NA	YES	YES	NC/BIO
RDX	3/28	0.44 J	2.2	0.231	1.12	13SD1101	ND	NA	NA	YES	YES	NC/BIO
Herbicides (ug/kg)												
PENTACHLOROPHENOL	1/3	2.1 J	2.1 J	0.890	2.10	13SD0601	NA	23,000	0.0001	NO	NO	BSL
Inorganics (mg/kg)												
ALUMINUM	30/30	1480	18500	8944	8944	13SD2201	13400 J - 17100 J	NA	NA	YES	NO	NC/NONBIO
ANTIMONY	10/30	0.8 J	2.3 J	0.575	1.40	13SD2401	0.98 J - 1.1 J	NA	NA	YES	NO	NC/NONBIO
ARSENIC	29/30	3.7 J	58.2 J	15.0	15.5	13SD2401	22.2 J - 28.7 J	9.79	5.94	YES	YES	ASL/BIO
BARIUM	30/30	28.5 J	693 J	136	136	13SD0102	129 J - 199 J	NA	NA	YES	NO	NC/NONBIO
BERYLLIUM	26/30	0.53 J	4.3 J	1.25	1.41	13SD2201	2 J - 2.1 J	NA	NA	YES	NO	NC/NONBIO
CADMIUM	20/30	0.41 J	4.1 J	0.868	1.21	13SD1301	0.59 J - 0.63 J	0.99	4.14	YES	YES	ASL/BIO
CALCIUM	30/30	766 J	89700 J	14645	14645	13SD1301	799 J - 845 J	NA	NA	NO	NO	NUT
CHROMIUM	30/30	7.9 J	228 J	44.4	44.4	13SD2401	38.7 J - 55 J	43.4	5.25	YES	YES	ASL/BIO
COBALT	30/30	1.8 J	107 J	25.2	25.2	13SD1901	31.3 J - 40.7 J	50	2.14	YES	NO	ASL/NONBIO
COPPER	30/30	7 J	52.1 J	16.5	16.5	13SD0101	17.3 J - 27.8 J	31.6	1.65	YES	YES	ASL/BIO
IRON	30/30	1990 J	195000 J	48890	48890	13SD2401	93700 J - 112000 J	NA	NA	YES	NO	NC/NONBIO
LEAD	30/30	4.2 J	521 J	59.0	59.0	13SD0102	35.7 J - 37.2 J	35.8	14.6	YES	YES	ASL/BIO
LITHIUM	23/23	2.1 J	38.8 J	9.46	9.46	13SD1901	NA	NA	NA	YES	NO	NC/NONBIO
MAGNESIUM	30/30	292 J	7540 J	1915	1915	13SD0701	1470 J - 1580 J	NA	NA	NO	NO	NUT
MANGANESE	30/30	65.3 J	6130 J	1683	1683	13SD1201	2570 J - 3240 J	NA	NA	YES	NO	NC/NONBIO
MERCURY	19/30	0.013 J	0.16 J	0.0304	0.0385	13SD0101	0.026 J	0.174	0.92	NO	NO	BSL
NICKEL	30/30	7.9 J	83.9 J	24.6	24.6	13SD2201	33.5 J - 36.6 J	22.7	3.70	YES	YES	ASL/BIO
POTASSIUM	30/30	252 J	2390 J	753	753	13SD1501	1340 J - 2000 J	NA	NA	NO	NO	NUT
SELENIUM	22/30	0.18 J	1.1 J	0.439	0.557	13SD2401	0.56 J - 0.61 J	NA	NA	YES	YES	NC/BIO
SODIUM	5/30	31.7 J	334 J	39.5	121	13SD0701	31.6 J - 183 J	NA	NA	NO	NO	NUT
STRONTIUM	23/23	4.1 J	77.1 J	20.3	20.3	13SD1101	NA	NA	NA	YES	NO	NC/NONBIO
TIN	9/30	0.52 J	12 J	1.28	3.74	13SD1201	ND	NA	NA	YES	NO	NC/NONBIO
TITANIUM	28/28	13.8 J	164 J	69.9	69.9	13SD2401	40.9 J	NA	NA	YES	NO	NC/NONBIO
VANADIUM	30/30	11.8 J	144 J	34.9	34.9	13SD2401	46.2 J - 53.8 J	NA	NA	YES	NO	NC/NONBIO
ZINC	25/30	7.9 J	541 J	107	108	13SD0101	72.8 J - 79.7 J	121	4.47	YES	YES	ASL/BIO
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE, SEM	7/7	0.23 J	0.88 J	0.543	0.543	13SD0501	NA	NA	NA	NO	NO	NZ
CADMIUM, SEM	2/7	0.002	0.004	0.00131	0.00300	13SD0801	NA	NA	NA	NO	NO	NZ
COPPER, SEM	7/7	0.036 J	2.223 J	0.379	0.379	13SD0801	NA	NA	NA	NO	NO	NZ
LEAD, SEM	6/7	0.03 J	0.067 J	0.0394	0.0455	13SD0201	NA	NA	NA	NO	NO	NZ
MERCURY, SEM	5/7	0.00004 J	0.00054 J	0.000118	0.000158	13SD1401	NA	NA	NA	NO	NO	NZ
NICKEL, SEM	7/7	0.02	0.111	0.0469	0.0469	13SD0501	NA	NA	NA	NO	NO	NZ
SEM/AVS, SEM (S.U.)	7/7	0.09	3.74	1.39	1.39	13SD0801	NA	NA	NA	NO	NO	NZ
ZINC, SEM	3/7	0.407 J	0.538 J	0.268	0.483	13SD1101	NA	NA	NA	NO	NO	NZ

TABLE 8-2

ECOLOGICAL COPC SELECTION - GULLY SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
										Sediment Invertebrates	Wildlife	
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)	7/7	9.9	18	13.7	13.7	13SD1101	NA	NA	NA	NO	NO	NZ
PH (S.U.)	7/7	5	7.9	7.09	7.09	13SD1101	NA	NA	NA	NO	NO	NZ
TOTAL ORGANIC CARBON (mg/kg)	7/7	2500 J	19000 J	9014	9014	13SD0501	NA	NA	NA	NO	NO	NZ

Field duplicate samples were excluded from these summaries because they are considered to be field QC samples.

Acronyms:
AVS = Acid Volatile Sulfide
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
NA - Not Available or Not Applicable
ND - Not detected
SEM = Simultaneously Extracted Metals
SWMU = Solid Waste Management Unit

Footnotes:
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.4).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria Available
NUT = Essential nutrient
NZ = Field parameters not selected as COPCs

TABLE 8-3

ECOLOGICAL COPC SELECTION - MAINSTREAM SEDIMENT SAMPLES ROUNDS 2 AND 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
										Sediment Invertebrates	Wildlife	
Inorganics (mg/kg)												
ALUMINUM	5/5	11500 J	13700 J	12320	12320	13SD3501	14400 J - 22100 J	NA	NA	YES	NO	NC/NONBIO
ANTIMONY	5/5	1.9 J	4.7 J	2.58	2.58	13SD3001	1.8 J - 2.1 J	NA	NA	YES	NO	NC/NONBIO
ARSENIC	5/5	23.9 J	56.9 J	40.6	40.6	13SD3001	25.6 J - 33.3 J	9.79	5.81	YES	YES	ASL/BIO
BARIUM	5/5	77.4 J	207 J	132	132	13SD3002	90.8 J - 137 J	NA	NA	YES	NO	NC/NONBIO
BERYLLIUM	5/5	1.9 J	3.7 J	3.02	3.02	13SD3001	2 J - 2.3 J	NA	NA	YES	NO	NC/NONBIO
CADMIUM	5/5	9.4 J	17.1 J	12.4	12.4	13SD3001	1.8 J - 4.3 J	0.99	17.3	YES	YES	ASL/BIO
CALCIUM	5/5	1290 J	12200 J	3634	3634	13SD3501	2010 J - 2500 J	NA	NA	NO	NO	NUT
CHROMIUM	5/5	51.7 J	192 J	123	123	13SD3001	49.1 J - 77.2 J	43.4	4.42	YES	YES	ASL/BIO
COBALT	5/5	19 J	29.9 J	24.6	24.6	13SD3501	20.4 J - 27.5 J	50	0.60	NO	NO	BSL
COPPER	5/5	16.4 J	18.4 J	17.5	17.5	13SD3002	18.4 J - 22 J	31.6	0.58	NO	NO	BSL
IRON	5/5	89600 J	299000 J	208720	208720	13SD3001	120000 J - 121000 J	NA	NA	YES	NO	NC/NONBIO
LEAD	5/5	25.6 J	45.6 J	38.0	38.0	13SD3001	20.6 J - 25.2 J	35.8	1.27	YES	YES	ASL/BIO
MAGNESIUM	5/5	610 J	2110 J	948	948	13SD3501	1490 J - 1940 J	NA	NA	NO	NO	NUT
MANGANESE	5/5	1450 J	3960 J	2342	2342	13SD3002	1250 J - 1330 J	NA	NA	YES	NO	NC/NONBIO
MERCURY	1/5	0.016 J	0.016 J	0.0175	0.0160	13SD3001	0.021 J	0.174	0.09	NO	NO	BSL
NICKEL	5/5	35.8 J	47.8 J	42.3	42.3	13SD3002	41.5 J - 54.1 J	22.7	2.11	YES	YES	ASL/BIO
POTASSIUM	5/5	452 J	1680 J	851	851	13SD3501	2080 J - 3190 J	NA	NA	NO	NO	NUT
SELENIUM	5/5	0.62 J	1.5 J	0.890	0.890	13SD3401	0.48 J - 0.85 J	NA	NA	YES	YES	NC/BIO
SODIUM	3/5	91.1 J	298 J	117	178	13SD3301	92.3 J - 126 J	NA	NA	NO	NO	NUT
TITANIUM	1/1	65.6 J	65.6 J	65.6	65.6	13SD3001	26.4 J	NA	NA	YES	NO	NC/NONBIO
VANADIUM	5/5	48.3 J	101 J	73.5	73.5	13SD3001	47.6 J - 61.6 J	NA	NA	YES	NO	NC/NONBIO
ZINC	5/5	121 J	195 J	161	161	13SD3301	73.1 J - 98.3 J	121	1.61	YES	YES	ASL/BIO

Field duplicate samples are excluded from these summaries because they are considered field QC samples.

Acronyms:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
NA = Not Applicable or Not Available
SWMU = Solid Waste Management Unit

Footnotes:
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.4).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria Available
NUT = Essential Nutrient

TABLE 8-4

ECOLOGICAL COPC SELECTION - GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC (2)		Rationale (3)
										Aquatic Invertebrates	Wildlife	
Semivolatile Organics (ug/L)												
BENZO(A)ANTHRACENE	2/5	0.2 J	0.22	0.0989	0.210	13SW0601	NA	0.025	8.8	YES	YES	ASL/BIO
BENZO(A)PYRENE	2/5	0.26	0.27 J	0.121	0.265	13SW3201	NA	0.014	19.3	YES	YES	ASL/BIO
BENZO(B)FLUORANTHENE	2/5	0.38	0.4 J	0.171	0.390	13SW3201	NA	9.07	0.04	NO	NO	BSL
BENZO(G,H,I)PERYLENE	2/5	0.22 J	0.23	0.105	0.225	13SW0601	NA	7.64	0.03	NO	NO	BSL
BENZO(K)FLUORANTHENE	2/5	0.19 J	0.2	0.0929	0.195	13SW0601	NA	NA	NA	YES	YES	NC/BIO
CHRYSENE	2/5	0.33 J	0.35	0.151	0.340	13SW0601	NA	NA	NA	YES	YES	NC/BIO
FLUORANTHENE	2/5	0.77 J	0.96	0.361	0.865	13SW0601	NA	1.9	0.51	NO	NO	BSL
INDENO(1,2,3-CD)PYRENE	2/5	0.2	0.21 J	0.0969	0.205	13SW3201	NA	4.31	0.05	NO	NO	BSL
PHENANTHRENE	2/5	0.32 J	0.51	0.181	0.415	13SW0601	NA	3.6	0.14	NO	NO	BSL
PYRENE	2/5	0.58 J	0.65	0.261	0.615	13SW0601	NA	0.3	2.17	YES	YES	ASL/BIO
Energetics (ug/L)												
2,4,6-TRINITROTOLUENE	5/34	0.42 J	6.8	0.480	2.39	13SW1301	ND	NA	NA	YES	YES	NC/BIO
2,6-DIAMINO-4-NITROTOLUENE	1/21	0.44 J	0.44 J	0.141	0.440	13SW1302	ND	NA	NA	YES	YES	NC/BIO
2-AMINO-4,6-DINITROTOLUENE	11/33	0.26 J	8.3 J	0.606	1.49	13SW1302	ND	NA	NA	YES	YES	NC/BIO
3-NITROTOLUENE	2/34	0.29 J	0.31 J	0.169	0.300	13SW1302	ND	NA	NA	YES	YES	NC/BIO
4-AMINO-2,6-DINITROTOLUENE	14/34	0.46 J	21 J	1.39	3.15	13SW1302	ND	NA	NA	YES	YES	NC/BIO
DNX	10/21	0.59 J	35	3.70	7.63	13SW1102	ND	NA	NA	YES	YES	NC/BIO
HMX	21/34	0.67	730	41.3	66.8	13SW1102	ND	NA	NA	YES	YES	NC/BIO
MNX	10/21	1.2	72	7.70	16.0	13SW1102	ND	NA	NA	YES	YES	NC/BIO
RDX	25/34	0.29 J	5500	276	375	13SW1102	ND	NA	NA	YES	YES	NC/BIO
TNX	7/21	0.48 J	4	0.644	1.68	13SW1102, 13SW1501	ND	NA	NA	YES	YES	NC/BIO
Herbicides (ug/L)												
PENTACHLOROPHENOL	2/3	0.025 J	0.091	0.0408	0.0580	13SW0401	NA	4	0.02	NO	NO	BSL
Total Metals (ug/L)												
ALUMINUM	28/33	108 J	19100 J	2329	2739	13SW0701	486 J - 1770 J	87	220	YES	NO	ASL/NONBIO
ARSENIC	15/33	0.85 J	35.7 J	2.38	4.96	13SW1101	0.8 J	148	0.24	NO	NO	BSL
BARIUM	33/33	25.3 J	247 J	75.4	75.4	13SW0701	58.1 J - 58.2 J	220	1.12	YES	NO	ASL/NONBIO
CADMIUM	1/33	1.3 J	1.3 J	0.105	1.30	13SW0102	ND	0.15	8.67	YES	YES	ASL/BIO
CALCIUM	33/33	3040 J	133000 J	47368	47368	13SW0701	5060 J - 6550 J	NA	NA	NO	NO	NUT
CHROMIUM	17/33	1 J	20.5 J	3.34	6.19	13SW0701	0.82 J - 2.2 J	42	0.49	NO	NO	BSL
COBALT	18/33	0.47 J	9.4 J	1.79	3.15	13SW1101	ND	24	0.39	NO	NO	BSL
COPPER	30/33	0.89 J	27.1 J	5.65	6.18	13SW1101	1.3 J - 2.2 J	1.58	17.2	YES	YES	ASL/BIO
IRON	26/33	152 J	16200 J	2142	2706	13SW0701	415 J - 1600 J	1000	16.2	YES	NO	ASL/NONBIO
LEAD	14/33	1.3 J	137 J	6.42	14.8	13SW0102	ND	1.17	117	YES	YES	ASL/BIO
LITHIUM	8/13	2.8 J	14.3 J	4.18	6.24	13SW0701	NA	NA	NA	YES	NO	NC/NONBIO
MAGNESIUM	32/33	836 J	92200 J	11421	11556	13SW1101	2830 J - 3600 J	NA	NA	NO	NO	NUT
MANGANESE	32/33	7.5 J	3190 J	244	251	13SW0802	60.1 J - 122 J	NA	NA	YES	NO	NC/NONBIO
MERCURY	1/33	0.047 J	0.047 J	0.0168	0.0470	13SW1501	ND	0.0013	36.2	YES	YES	ASL/BIO
NICKEL	32/33	0.67 J	22 J	4.50	4.61	13SW1501	2.3 J	28.9	0.76	NO	NO	BSL
POTASSIUM	33/33	621 J	690000 J	35130	35130	13SW1101	1800 J - 2920 J	NA	NA	NO	NO	NUT
SELENIUM	1/33	2 J	2 J	0.167	2.00	13SW1101	ND	5	0.4	NO	NO	BSL
SODIUM	33/33	2260 J	325000 J	30873	30873	13SW0701	1540 J	NA	NA	NO	NO	NUT
STRONTIUM	13/13	48 J	245 J	108	108	13SW0701	NA	NA	NA	YES	NO	NC/NONBIO
TITANIUM	30/31	1.3 J	356 J	38.2	39.5	13SW0701	10.1 J	NA	NA	YES	NO	NC/NONBIO
VANADIUM	25/33	0.42 J	43.5 J	5.92	7.76	13SW1101	0.89 J - 2.9	12	3.63	YES	NO	ASL/NONBIO
ZINC	25/33	6.8 J	269 J	28.6	36.8	13SW0102	8.8 J	65.7	4.1	YES	YES	ASL/BIO
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED	18/33	52.7 J	822	109	191	13SW0901-F	254 J - 938 J	87	9.45	YES	NO	ASL/NONBIO
ARSENIC, FILTERED	8/33	0.64 J	35.3 J	1.65	6.33	13SW1101-F	ND	148	0.24	NO	NO	BSL
BARIUM, FILTERED	33/33	10.1 J	149 J	61.5	61.5	13SW0701-F	51.7 J - 54.1 J	220	0.68	NO	NO	BSL
CALCIUM, FILTERED	33/33	5660 J	121000 J	45608	45608	13SW0701-F	5120 J - 6680 J	NA	NA	NO	NO	NUT
CHROMIUM, FILTERED	1/33	2 J	2 J	0.289	2.00	13SW1101-F	1 J	42	0.05	NO	NO	BSL
COBALT, FILTERED	20/33	0.6 J	8.8 J	1.60	2.50	13SW1101-F	0.79 J	24	0.37	NO	NO	BSL
COPPER, FILTERED	28/33	0.57 J	26.4 J	2.95	3.41	13SW1101-F	1.5 J	1.58	16.7	YES	YES	ASL/BIO
IRON, FILTERED	15/33	35.7 J	1120 J	135	275	13SW0802-F	155 J - 645 J	1000	1.12	YES	NO	ASL/NONBIO
LEAD, FILTERED	1/33	1.1 J	1.1 J	0.109	1.10	13SW0102-F	ND	1.17	0.94	NO	NO	BSL

TABLE 8-4

ECOLOGICAL COPC SELECTION - GULLY SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration (1)	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC (2)		Rationale (3)
										Aquatic Invertebrates	Wildlife	
LITHIUM, FILTERED	3/13	3.1 J	5.5 J	1.32	4.03	13SW1001-F	NA	NA	NA	YES	NO	NC/NONBIO
MAGNESIUM, FILTERED	32/33	3440 J	92900 J	11414	11557	13SW1101-F	2740 J - 3770 J	NA	NA	NO	NO	NUT
MANGANESE, FILTERED	30/33	2.9 J	3110 J	180	198	13SW0802-F	112 J	NA	NA	YES	NO	NC/NONBIO
NICKEL, FILTERED	28/33	0.58 J	18.6 J	2.39	2.75	13SW1101-F	1.8 J	28.9	0.64	NO	NO	BSL
POTASSIUM, FILTERED	33/33	600 J	700000 J	35149	35149	13SW1101-F	1850 J - 2700 J	NA	NA	NO	NO	NUT
SELENIUM, FILTERED	1/33	2.2 J	2.2 J	0.163	2.20	13SW1101-F	ND	5	0.44	NO	NO	BSL
SODIUM, FILTERED	33/33	2920 J	311000 J	30880	30880	13SW0701-F	1660 J	NA	NA	NO	NO	NUT
STRONTIUM, FILTERED	13/13	45.5 J	219 J	102	102	13SW0701-F	NA	NA	NA	YES	NO	NC/NONBIO
TITANIUM, FILTERED	26/31	0.1 J	19.5 J	3.55	4.15	13SW0901-F	5.3 J	NA	NA	YES	NO	NC/NONBIO
VANADIUM, FILTERED	9/33	0.44 J	38.5 J	1.75	5.91	13SW1101-F	ND	12	3.21	YES	NO	ASL/NONBIO
ZINC, FILTERED	18/33	3.4 J	54.5 J	9.44	14.7	13SW0902-F	18.6 J	65.7	0.83	NO	NO	BSL
Field Parameters (mg/L)												
DISSOLVED OXYGEN	5/5	2.83	11.97	9.51	9.51	13SW1502	8.05	NA	NA	NA	NA	NZ
DISSOLVED OXYGEN - METER	32/32	2.19	12.32	7.87	7.87	13SW1301	7.97	NA	NA	NA	NA	NZ
OXIDATION REDUCTION POTENTIAL (MV)	37/37	-23.7	640	196	196	13SW0601	49 - 330.8	NA	NA	NA	NA	NZ
PH (S.U.)	37/37	6.13	8.48	7.39	7.39	13SW0901	6.37 - 7.99	NA	NA	NA	NA	NZ
SPECIFIC CONDUCTANCE (MS/CM)	37/37	0.138	829	22.9	22.9	13SW0102	0.059 - 0.073	NA	NA	NA	NA	NZ
TEMPERATURE (C)	37/37	6.52	16.45	12.1	12.1	13SW1101	8.84 - 13.75	NA	NA	NA	NA	NZ
TURBIDITY (NTU)	36/36	0	352	44.2	44.2	13SW0701	56.4 - 221	NA	NA	NA	NA	NZ
Miscellaneous Parameters (mg/L)												
AMMONIA-N	18/31	0.01	3.4	0.180	0.307	13SW1101	ND	NA	NA	YES	NO	NC/NONBIO
NITRITE/NITRATE-N	23/34	0.14	200	7.65	11.3	13SW2401	4	NA	NA	YES	NO	NC/NONBIO

Field duplicate samples are excluded from these summaries because they are considered to be field QC samples.

Acronyms:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
NA = Not Available or Not Applicable
ND = Not detected
SWMU = Solid Waste Management Unit

Footnotes:
1 - Mean concentrations incorporate TV/2 for non-detect values where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.4).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria available
NUT = Essential Nutrient
NZ = Field parameters not selected as COPCs

TABLE 8-5

ECOLOGICAL COPC SELECTION - MAINSTREAM SURFACE WATER SAMPLES ROUNDS 2 AND 3
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration[1]	Average of Positive Detects	Sample of Maximum Detect	Range of Background Detects	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
										Aquatic Invertebrates	Wildlife	
Energetics (ug/L)												
HMX	4/5	1.4	3.2 J	2.01	2.48	13SW3001	ND	NA	NA	YES	YES	NC/BIO
MNX	2/5	0.28 J	0.31 J	0.195	0.295	13SW3002	ND	NA	NA	YES	YES	NC/BIO
RDX	4/5	1.3	9.9	5.23	6.50	13SW3002	ND	NA	NA	YES	YES	NC/BIO
Total Metals (ug/L)												
BARIUM	2/2	54.1 J	57.8 J	56.0	56.0	13SW3002	53.7 J - 62.7 J	220	0.26	NO	NO	BSL
CALCIUM	2/2	50000 J	54800 J	52400	52400	13SW3001	55700 J - 65300 J	NA	NA	NO	NO	NUT
CHROMIUM	1/2	0.68 J	0.68 J	0.550	0.680	13SW3002	3.8 J	42	0.02	NO	NO	BSL
COPPER	2/2	1.3 J	1.4 J	1.35	1.35	13SW3001	1.1 J - 5.5	1.58	0.89	NO	NO	BSL
IRON	1/2	175 J	175 J	105	175	13SW3001	2460	1000	0.18	NO	NO	BSL
MAGNESIUM	2/2	8780 J	9770 J	9275	9275	13SW3001	9090 J - 14500 J	NA	NA	NO	NO	NUT
MANGANESE	1/2	7.9 J	7.9 J	5.28	7.90	13SW3001	23	NA	NA	YES	NO	NC/NONBIO
NICKEL	1/2	0.45 J	0.45 J	0.458	0.450	13SW3001	0.77 J - 6.9	28.9	0.02	NO	NO	BSL
POTASSIUM	2/2	4850 J	6690 J	5770	5770	13SW3002	2560 J - 3860 J	NA	NA	NO	NO	NUT
SODIUM	2/2	18400 J	25600 J	22000	22000	13SW3001	29900 J - 34300 J	NA	NA	NO	NO	NUT
TITANIUM	1/1	2.3 J	2.3 J	2.30	2.30	13SW3001	0.31 J	NA	NA	YES	NO	NC/NONBIO
Dissolved Metals (ug/L)												
BARIUM, FILTERED	2/2	81.6 J	280 J	181	181	13SW3002-F	52.7 J - 56 J	220	1.27	YES	NO	ASL/NONBIO
CALCIUM, FILTERED	2/2	29000 J	52400 J	40700	40700	13SW3002-F	54900 J - 75800 J	NA	NA	NO	NO	NUT
CHROMIUM, FILTERED	1/2	0.6 J	0.6 J	0.375	0.600	13SW3002-F	ND	42	0.01	NO	NO	BSL
COBALT, FILTERED	1/2	2.8 J	2.8 J	1.42	2.80	13SW3001-F	0.16 J - 3.2 J	NA	NA	YES	NO	NC/NONBIO
COPPER, FILTERED	2/2	1.2 J	1.5 J	1.35	1.35	13SW3001-F	1 J - 1.6 J	1.58	0.95	NO	NO	BSL
MAGNESIUM, FILTERED	2/2	8840 J	9090 J	8965	8965	13SW3001-F	9630 J - 15700	NA	NA	NO	NO	NUT
MANGANESE, FILTERED	1/2	23 J	23 J	12.3	23.0	13SW3001-F	4.9 J - 6.1 J	NA	NA	YES	NO	NC/NONBIO
NICKEL, FILTERED	1/2	1.4	1.4	0.910	1.40	13SW3001-F	0.87 J - 1.8	28.9	0.05	NO	NO	BSL
POTASSIUM, FILTERED	2/2	6780 J	15100 J	10940	10940	13SW3001-F	2470 J - 3550 J	NA	NA	NO	NO	NUT
SODIUM, FILTERED	2/2	9830 J	18700 J	14265	14265	13SW3002-F	33800 J - 35700 J	NA	NA	NO	NO	NUT
TITANIUM, FILTERED	1/1	0.6 J	0.6 J	0.600	0.600	13SW3001-F	0.22 J	NA	NA	YES	NO	NC/NONBIO
Field Parameters (mg/L)												
DISSOLVED OXYGEN	4/4	8.72	11.45	9.92	9.92	13SW3301	9.34	NA	NA	NA	NA	NZ
DISSOLVED OXYGEN - METER	1/1	9.63	9.63	9.63	9.63	13SW3001	9.4	NA	NA	NA	NA	NZ
OXIDATION REDUCTION POTENTIAL (MV)	5/5	39.3	222.1	124	124	13SW3001	130 - 226.2	NA	NA	NA	NA	NZ
PH (S.U.)	5/5	7.12	7.84	7.52	7.52	13SW3001	7.63 - 7.88	NA	NA	NA	NA	NZ
SPECIFIC CONDUCTANCE (MS/CM)	5/5	0.347	512	177	177	13SW3501	0.448 - 457	NA	NA	NA	NA	NZ
TEMPERATURE (C)	5/5	10.79	14.5	13.4	13.4	13SW3501	12.5 - 14.25	NA	NA	NA	NA	NZ
TURBIDITY (NTU)	5/5	1.3	5.92	3.86	3.86	13SW3301	1.1 - 119	NA	NA	NA	NA	NZ
Miscellaneous Parameters (mg/L)												
NITRITE/NITRATE-N	2/5	0.26	0.28	0.116	0.270	13SW3301	ND	NA	NA	YES	NO	NC/NONBIO

Field duplicates are excluded from these summaries because they are considered to be field QC samples.

Acronyms:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
NA = Not Applicable or Not Available
ND = Not Detected
SWMU = Solid Waste Management Unit

Footnotes:
1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.4).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria Available
NUT = Essential Nutrient
NZ = Field parameters not selected as COPCs

TABLE 8-6

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SURFACE SOIL COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Ecological Screening Level (ESL) (mg/kg)	Maximum EEQ[1]	Number of Samples > ESL[2]	Step 3a Evaluation[4]			Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks		Other Step 3a Factors Considered in Evaluation		
						Canadian SQG[3]	ORNL Benchmarks[3]			
Dioxins										
TEQ BIRD	12/12	0.00004	0.000000199	224	12	NA	NA	- A study in the literature found that two species of earthworms showed no adverse effects from soil containing 5 mg/kg of 2,3,7,8-TCDD. - Dioxins are not harmful to invertebrates at "high" levels because they lack the aryl hydrocarbon (Ah)receptor; invertebrates are not likely to be impacted by dioxin concentrations in the soil. - Plants also lack the Ah receptors so they are not likely to be impacted by the concentrations of dioxins in the soil.	Acceptable	No
TEQ MAMMAL	12/12	0.00001	0.000000199	74.8	12	NA	NA			
Pesticides PCBs										
Aroclor-1248	26/35	160	0.000332	481928	26	33	NA	-Maximum concentration exceeds the Canadian SQG. -Only maximum concentration in northern samples exceed the Canadian SQG and this sample is bounded by surrounding samples that are less than SQG. -Concentrations exceed the SQG in six samples collected from the southern area. -Samples collected in maintained grassy areas; significant plant diversity is not expected to exist in these areas. -Areas in the middle of SWMU 13 and along the boundary of the ridge top are heavily vegetated; potentially impacted area represents only a small percentage of potential habitat. -Although individual impacts are possible at isolated locations, risks to the overall plant and invertebrate populations at SWMU 13 are acceptable.	Acceptable	No
EXPLOSIVES										
1,3,5-Trinitrobenzene	2/371	1.7	0.376	4.52	1	NA	NA	-Detected infrequently in only 2 of 371 surface soil samples; only other detection is less than ESL.	Acceptable	No
2,4,6-Trinitrotoluene	216/368	57	NA	NA	NA	NA	NA	-Maximum and average concentrations are greater than LOECs reported for plants (2.4 mg/kg) and soil invertebrates (1.2 mg/kg) -Samples collected in areas immediately surrounding the buildings which are maintained grassy areas to allow access to buildings; significant plant diversity is not expected to exist in these areas. -Areas in the middle of SWMU 13 and along the boundary of the ridge top are heavily vegetated; potentially impacted area represents only a small percentage of potential habitat. -Although individual impacts are possible at isolated locations, risks to the overall plant and invertebrate populations at SWMU 13 are acceptable.	Acceptable	No
2-Amino-4,6-dintrotoluene	35/370	150	NA	NA	NA	NA	NA	-Detected in 3 of 32 samples at Building 165 and average is 4.99 mg/kg, which is less than plant and soil microbial processes toxicity information of 80 mg/kg reported in Talmage et al., 1999. Therefore, it appears that the maximum concentration is an isolated occurrence at Building 165. -Maximum concentrations at all other buildings were 1.03 mg/kg or less, which is less than toxicity values reported in Talmage et al., 1999.	Acceptable	No
2-Nitrotoluene	1/371	0.43	NA	NA	NA	NA	NA	-Detected infrequently in only 1 of 371 surface soil samples.	Acceptable	No

TABLE 8-6

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SURFACE SOIL COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Ecological Screening Level (ESL) (mg/kg)	Maximum EEQ[1]	Number of Samples > ESL[2]	Step 3a Evaluation[4]			Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks		Other Step 3a Factors Considered in Evaluation		
						Canadian SQG[3]	ORNL Benchmarks[3]			
4-Amino-2,6-dintrotoluene	57/371	303	NA	NA	NA	NA	NA	-Maximum concentration at Building 171 is greater than 2-ADNT toxicity benchmarks (using 2-ADNT as a surrogate); however, average concentration at Building 171 (7.97 mg/kg) is an order of magnitude less than 2-ADNT toxicity benchmarks. Therefore, it appears that the maximum concentration is an isolated occurrence at Building 171. -Maximum concentrations at all other buildings were 2.95 mg/kg or less, which is less than toxicity values reported for 2-ADNT in Talmage et al., 1999.	Acceptable	No
HMX	289/368	5390	NA	NA	NA	NA	NA	-Maximum concentration at Building 171 is greater than LOEC for earthworms (280 mg/kg) reported in Robidoux et al., 2001. The average concentration at Building 171 (212 mg/kg) is less than LOEC but greater than estimated NOEC (28 mg/kg). -Maximum concentrations at other buildings were 100 mg/kg or less; average concentrations at other buildings were 2.02 mg/kg and less. -Samples collected in areas immediately surrounding the buildings which are maintained grassy areas to allow access to buildings; significant plant diversity is not expected to exist in these areas. -Areas in the middle of SWMU 13 and along the boundary of the ridge top are heavily vegetated; potentially impacted area represents only a small percentage of potential habitat. -Although individual impacts are possible at isolated locations, risks to the overall plant and invertebrate populations at SWMU 13 are acceptable.	Acceptable	No
RDX	273/368	29	NA	NA	NA	NA	NA	-Maximum concentration is less than plant benchmark (100 mg/kg) reported in Talmage et al., 1999 and LOEC for earthworms (95 mg/kg) reported in Robidoux et al., 2000. -Maximum concentration is greater than estimated NOEC for earthworms (9.5 mg/kg); however, average concentrations at all the buildings were 3.19 mg/kg and less.	Acceptable	No
METALS										
Arsenic	167/231	30.5	5.7	5.35	NA	17.1	NA	-Maximum concentration at Buildings 168/2500 is greater than Canadian SQG; however, the average concentration at Buildings 168/2500 (7.94 mg/kg) is less than the SQG. -Maximum concentrations at all other buildings are less than SQG.	Acceptable	No
Barium	231/231	1160	330[5]	3.52	NA	NA	500 (plant)	-Maximum concentrations at Building 165 and Building 173 (567 mg/kg) are greater than ESL and ORNL plant benchmark; however, average concentrations were 120 mg/kg and less.	Acceptable	No
Cadmium	54/231	1.7	0.38[6]	4.47	NA	NA	NA	-Maximum concentration is less than U.S. EPA Eco-SSLs for plants (32 mg/kg) and soil invertebrates (140 mg/kg). -Maximum concentration is within the range of background detections for NSWC Crane surface soils (0.05 mg/kg - 3.6 mg/kg).	Acceptable	No
Chromium	231/231	95.8	0.4	240	NA	64	NA	-Maximum concentration was detected at Building 171; however, the average concentrations at Building 171 (20.6 mg/kg) is less than SQG. -Maximum concentrations at all other buildings were 50.9 mg/kg and less, which is less than SQG.	Acceptable	No
Lead	225/227	69	16[7]	4.31	NA	NA	NA	-Maximum concentration is less than U.S. EPA Eco-SSLs for plants (115 mg/kg) and soil invertebrates (1,700 mg/kg).	Acceptable	No
Mercury	183/230	3.6	0.1	36	NA	12	NA	-Maximum concentration is less than Canadian SQG.	Acceptable	No

TABLE 8-6

STEP 3A EVALUATION FOR RISKS TO PLANTS AND INVERTEBRATES
SURFACE SOIL COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Ecological Screening Level (ESL) (mg/kg)	Maximum EEQ[1]	Number of Samples > ESL[2]	Step 3a Evaluation[4]			Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks		Other Step 3a Factors Considered in Evaluation		
						Canadian SQG[3]	ORNL Benchmarks[3]			
Selenium	57/231	12.4	0.0276	449	NA	1	NA	-Maximum concentration is greater than Canadian SQG. -Maximum and average concentrations at all buldings (except Building 174) are greater than NSWC Crane background concentrations for selenium. -Samples collected in areas immediately surrounding the buildings which are maintained grassy areas to allow access to buildings; significant plant diversity is not expected to exist in these areas. -Areas in the middle of SWMU 13 and along the boundary of the ridge top are heavily vegetated; potentially impacted area represents only a small percentage of potential habitat. -Although individual impacts are possible at isolated locations, risks to the overall plant and invertebrate populations at SWMU 13 are acceptable.	Acceptable	No

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 Canadian and ORNL benchmarks were used only in the absence of Eco-SSLs.
4 See Section 8.4.1.1 for a more detailed Step 3a evaluation.
5 Barium ESL is based on U.S. EPA Eco-SSL for soil invertebrates; Eco-SSL for plants is unavailable.
6 Cadmium ESL is based on U.S. EPA Eco-SSL for wildlife.
7 Lead ESL is based on U.S. EPA Eco-SSL for wildlife.

EEQ = Ecological Effects Quotient
NA = Not Available or Not Applicable
SQG = Soil Quality Guideline
Eco-SSL = U.S. EPA Ecological Soil Screening Level
ORNL = Oak Ridge National Laboratory
NOEC = No Observed Effect Concentration
LOEC = Lowest Observed Effect Concentration

TABLE 8-7

STEP 3A EVALUATION FOR RISKS TO BENTHIC INVERTEBRATES
SEDIMENT COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Screening Level (mg/kg)	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation[3]					Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks						
						Consensus-based TEC	ER-L	Canadian LEL	AET	Other Step 3a Factors Considered in Evaluation		
Inorganics												
ALUMINUM	5/5	13700	NA	NA	NA	NA	NA	NA	NA	-Maximum concentration is less than the TEL of 25,500 mg/kg.	Acceptable	No
ANTIMONY	5/5	4.7	NA	NA	NA	NA	2	NA	NA	-Maximum concentration is greater than the ER-L but is less than the ER-M (4.7 mg/kg); this is the range within which effects are expected to occasionally occur. -Maximum concentration was detected during Round 2 and the concentration of antimony at the same location during Round 3 was 2 mg/kg which is similar to upstream concentrations (2.1 mg/kg and 1.8 mg/kg).	Acceptable	No
ARSENIC	5/5	56.9	9.79	5.81	5	9.79 (ESL)	NA	NA	NA	-Both the maximum and average concentration (40.6 mg/kg) exceed the consensus based PEC (33 mg/kg). -Mainstream sample concentrations are greater than gully samples and concentrations are not well bounded with respect to the SWMU boundaries.	Unacceptable	Yes
BARIUM	5/5	207	NA	NA	NA	NA	NA	NA	48	-Maximum concentration was detected during Round 3 and the concentration of barium at the same location during Round 2 was 125 mg/kg which is similar to upstream concentrations (90.7 mg/kg and 137 mg/kg). -Barium is a common element in sediments and it is not generally associated with toxicity.	Acceptable	No
BERYLLIUM	5/5	3.7	NA	NA	NA	NA	NA	NA	NA	-Upstream concentrations of beryllium (2 mg/kg to 2.3 mg/kg) were only slightly lower than main stream sediment concentrations (1.9 mg/kg to 3.7 mg/kg). -Beryllium was not detected in main stream surface water samples.	Acceptable	No
CADMIUM	5/5	17.1	0.99	17.3	5	0.99 (ESL)	NA	NA	NA	-All five sample concentrations were greater than the PEC (4.98 mg/kg) and upstream concentrations .	Unacceptable	Yes
CHROMIUM	5/5	192	43.4	4.42	5	43.4 (ESL)	NA	NA	NA	-Maximum and average (123 mg/kg) concentrations exceed the PEC (111 mg/kg) and upstream concentrations (49.1 mg/kg to 77.2 mg/kg).	Unacceptable	Yes
IRON	5/5	299,000	NA	NA	NA	NA	NA	20,000	NA	-All five sample concentrations were greater than the SEL (40,000 mg/kg) -Maximum concentration is greater than upstream concentrations (120,000 mg/kg to 121,000 mg/kg).	Unacceptable	Yes
LEAD	5/5	45.6	35.8	1.27	4	35.8 (ESL)	NA	NA	NA	-Maximum concentration is greater than the TEC, but less than the PEC (128 mg/kg). -Average concentration (38 mg/kg) only slightly exceeds the TEC. -Upstream concentrations (20.6 mg/kg to 25.2 mg/kg) are within the same range as main stream samples. -Lead concentrations were low in surface soil samples (i.e., maximum concentration of 69 mg/kg in 227 samples).	Acceptable	No
MANGANESE	5/5	3960	NA	NA	NA	NA	NA	460	NA	-All five sample concentrations were greater than the SEL (1,100 mg/kg). -Concentrations in downstream samples exceed the SEL and concentrations are not well bounded with respect to the SWMU boundaries.	Unacceptable	Yes
NICKEL	5/5	47.8	22.7	2.11	5	22.7 (ESL)	NA	NA	NA	-Maximum concentration is greater than the TEC, but less than the PEC (48.6 mg/kg). -Upstream concentrations (41.5 mg/kg to 54.1 mg/kg) are within the same range as mainstream samples.	Acceptable	No

TABLE 8-7

STEP 3A EVALUATION FOR RISKS TO BENTHIC INVERTEBRATES
SEDIMENT COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (mg/kg)	Screening Level (mg/kg)	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation[3]					Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						Alternate Benchmarks						
						Consensus-based TEC	ER-L	Canadian LEL	AET	Other Step 3a Factors Considered in Evaluation		
SELENIUM	5/5	1.5	NA	NA	NA	NA	NA	NA	NA	-Concentrations were similar among all samples and ranged from 0.62 mg/kg to 1.5 mg/kg. -Detected in the majority of gully sediment samples with concentrations (0.18 mg/kg to 1.1 mg/kg) similar to those seen in main stream samples. -Concentrations in main stream samples were similar to the range of back-ground detections (0.48 mg/kg to 0.85 mg/kg).	Acceptable	No
TITANIUM	1/1	65.6	NA	NA	NA	NA	NA	NA	NA	-Generally considered poorly soluble, poorly bioavailable, and non-toxic. -No reason to suspect that titanium is present in SWMU 13 media as a result of former activities at SWMU 13.	Acceptable	No
VANADIUM	5/5	101	NA	NA	NA	NA	NA	NA	57	-Maximum concentration was detected during Round 2 and the concentration of vanadium at the same location during Round 3 was 67.5 mg/kg which is similar to upstream concentrations (47.6 mg/kg and 61.6 mg/kg).	Acceptable	No
ZINC	5/5	195	121	1.61	4	121 (ESL)	NA	NA	NA	-Maximum concentration is greater than the TEC, but less than the PEC (495 mg/kg). -Concentrations in gully samples ranged from 7.9 mg/kg to 541 mg/kg and indicate that possible sources to the main stream exist. -Concentrations in downstream samples are greater than the TEC and concentrations are not well bounded with respect to the SWMU boundaries.	Unacceptable	Yes

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 See Section 8.4.1.2 for a more detailed Step 3a Evaluation.

EEQ = Ecological Effects Quotient
NA = Not Available or Not Applicable
TEC = Threshold Effect Concentration
ER-L = Effects Range-Low
LEL = Lowest Effects Level
AET = Apparent Effects Threshold

TABLE 8-8

STEP 3A EVALUATION FOR RISKS TO AQUATIC ORGANISMS
SURFACE WATER COPCs
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection	Maximum Detected Concentration (ug/L)	Screening Level (ug/L)	Maximum EEQ[1]	Number of Samples > Screening Level[2]	Step 3a Evaluation[3]		Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
						ORNL SCV	Other Step 3a Factors Considered in Evaluation		
Energetics									
HMX	4/5	3.2	NA	NA	NA	330	-Maximum concentration is less than the SCV.	Acceptable	No
RDX	4/5	9.9	NA	NA	NA	NA	-Maximum concentration is less than the SCV.	Acceptable	No
MNX	2/5	0.31	NA	NA	NA	190	-Maximum concentration is not expected to cause risks to aquatic organisms based on SCVs for HMX and RDX.	Acceptable	No
Metals									
BARIUM, FILTERED	2/2	280	220	1.27	1	NA	-Not retained as a COPC in unfiltered samples because the maximum concentration is less than the ESL. -Maximum concentration in unfiltered samples is within the range of upstream concentrations (53.7 ug/L to 62.7 ug/L). -Average concentration in filtered samples (181 ug/L) is less than the ESL.	Acceptable	No
COBALT, FILTERED	1/2	2.8	NA	NA	NA	23	-Maximum concentration is less than the SCV. -Maximum concentration is within the range of upstream filtered concentrations (0.16 ug/L to 3.2 ug/L).	Acceptable	No
MANGANESE	1/2	7.9	NA	NA	NA	120	-Maximum concentrations in unfiltered and filtered samples are less than the SCV	Acceptable	No
MANGANESE, FILTERED	1/2	23	NA	NA	NA				
TITANIUM	1/1	2.3	NA	NA	NA	NA	-Generally considered poorly soluble, poorly bioavailable, and non-toxic. -No reason to suspect that titanium is present in SWMU 13 media as a result of former activities at SWMU 13.	Acceptable	No
TITANIUM, FILTERED	1/1	0.6	NA	NA	NA				
Miscellaneous Parameters									
NITRITE/NITRATE-N	2/5	0.00028	NA	NA	NA	NA	-Surface waters at SWMU 13 are shallow and well oxygenated so nitrate is the predominant form of N present; the maximum concentration is less than the Canadian water quality guideline of 0.013 ug/L.	Acceptable	No

Footnotes:
1 Maximum EEQ = Maximum detection divided by the screening level.
2 Number of samples with concentrations greater than the screening level.
3 See Section 8.4.1.3 for a more detailed Step 3a Evaluation.

EEQ = Ecological Effects Quotient
NA = Not Available or Not Applicable
ORNL = Oak Ridge National Laboratory
SCB = Secondary Chronic Value

TABLE 8-9

EXPOSURE PARAMETERS FOR THE TERRESTRIAL WILDLIFE MODEL
SMWU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Species/Exposure Inputs	Conservative Inputs		Average Inputs		Source
	Values	Units	Values	Units	
Meadow Vole					
Body Weight = BW	3.290E-02	kg	3.663E-02	kg	USEPA, 1993
Food Ingestion Rate = If	3.840E-03	kg/day	3.570E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	7.700E-03	L/day	6.400E-03	L/day	USEPA, 1993
Soil Ingestion Rate - Is (2.4%)	9.216E-05	kg/day	8.568E-05	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		1.640E-01	acres	USEPA, 1993
Short-Tailed Shrew					
Body Weight = BW	1.525E-02	kg	1.687E-02	kg	USEPA, 1993
Food Ingestion Rate = If	2.592E-03	kg/day	1.648E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	4.300E-03	L/day	3.800E-03	L/day	USEPA, 1993
Soil Ingestion Rate - Is (13%)	3.370E-04	kg/day	2.142E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		9.700E-01	acres	USEPA, 1993
American Woodcock					
Body Weight = BW	1.660E-01	kg	1.895E-01	kg	USEPA, 1993
Food Ingestion Rate = If	3.032E-02	kg/day	2.526E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	1.900E-02	L/day	1.900E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is(11.74%,6.68%)	3.560E-03	kg/day	1.688E-03	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		6.133E+01	acres	USEPA, 1993
Bobwhite Quail					
Body Weight = BW	1.620E-01	kg	1.770E-01	kg	USEPA, 1993
Food Ingestion Rate = If	4.920E-03	kg/day	4.320E-03	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	2.310E-02	L/day	1.840E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is (8.2%)	4.034E-04	kg/day	3.542E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		2.860E+01	acres	USEPA, 1993
Mink					
Body Weight = BW	8.730E-01	kg	1.351E+00	kg	USEPA, 1993
Food Ingestion Rate = If	5.245E-02	kg/day	4.638E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	5.100E-02	kg/day	3.780E-02	kg/day	USEPA, 1993
Sediment Ingestion Rate - Is (3.3%)	1.731E-03	kg/day	1.530E-03	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		3.484E+01	acres	USEPA, 1993
Belted Kingfisher					
Body Weight = BW	1.360E-01	kg	1.520E-01	kg	USEPA, 1993
Food Ingestion Rate = If	1.895E-02	kg/day	1.723E-02	kg/day	USEPA, 1993
Water Ingestion Rate = Iw	1.870E-02	L/day	1.670E-02	L/day	USEPA, 1993
Soil Ingestion Rate - Is	3.790E-04	kg/day	3.445E-04	kg/day	Beyer, 1993
Home Range = HR	Assume 100% on site		1.160E+00	km	USEPA, 1993
Red-tailed Hawk					
Body Weight = (BW)	1.02E+00	kg	1.13E+00	kg	USEPA, 1993
Food Ingestion Rate = (If)	4.04E-02	kg/day	3.86E-02	kg/day	USEPA, 1993
Water Ingestion Rate = (Iw)	6.65E-02	L/day	6.43E-02	L/day	USEPA, 1993
Soil Ingestion Rate = (Is)	1.13E-03	kg/day	1.08E-03	kg/day	Beyer, 1993
Home Range = (HR)	Assume 100% on site		1021	acres	USEPA, 1993
Red Fox					
Body Weight = (BW)	4.13E+00	kg	4.71E+00	kg	USEPA, 1993
Food Ingestion Rate = (If)	2.11E-01	kg/day	1.43E-01	kg/day	USEPA, 1993
Water Ingestion Rate = (Iw)	4.05E-01	L/day	4.00E-01	L/day	USEPA, 1993
Soil Ingestion Rate = (Is)	5.91E-03	kg/day	4.00E-03	kg/day	Beyer, 1993
Home Range = (HR)	Assume 100% on site		1307	acres	USEPA, 1993

TABLE 8-10

NOAEL EEQs FOR HERBIVOROUS/INSECTIVOROUS RECEPTORS ACROSS THE ENTIRE SWMU
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Chemicals of Potential Concern (COPCs)	Maximum Concentration, Conservative BAFs and Exposure Parameters				Maximum Concentration, Less Conservative BAFs and Exposure Parameters			
	Vole	Shrew	Woodcock	Quail	Vole	Shrew	Woodcock	Quail
DIOXINS/FURANS								
TEQ Bird	NA	NA	1.30E+01	8.33E-03	NA	NA	1.30E+01	6.70E-03
TEQ Mammal	5.50E-03	3.11E+00	NA	NA	4.59E-03	8.90E-01	NA	NA
EXPLOSIVES								
2,4,6-Trinitrotoluene	8.47E-01	3.76E-01	1.66E+00	4.65E-01	7.07E-01	2.16E-01	1.66E+00	3.74E-01
HMX	4.65E+03	2.21E+02	NA	NA	3.89E+03	1.27E+02	NA	NA
RDX	3.05E-01	5.10E-01	2.65E+00	2.15E-01	2.55E-01	2.93E-01	2.65E+00	1.72E-01
PCBs								
Aroclor-1248	5.84E-01	1.68E+02	2.60E+03	2.65E+00	4.88E-01	4.08E+01	2.60E+03	2.13E+00
METALS								
Arsenic	4.15E+01	1.72E+01	1.45E+00	4.46E-01	1.89E+00	5.36E+00	1.45E+00	3.62E-02
Cadmium	8.38E-02	7.48E-01	8.74E+00	1.19E-01	1.30E-02	8.25E-02	8.74E+00	1.91E-02
Chromium	4.11E-02	8.97E-01	5.74E+01	4.83E-01	2.07E-02	6.83E-02	5.74E+01	2.88E-01
Lead	5.53E-02	1.33E-01	1.83E+01	1.02E+00	5.91E-03	1.83E-02	1.83E+01	1.80E-01
Mercury	5.50E+00	1.63E+01	2.13E+03	8.68E+01	6.18E-01	8.21E-01	2.13E+03	1.01E+01
Selenium	2.45E+00	8.50E-01	8.25E+00	2.91E+00	4.70E-01	3.71E-01	8.25E+00	5.70E-01

Acronyms:

BAF = Bioaccumulation Factor

EEQ = Ecological Effects Quotient

NA = Not Applicable or Not Available

NOAEL = No Observed Adverse Effect Level

PCB = Polychlorinated Biphenyl

SWMU = Solid Waste Management Unit

TABLE 8-11

EEQs FOR CARNIVOROUS RECEPTORS ACROSS THE ENTIRE SWMU
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

Chemicals of Potential Concern (COPCs)	Maximum Concentration, Conservative BAFs and Exposure Parameters		Average Concentration, Less Conservative BAFs and Exposure Parameters				Average Concentration, Less Conservative BAFs and Exposure Parameters, and AUFs											
	Fox (AUF=100%)	Hawk (AUF=100%)	Fox (AUF=100%)		Hawk (AUF=100%)		Fox (AUF=0.77%)[1]		Fox North (AUF=0.053%)[2]		Fox South (AUF=0.15%)[3]		Hawk (AUF=1%)[4]		Hawk North (AUF=0.068%)[2]		Hawk South (AUF=0.2%)[3]	
	NOAEL	NOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
DIOXINS/FURANS																		
TEQ Bird	NA	2.80E-01	NA	NA	1.90E-02	1.90E-03	NA	NA	NA	NA	NA	NA	5.1E-05	5.1E-06	1.0E-05	1.0E-06	4.6E-05	4.6E-06
TEQ Mammal	2.55E+01	NA	1.39E+00	1.39E-01	NA	NA	2.93E-03	2.93E-04	5.19E-04	5.19E-05	2.25E-03	2.25E-04	NA	NA	NA	NA	NA	NA
EXPLOSIVES																		
1,3,5-Trinitrobenzene	5.08E-01	NA	7.47E-02	1.48E-02	NA	NA	5.72E-04	1.13E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	2.81E+01	3.30E-01	3.67E-01	3.67E-02	6.32E-03	2.49E-04	2.81E-03	2.81E-04	NA	NA	NA	NA	6.2E-05	2.4E-06	NA	NA	NA	NA
2-Nitrotoluene	1.70E-02	NA	9.79E-03	9.79E-04	NA	NA	7.49E-05	7.49E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	1.65E+04	NA	4.62E+01	1.85E+01	NA	NA	3.90E-02	1.56E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	3.81E+01	5.28E-01	2.14E+00	4.29E-01	4.34E-02	3.68E-02	1.64E-02	3.28E-03	NA	NA	NA	NA	4.3E-04	3.6E-04	NA	NA	NA	NA
PCBs																		
Aroclor-1248	1.12E+04	4.57E+02	7.00E+02	7.00E+01	4.19E+01	4.19E+00	1.47E+00	1.47E-01	9.26E-02	9.26E-03	1.37E+00	1.37E-01	1.1E-01	1.1E-02	7.9E-03	7.9E-04	1.2E-01	1.2E-02
METALS																		
Arsenic	9.30E+01	2.10E-02	1.16E+01	1.16E+00	3.84E-03	1.28E-03	8.89E-02	8.89E-03	NA	NA	NA	NA	3.8E-05	1.3E-05	NA	NA	NA	NA
Cadmium	7.17E-01	2.20E-02	3.77E-02	3.77E-03	1.70E-03	1.23E-04	2.89E-04	2.89E-05	NA	NA	NA	NA	1.7E-05	1.2E-06	NA	NA	NA	NA
Chromium	8.10E+00	1.37E+00	2.83E-01	7.07E-02	7.00E-02	1.40E-02	2.17E-03	5.41E-04	NA	NA	NA	NA	6.9E-04	1.4E-04	NA	NA	NA	NA
Lead	2.08E+00	7.58E-01	1.48E-01	1.48E-02	7.90E-02	7.90E-03	1.13E-03	1.13E-04	NA	NA	NA	NA	7.7E-04	7.7E-05	NA	NA	NA	NA
Mercury	1.42E+01	4.88E+00	1.17E-01	7.02E-02	5.90E-02	5.90E-03	8.95E-04	5.37E-04	NA	NA	NA	NA	5.8E-04	5.8E-05	NA	NA	NA	NA
Selenium	5.78E+01	1.49E+00	7.44E-01	4.51E-01	2.80E-02	1.40E-02	5.70E-03	3.45E-03	NA	NA	NA	NA	2.7E-04	1.4E-04	NA	NA	NA	NA

Acronyms:
AUF = Area Use Factor
LOAEL = Lowest Observed Adverse Effect Level
NA = Not Applicable or Not Available
NOAEL = No Observed Adverse Effect Level
PCB = Polychlorinated Biphenyl
SWMU = Solid Waste Management Unit

Footnotes:
1 - An AUF of 0.21% was used for dioxins and Aroclor-1248.
2 - EEQs for the Northern exposure area (dioxins and PCBs only) (i.e., southwest of Building 166).
3 - EEQs for the Southern exposure area (dioxins and PCBs only) (i.e., surrounding Building 171).
4 - An AUF of 0.27% was used for dioxins and Aroclor-1248.

TABLE 8-12

EEQS FOR BACKGROUND SURFACE SOIL GROUP 3
SWMU 13 MINE FILL B
NSWC CRANE
CRANE INDIANA

	Meadow Vole		Short-Tailed Shrew		American Woodcock		Bobwhite Quail		Red-tailed Hawk		Red Fox	
Parameter	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ
METALS												
Arsenic	6.3E-01	6.3E-02	1.8E+00	1.8E-01	1.6E-01	5.4E-02	1.2E-02	4.0E-03	4.3E-03	1.4E-03	1.31E+01	1.31E+00
Cadmium	2.8E-02	2.8E-03	1.7E-01	1.7E-02	2.6E+00	1.9E-01	4.0E-02	2.9E-03	1.3E-02	9.5E-04	2.91E-01	2.91E-02
Chromium	4.7E-03	1.2E-03	1.5E-02	3.9E-03	1.1E+00	2.2E-01	6.5E-02	1.3E-02	8.4E-02	1.7E-02	3.39E-01	8.46E-02
Lead	1.8E-03	1.8E-04	5.7E-03	5.7E-04	8.4E-01	8.4E-02	5.6E-02	5.6E-03	8.7E-02	8.7E-03	1.63E-01	1.63E-02
Mercury	1.2E-02	7.2E-03	1.6E-02	9.6E-03	2.6E+00	2.6E-01	2.0E-01	2.0E-02	3.1E-02	3.1E-03	6.11E-02	3.67E-02
Selenium	2.4E-02	1.5E-02	1.9E-02	1.2E-02	2.2E-01	1.1E-01	2.9E-02	1.5E-02	1.0E-02	5.2E-03	2.76E-01	1.67E-01

Cells are shaded if the EEQ is greater than 1.0
EEQs were calculated using the maximum background concentration for soil group 3, average BAFs, and average exposure parameters.

Acronyms:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Concentration
LOAEL = Lowest Observed Adverse Effects Concentration
SWMU = Solid Waste Management Unit

TABLE 8-13

STEP 3A EVALUATION FOR RISKS TO TERRESTRIAL WILDLIFE
SURFACE SOIL COPCs
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection[1]	Maximum Detected Concentration (mg/kg)[1]	EEQs Using Maximum Concentrations and Average Exposure Parameters				Basis of Wildlife Toxicity Reference Value	Other Step 3a Factors Considered in Evaluation[2]	Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
			NOAEL		LOAEL					
			EEQ > 1.0	Species	EEQ > 1.0	Species				
Insectivorous/Herbivorous Wildlife										
TEQ Bird	12/12	44.51305	4.7	Woodcock	None	NA	Significant reduction in egg production and hatchability.	-NOAEL-based EEQs were less than 1.0 using the average concentration at the northern and southern exposure areas.	Acceptable	No
TEQ Mammal	12/12	14.88895	None	NA	None	NA	NA	-NOAEL EEQ is less than 1.0.	Acceptable	No
2,4,6-Trinitrotoluene	216/368	57	1.2	Woodcock	None	NA	Mortality was observed at 178 mg/kg/day in Northern bobwhite (LOAEL); estimated NOAEL of 7 mg/kg/day from 90-day study.[3]	-NOAEL-based EEQs were less than 1.0 using the average concentration at the individual buildings and average exposure parameters.	Acceptable	No
HMX	289/368	5390	3900	Vole	1600	Vole	No significant increase in mortality was observed among mice consuming 30 mg/kg-day HMX, but a significant increase in mortality was observed among mice consuming 75 mg/kg/day.	-NOAEL-based EEQs using average concentrations and average exposure parameters at Buildings 166, 168/2500, and 173 only slightly exceed 1.0; LOAEL-based EEQs at these buildings are less than 1.0. -Average HMX concentration at Building 171 is high because of the two highest concentrations; soil from these grids was not excavated during bioremediation. NOAEL-based EEQs are less than 1.0 if these two samples are removed.	Unacceptable (Building 171 only; acceptable in other areas of SWMU 13	Yes
RDX	273/368	29	1.9	Woodcock	1.6	Woodcock	Mortality was observed at a subchronic dose of 26.3 mg/kg/day in female Northern bobwhite (LOAEL); estimated NOAEL of 22.3 mg/kg/day from 90-day study.[4]	-NOAEL-based EEQs were less than 1.0 using the average concentration at the individual buildings and average exposure parameters.	Acceptable	No
Aroclor-1248	26/35	160000	800	Woodcock	80	Woodcock	Egg hatchability was reduced at 12.5 mg/kg/day (LOAEL).	-NOAEL-based EEQ is greater than 1.0 in the northern exposure area NOAEL and LOAEL-based EEQs are greater than 1.0 in the southern exposure area after using an AUF of 0.2.	Unacceptable	Yes
Arsenic	167/231	30.5	5.4	Shrew	None	NA	Declining litter sizes over multiple mice generations (LOAEL).	-NOAEL-based EEQs at Buildings 165, 166, 168/2500, 171, and 173 were less than NOAEL-based EEQs using the maximum background concentration and average exposure parameters; NOAEL-based EEQ at Building 174 was less than 1.0.	Acceptable	No
Cadmium	54/231	1.7	1.2	Woodcock	None	NA	LOAEL is based on significantly fewer eggs produced by mallard ducks.	-NOAEL-based EEQs were less than 1.0 using the average concentration at the individual buildings and average exposure parameters.	Acceptable	No
Chromium	231/231	95.8	4.8	Woodcock	None	NA	Reproduction	-NOAEL-based EEQs were less than 1.0 using the average concentration at the individual buildings and average exposure parameters.	Acceptable	No
Lead	225/227	69	2.7	Woodcock	None	NA	Reproduction not impaired at 10 mg/kg (NOAEL).	-NOAEL-based EEQs were less than 1.0 using the average concentration at the individual buildings and average exposure parameters.	Acceptable	No
Mercury	183/230	3.6	130	Woodcock	13	Woodcock	Fewer eggs and ducklings were produced in mallard ducks fed 0.5 mg/kg/day dose (LOAEL). NOAEL was estimated by multiplying the chronic LOAEL by an uncertainty factor of 0.1.	-NOAEL-based EEQs were greater than 1.0 in the bird model only; NOAEL-based EEQs were less than 1.0 using the average concentrations, average exposure parameters, and an AUF of 20 percent, except for NOAEL-based EEQs at Buildings 166 and 171. -NOAEL-based EEQs at Buildings 166 and 171 (assuming an AUF of 20 percent) were less than background NOAEL-based EEQs.	Acceptable	No
Selenium	57/231	12.4	4.3	Woodcock	2.2	Woodcock	A dose of 4 mg/kg/day did not produce adverse reproductive effects in mallard ducks (NOAEL); however, a dose of 8 mg/kg/day resulted in reduced duckling survival (LOAEL).	-NOAEL-based EEQs were greater than 1.0 in the bird model only; NOAEL-based EEQs were less than 1.0 using the average concentrations, average exposure parameters, and an AUF of 20 percent	Acceptable	No
Carnivorous Wildlife										
TEQ Mammal	12/12	14.88895	7.4	Fox	None	NA	Significant reduction in fertility and neonatal survival.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.2 percent.	Acceptable	No
2,4,6-Trinitrotoluene	216/368	57	16.7	Fox	1.67	Fox	Rats exposed to 160 mg/kg/day experienced testicular atrophy in a 13 week study. Because the study was subchronic, the LOAEL value was multiplied by 0.1; NOAEL was estimated by multiplying the chronic LOAEL by an uncertainty factor of 0.1.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No
HMX	289/368	5390	9800	Fox	3920	Fox	No significant increase in mortality was observed among mice consuming 30 mg/kg/day HMX, but a significant increase in mortality was observed among mice consuming 75 mg/kg/day.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No

TABLE 8-13

STEP 3A EVALUATION FOR RISKS TO TERRESTRIAL WILDLIFE
SURFACE SOIL COPCs
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

Chemical of Potential Concern (COPC)	Frequency of Detection[1]	Maximum Detected Concentration (mg/kg)[1]	EEQs Using Maximum Concentrations and Average Exposure Parameters				Basis of Wildlife Toxicity Reference Value	Other Step 3a Factors Considered in Evaluation[2]	Risk Determination (Acceptable/ Unacceptable)	Retained as a COPC?
			NOAEL		LOAEL					
			EEQ > 1.0	Species	EEQ > 1.0	Species				
RDX	273/368	29	22.6	Fox	4.52	Fox	Mice exposed to 35 mg/kg/day through their diet experience testicular degeneration over a two year exposure period (LOAEL); 7 mg/kg/day was the highest concentration that did not produce effects.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No
Aroclor-1248	26/35	160000	6630	Fox	663	Fox	Pregnancy and live births were reduced by 2.5 mg/kg in rhesus monkey.	-NOAEL-based EEQ is greater than 1.0 in the southern exposure area only; the NOAEL-based EEQ only slightly exceeds 1.0 and the LOAEL-based EEQ is less than 1.0. -It is unlikely that the carnivorous mammals are obtaining significant portions of their diet from animals that feed and live in the areas surrounding the buildings only.	Acceptable	No
Arsenic	167/231	30.5	39.2	Fox	3.92	Fox	Declining litter sizes over multiple mice generations (LOAEL).	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No
Chromium	231/231	95.8	1.5	Fox	None	NA	No effects were observed in rats exposed to 25 mg/L chromium in drinking water over one year (NOAEL). Mortality was observed in rats fed 1,000 mg/L chromium in drinking water (LOAEL); the subchronic LOAEL was multiplied by an uncertainty factor of 0.1 to estimate a chronic LOAEL.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No
Lead	225/227	69	None	NA	None	NA	NA	-NOAEL EEQ is less than 1.0.	Acceptable	No
Mercury	183/230	3.6	3.14	Fox	1.89	Fox	Mortality, weight loss, and behavioral abnormalities were observed in mink fed 1.8 mg/kg/day dose (LOAEL); significant effects were not observed at 1.1 mg/kg/day (NOAEL).	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No
Selenium	57/231	12.4	5.35	Fox	3.24	Fox	No adverse reproductive effects were observed in rats exposed to 1.5 mg/L in drinking water (NOAEL); however, number of offspring was reduced by 50% at 2.5 m/L dose.	-NOAEL-based EEQs were less than 1.0 using the average concentration at SWMU 13, average exposure parameters, and AUF of 0.8 percent.	Acceptable	No

Footnotes:
1 - These columns present the Frequency of Detection and maximum concentrations for soil, across SWMU 13.
2 - See Section 8.4.2.2 for a more detailed Step 3a evaluation.
3 - TRVs taken from Gogal, Jr., R.M., M.S. Johnson, C.T. Larsen, M.R. Prater, R.B. Duncan, D.L. Ward, and S.D. Holladay. 2002. Influence of Dietary 2,4,6-Trinitrotoluene Exposure in the Northern Bobwhite (*Colinus Virginianus*). Environmental Toxicology and Chemistry, Vol. 21, No. 1 pp. 81-83.
4 - TRVs taken from Gogal, Jr., R.M., M.S. Johnson, C.T. Larsen, M.R. Prater, R.B. Duncan, D.L. Ward, R.B. Lee, C.J. Salice, B. Jortner, and S.D. Holladay. 2003. Dietary Oral Exposure to 1,3,5-Trinitro-1,3,5-Triazine in the Northern Bobwhite (*Colinus Virginianus*). Environmental Toxicology and Chemistry, Vol. 22, No. 2, pp. 381-387.

EEQ - Ecological Effects Quotient
NA - Not available or not applicable
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

TABLE 8-14

ECOLOGICAL COPC SELECTION - ES/DI SURFACE SOIL DATA
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

CHEMICAL[1]	Frequency of Detection	Minimum Concentration	Maximum Concentration	Region 5 ESL	EEQ	COPC[2] Plants/ Invertebrates	Rationale[3]
Energetics (mg/kg)							
1,3,5-Trinitrobenzene	1/25	3	3	0.376	7.98	YES	ASL
1,3-Dinitrobenzene	1/25	0.71	0.71	0.655	1.08	YES	ASL
2,4,6-Trinitrotoluene	6/25	0.34	250	NA	NA	YES	NC
2,4-Dinitrotoluene	1/25	0.87	0.87	1.28	0.68	NO	BSL
2-Amino-4,6-dintrotoluene	1/25	100	100	NA	NA	YES	NC
4-Amino-2,6-dintrotoluene	5/25	0.25	130	NA	NA	YES	NC
HMX	9/25	0.25	350	NA	NA	YES	NC
RDX	6/24	0.33	1800	NA	NA	YES	NC

Acronyms:

COPC = Chemical of Potential Concern

EEQ = Ecological Effects Quotient

ES/DI - External Sump/Drainage Investigation

ESL = Region 5 Ecological Screening Level

NA = Not Available or Not Applicable

SWMU = Solid Waste Management Unit

Footnotes:

1 - Only the data from samples collected as part of the external sump/drainage investigation and PCB delineation investigation are included on this table.

2 - Chemicals retained as COPCs are further evaluated in Section 8.5.

3 - Rationale for COPC selection/deletion:

ASL = Above Screening Level

BSL = Below Screening Level

NC = No Criteria available

TABLE 8-15

ECOLOGICAL COPC SELECTION - BOGGS CREEK SEDIMENT SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
									Sediment Invertebrates	Wildlife	
Inorganics (mg/kg)											
ALUMINUM	7/7	4020 J	10700 J	7171	7171	13SD3701	NA	NA	YES	NO	NC/NONBIO
ANTIMONY	1/7	1.4 J	1.4 J	0.44	1.4	13SD3701	NA	NA	YES	NO	NC/NONBIO
ARSENIC	7/7	5.9 J	11.7 J	8.5	8.5	13SD3801	9.79	1.20	YES	YES	ASL/BIO
BARIUM	7/7	30.6 J	77.5 J	54.4	54.4	13SD3801	NA	NA	YES	NO	NC/NONBIO
BERYLLIUM	7/7	0.48 J	1	0.78	0.78	13SD3701	NA	NA	YES	NO	NC/NONBIO
CADMIUM	7/7	0.12 J	5.1	1.4	1.4	13SD3801	0.99	5.15	YES	YES	ASL/BIO
CALCIUM	7/7	367 J	1980 J	1037	1037	13SD3801	NA	NA	NO	NO	NUT
CHROMIUM	7/7	15.3 J	29.5 J	22.7	22.7	13SD3901	43.4	0.68	NO	NO	BSL
COBALT	7/7	7.2 J	17.8 J	12.1	12.1	13SD3801	50	0.36	NO	NO	BSL
COPPER	7/7	4.7 J	13.3 J	8.5	8.5	13SD4001	31.6	0.42	NO	NO	BSL
IRON	7/7	16600 J	33600 J	24914	24914	13SD3801	NA	NA	YES	NO	NC/NONBIO
LEAD	7/7	7.5 J	24.3 J	14.4	14.4	13SD4001	35.8	0.68	NO	NO	BSL
MAGNESIUM	7/7	336 J	913 J	656	656	13SD3701	NA	NA	NO	NO	NUT
MANGANESE	7/7	380	1090	619	619	13SD3801	NA	NA	YES	NO	NC/NONBIO
NICKEL	7/7	10.5 J	21.6 J	15.9	15.9	13SD3701	22.7	0.95	NO	NO	BSL
POTASSIUM	7/7	456 J	1160 J	853	853	13SD4001	NA	NA	NO	NO	NUT
SELENIUM	7/7	0.15 J	0.35 J	0.26	0.26	13SD3701	NA	NA	YES	NO	NC/BIO
SILVER	5/7	0.06 J	1.9	0.46	0.63	13SD3701	0.5	3.80	YES	YES	ASL/BIO
SODIUM	5/7	7.2 J	24.2 J	11.1	14.7	13SD3701	NA	NA	NO	NO	NUT
THALLIUM	4/7	0.12 J	0.17 J	0.10	0.15	13SD3701	NA	NA	YES	NO	NC/NONBIO
VANADIUM	7/7	14.8 J	28.8 J	22.2	22.2	13SD3901	NA	NA	YES	NO	NC/NONBIO
ZINC	7/7	23.6 J	175 J	57.1	57.1	13SD4001	121	1.45	YES	YES	ASL/BIO

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
ES/DI - External Sump/Drainage Investigation
J - estimated value
mg/kg - milligrams per kilogram

Footnotes:

1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.5).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria Available
NUT = Essential Nutrient

TABLE 8-16

ECOLOGICAL COPC SELECTION - TURKEY CREEK SEDIMENT SAMPLES ES/DI ONLY
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Mean Concentration [1]	Average of Positive Detects	Sample of Maximum Detect	Region 5 ESL	EEQ	COPC[2]		Rationale[3]
									Sediment Invertebrates	Wildlife	
Inorganics (mg/kg)											
ALUMINUM	3/3	5360 J	30500 J	13793	13793	13SD4301	NA	NA	YES	NO	NC/NONBIO
ARSENIC	3/3	4.5 J	10.5 J	6.7	6.7	13SD4301	9.79	1.07	YES	YES	ASL/BIO
BARIUM	3/3	51.6 J	127 J	76.9	76.9	13SD4301	NA	NA	YES	NO	NC/NONBIO
BERYLLIUM	3/3	0.43 J	1.4	0.77	0.77	13SD4301	NA	NA	YES	NO	NC/NONBIO
CADMIUM	3/3	0.17 J	8.4	2.9	2.9	13SD4301	0.99	8.48	YES	YES	ASL/BIO
CALCIUM	3/3	703 J	1920 J	1153	1153	13SD4301	NA	NA	NO	NO	NUT
CHROMIUM	3/3	11.8 J	38.4 J	20.8	20.8	13SD4301	43.4	0.88	NO	NO	BSL
COBALT	3/3	7 J	11.8 J	10.0	10.0	13SD4301	50	0.24	NO	NO	BSL
COPPER	3/3	6.3 J	245 J	86.3	86.3	13SD4301	31.6	7.75	YES	YES	ASL/BIO
IRON	3/3	14100 J	36000 J	21933	21933	13SD4301	NA	NA	YES	NO	NC/NONBIO
LEAD	3/3	9.4 J	35.6 J	18.5	18.5	13SD4301	35.8	0.99	NO	NO	BSL
MAGNESIUM	3/3	565 J	2660 J	1279	1279	13SD4301	NA	NA	NO	NO	NUT
MANGANESE	3/3	444	564	511	511	13SD4401	NA	NA	YES	NO	NC/NONBIO
NICKEL	3/3	10.7 J	31.7 J	18.7	18.7	13SD4301	22.7	1.40	YES	YES	ASL/BIO
POTASSIUM	3/3	748 J	3740 J	1759	1759	13SD4301	NA	NA	NO	NO	NUT
SELENIUM	3/3	0.13 J	0.49 J	0.26	0.26	13SD4301	NA	NA	YES	YES	NC/BIO
SILVER	1/3	0.78 J	0.78 J	0.28	0.78	13SD4301	0.5	1.56	YES	YES	ASL/BIO
SODIUM	1/3	61.9 J	61.9 J	22.0	61.9	13SD4301	NA	NA	NO	NO	NUT
THALLIUM	1/3	0.43 J	0.43 J	0.18	0.43	13SD4301	NA	NA	YES	NO	NC/NONBIO
TIN	1/3	3 J	3 J	1.1	3.0	13SD4301	NA	NA	YES	NO	NC/NONBIO
VANADIUM	3/3	14 J	46.8 J	25.1	25.1	13SD4301	NA	NA	YES	NO	NC/NONBIO
ZINC	3/3	27.2 J	262 J	107	107	13SD4301	121	2.17	YES	YES	ASL/BIO

Field duplicate samples are excluded from these summaries because they are considered field QC samples.
ES/DI - External Sump/Drainage Investigation
J - estimated value
mg/kg - milligrams per kilogram

Footnotes:

1 - Mean concentrations incorporate TV/2 for non-detects where TV = threshold value.
2 - Chemicals retained as COPCs are further evaluated in the Step 3a evaluation (see Section 8.5).
3 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical
BSL = Below Screening Level
NONBIO = Nonbioaccumulative chemical
NC = No Criteria Available
NUT = Essential Nutrient

TABLE 8-17

CONSERVATIVE TERRESTRIAL WILDLIFE MODEL - BOGGS CREEK SEDIMENT
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

	Mink		Belted Kingfisher	
Parameter	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**
ARSENIC	4.0E+02	4.0E+01	4.8E-01	1.6E-01
CADMIUM	2.4E+01	2.4E+00	3.9E+00	2.9E-01
SILVER	6.4E+01	6.4E+00	NA	NA
ZINC	4.2E+00	2.1E+00	1.3E+01	1.4E+00

Notes:

- Cells are shaded black if the EEQ is greater than 1.0

NA = Not Applicable or Not Available
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
SWMU = Solid Waste Management Unit

TABLE 8-18

AVERAGE TERRESTRIAL WILDLIFE MODEL - BOGGS CREEK SEDIMENT
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

	Mink		Belted Kingfisher	
Parameter	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**
ARSENIC	1.6E+01	1.6E+00	6.9E-02	2.3E-02
CADMIUM	1.2E-01	1.2E-02	6.9E-02	5.0E-03
SILVER	3.5E+00	3.5E-01	NA	NA
ZINC	8.1E-02	4.0E-02	8.8E-01	9.7E-02

Notes:
- Cells are shaded black if the EEQ is greater than 1.0

NA = Not Applicable or Not Available
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
SWMU = Solid Waste Management Unit

TABLE 8-19

CONSERVATIVE TERRESTRIAL WILDLIFE MODEL - TURKEY CREEK SEDIMENT
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

	Mink		Belted Kingfisher	
Parameter	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**
Inorganics				
ARSENIC	3.6E+02	3.6E+01	4.3E-01	1.4E-01
CADMIUM	3.9E+01	3.9E+00	6.5E+00	4.7E-01
COPPER	2.0E+01	1.5E+01	3.8E+00	2.9E+00
NICKEL	9.4E-01	4.7E-01	1.3E-01	9.7E-02
SELENIUM	1.3E+00	7.7E-01	1.8E-01	8.8E-02
SILVER	2.6E+01	2.6E+00	NA	NA
ZINC	6.3E+00	3.1E+00	1.9E+01	2.1E+00

Notes:

- Cells are shaded black if the EEQ is greater than 1.0

NA = Not Applicable or Not Available
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
SWMU = Solid Waste Management Unit

TABLE 8-20

AVERAGE TERRESTRIAL WILDLIFE MODEL - TURKEY CREEK SEDIMENT
SWMU 13 MINE FILL B
NSWC CRANE, INDIANA

	Mink		Belted Kingfisher	
Parameter	**NOAEL EEQ**	**LOAEL EEQ**	**NOAEL EEQ**	**LOAEL EEQ**
Inorganics				
ARSENIC	1.3E+01	1.3E+00	5.4E-02	1.8E-02
CADMIUM	2.4E-01	2.4E-02	1.4E-01	1.0E-02
COPPER	4.7E-01	3.6E-01	3.3E-01	2.5E-01
NICKEL	2.8E-02	1.4E-02	1.4E-02	1.0E-02
SELENIUM	1.5E-01	9.3E-02	7.6E-02	3.8E-02
SILVER	2.1E+00	2.1E-01	NA	NA
ZINC	1.5E-01	7.6E-02	1.6E+00	1.8E-01

Notes:

- Cells are shaded black if the EEQ is greater than 1.0

NA = Not Applicable or Not Available
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
SWMU = Solid Waste Management Unit

TABLE 8-21

COMPARISON OF HISTORIC AND ES/DI EXPLOSIVES DATA IN SURFACE SOIL
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

	Building 166			
	Historic Data			ES/DI
Parameter	Frequency of Detection	Maximum Concentration	Average Concentration	Maximum Concentration
1,3,5-Trinitrobenzene	ND	ND	ND	3
1,3-Dinitrobenzene	ND	ND	ND	0.71
2,4,6-Trinitrotoluene	63/83	57	2.6	250
2,4-Dintrotoluene	ND	ND	ND	0.87
2-Amino-4,6-dintrotoluene	17/84	0.51	0.4	100
4-Amino-2,6-dintrotoluene	22/84	1.6	0.48	130
HMX	71/83	100	1.8	350
RDX	63/83	17	2.6	1800

	Building 168			
	Historic Data			ES/DI
Parameter	Frequency of Detection	Maximum Concentration	Average Concentration	Maximum Concentration
1,3,5-Trinitrobenzene	ND	ND	ND	ND
2,4,6-Trinitrotoluene	26/45	39	1.5	ND
2-Amino-4,6-dintrotoluene	5/45	1.03	0.38	ND
4-Amino-2,6-dintrotoluene	6/45	2.11	0.4	ND
HMX	30/45	7.4	1.9	0.55
RDX	28/45	29	2.4	1.9

	Building 171			
	Historic Data			ES/DI
Parameter	Frequency of Detection	Maximum Concentration	Average Concentration	Maximum Concentration
1,3,5-Trinitrobenzene	ND	ND	ND	ND
2,4,6-Trinitrotoluene	23/55	5.59	0.6	2.7
2-Amino-4,6-dintrotoluene	3/55	0.78	0.4	ND
4-Amino-2,6-dintrotoluene	14/55	303	8.0	1.3
HMX	37/55	5390	211	16
RDX	35/55	12.5	2.1	4.9

	Building 173			
	Historic Data			ES/DI
Parameter	Frequency of Detection	Maximum Concentration	Average Concentration	Maximum Concentration
1,3,5-Trinitrobenzene	1/150	1.7	0.48	ND
2,4,6-Trinitrotoluene	97/150	5.2	0.74	ND
2-Amino-4,6-dintrotoluene	8/150	0.19	0.48	ND
4-Amino-2,6-dintrotoluene	11/150	0.5	0.48	ND
HMX	150/150	46.5	2.0	0.68
RDX	146/150	29	3.2	0.88

ES/DI - External Sump/Drainage Investigation
Units are in milligrams per kilogram

TABLE 8-22

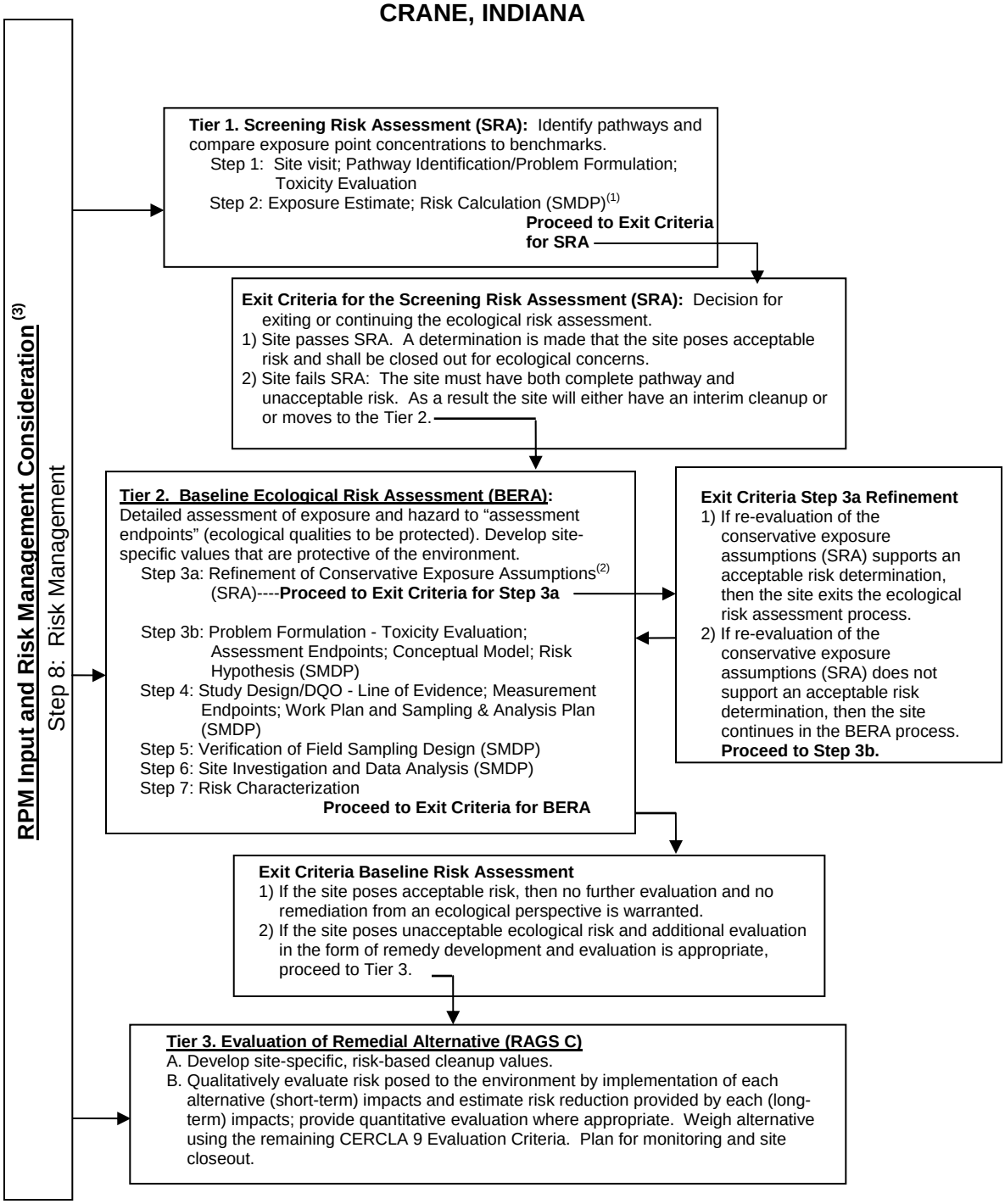
ECOLOGICAL COPC SELECTION - PCB DELINEATION IN DRAINAGE DITCHES
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

CHEMICAL	Frequency of Detection	Minimum Concentration	Maximum Concentration	Region 5 ESL	EEQ	COPC		Rationale[(1)]
						Plants/ Invertebrates	Wildlife	
PCBs (ug/kg)								
AROCLOR-1248	17/20	23	36000	59.8	602.0067	YES	YES	ASL/BIO
AROCLOR-1260	1/20	1900	1900	59.8	31.77258	YES	YES	ASL/BIO

Acronyms:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
ESL = Region 5 Ecological Screening Level
PCB = Polychlorinated Biphenyl

1 - Rationale for COPC selection/deletion:
ASL = Above Screening Level
BIO = Bioaccumulative chemical

FIGURE 8-1
NAVY ECOLOGICAL RISK ASSESSMENT TIERED APPROACH
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA



Notes: 1 See U.S. EPA's 8 Steps ERA Process for requirements for each Scientific Management Decision Point (SMDP).
2 Refinement Includes but is not limited to background, bioavailability, detection frequency, etc.
3 Risk management is incorporated throughout the tiered approach.

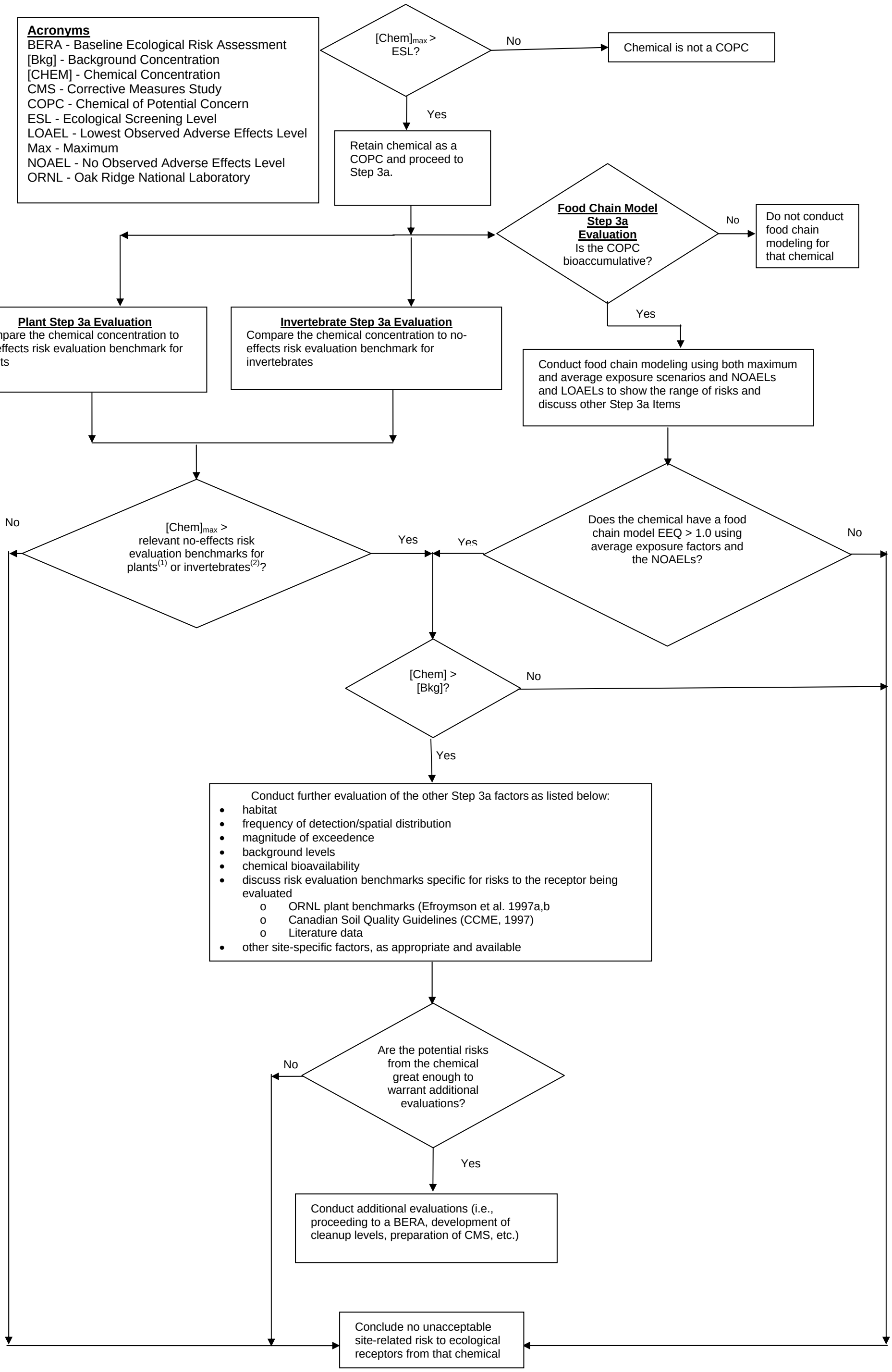


FIGURE 8-2

GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SURFACE SOIL AT NSWC CRANE, INDIANA
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Acronyms
BERA - Baseline Ecological Risk Assessment
[Bkg] - Background Concentration
[CHEM] - Chemical Concentration
CMS - Corrective Measures Study
COPC - Chemical of Potential Concern
EEQ - Ecological Effects Quotient
ESL - Ecological Screening Level
LOAEL - Lowest Observed Adverse Effects Level
Max - Maximum
NOAEL - No Observed Adverse Effects Level
TEC – Threshold Effects Concentration

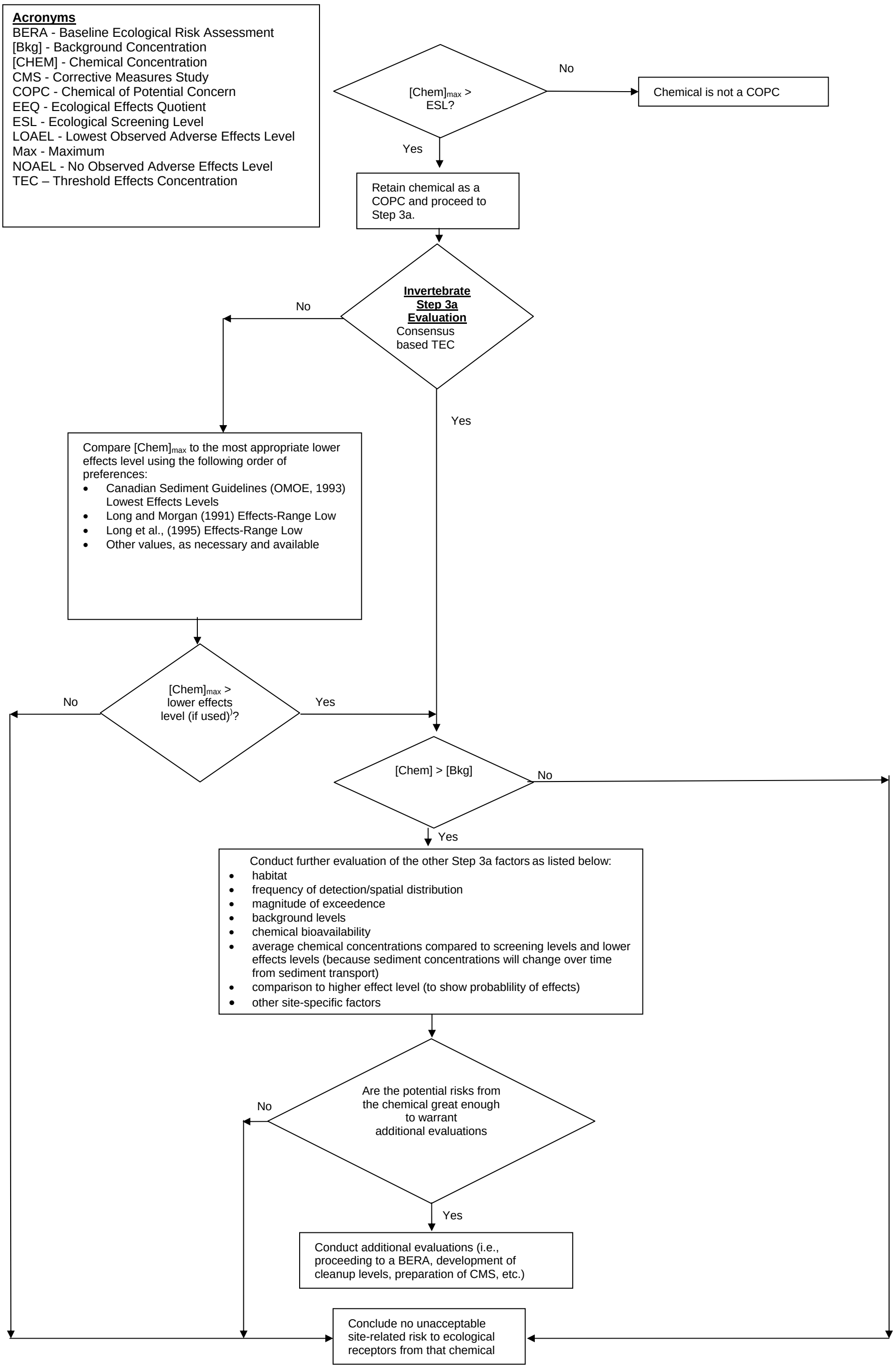
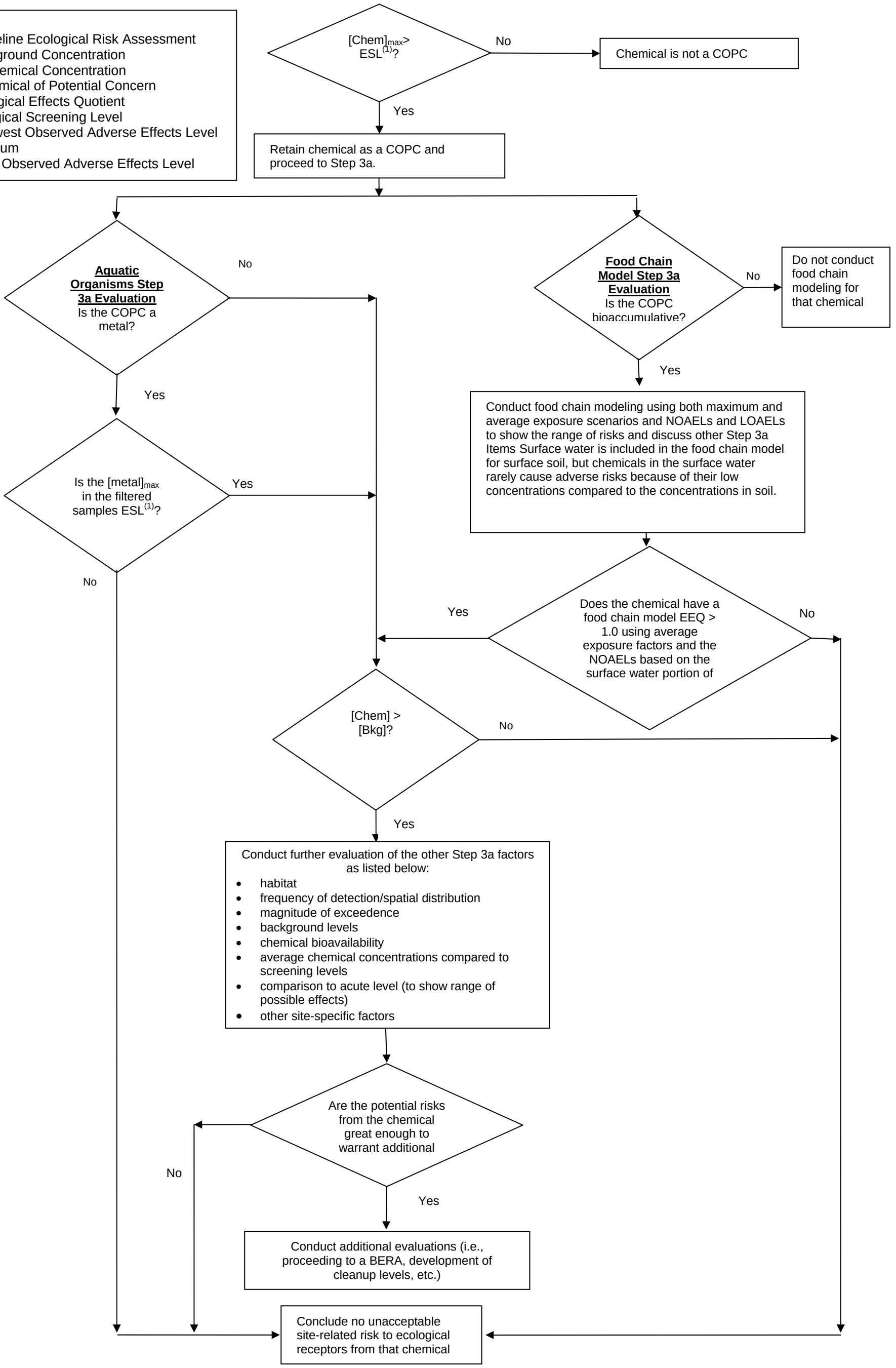


FIGURE 8-3

GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SEDIMENT AT NSWC CRANE, INDIANA
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Acronyms
BERA - Baseline Ecological Risk Assessment
[Bkg] - Background Concentration
[CHEM] - Chemical Concentration
COPC - Chemical of Potential Concern
EEQ - Ecological Effects Quotient
ESL - Ecological Screening Level
LOAEL - Lowest Observed Adverse Effects Level
Max - Maximum
NOAEL - No Observed Adverse Effects Level



(1) If the ESL is the Minnesota water quality standard, it will be replaced with the USEPA water quality criteria or the Indiana water quality standard, whichever is most current. The screening levels for surface water will be adjusted for water hardness for metals whose criteria are hardness-dependent.

FIGURE 8-4

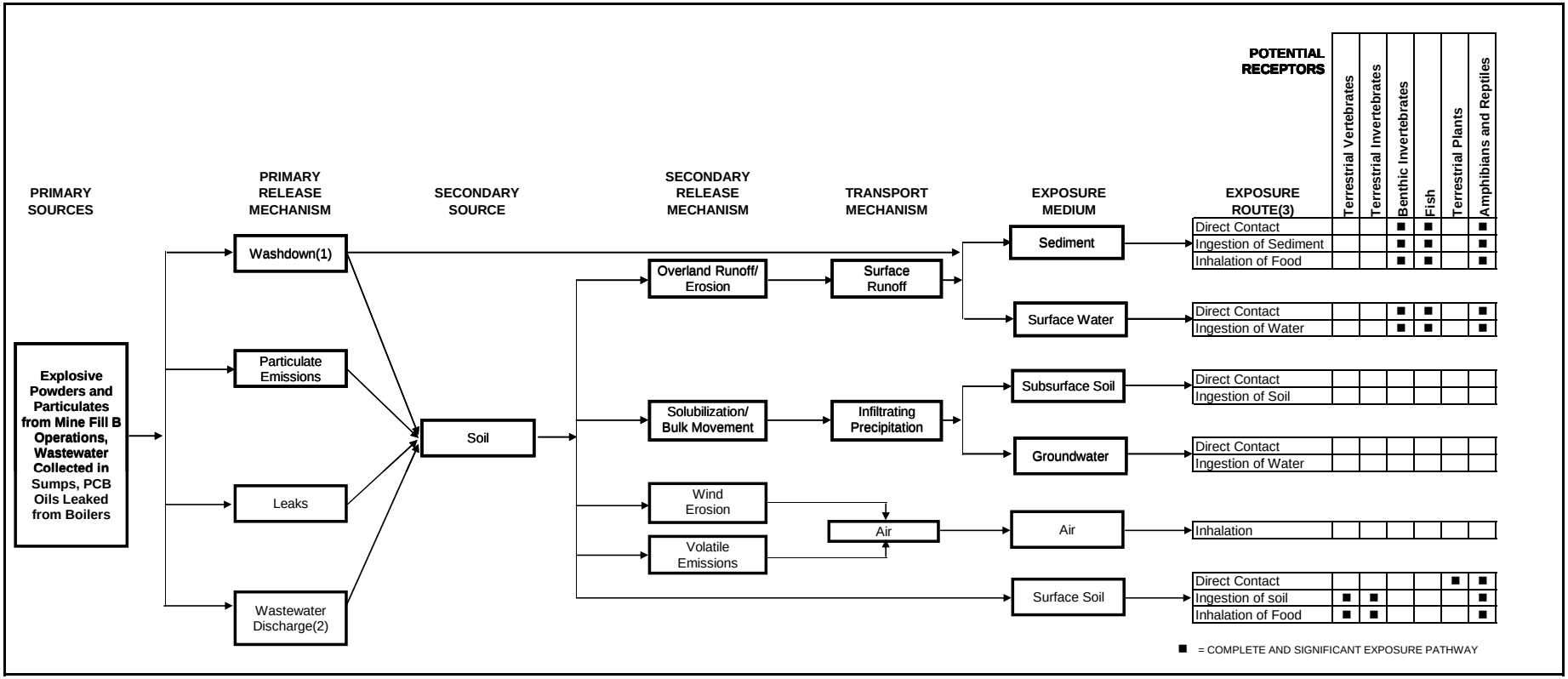
GENERAL ERA PROCESS FOR EVALUATION OF RISKS TO CHEMICALS IN SURFACE WATER AT NSWC CRANE, INDIANA
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13 APR SWMU 13 AERIAL LAYOUT - VERTICAL 2/16/07 SP

DRAWN BY: S. PAXTON	DATE: 2/16/07	AERIAL PHOTOGRAPH - SWMU 13 BOUNDARY	CONTRACT NUMBER: 7448
CHECKED BY: T. SMITH	DATE: 2/16/07	SWMU 13 - MINE FILL B	APPROVED BY: — DATE: —
COST/SCHEDULE-AREA		CRANE NWSC	APPROVED BY: — DATE: —
SCALE: AS NOTED	NAVFAC	CRANE, INDIANA	DRAWING NO.: FIGURE 8 - 5 REV: 0

FIGURE 8-6

ECOLOGICAL CONCEPTUAL SITE MODEL
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA



1. Washdown of powders and particulates from rooftops.
2. Wastewater containing explosives was collected in sumps that released the wastewater directly to surface drainage that flows into a tributary to Boggs Creek.
3. Blank space indicates incomplete exposure pathway or relatively insignificant or not applicable potential exposure.

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SWMU 13

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Supporting Documentation for the Ecological Risk Assessment

APPENDIX A
SWMU 13
PHOTOGRAPHS AND PHOTOGRAPH DIRECTION FIGURE
ROUND 1, ROUND 2, ROUND 3

N

13SW/SD31
x-vv
v
w
13SP03
13SW/SD29
y
z-ss
13SP04
13SW/SD22
13SD23
13SW/SD01
13SW/SD02
pp
yy
13SW/SD35
t
13SP02
u
qq
13SW/SD14
13SW/SD15
r-s-mm
k
13SW/SD13
l
aa
13SW/SD12
13SD21
a
13SW/SD03
d-ll
13SW/SD26
13SW/SD27
jj
ii
xx
13SW/SD34
13SP01
m
p
13SW/SD16
q
13SD11
13SW11
13SW/SD04
b
13SW/SD05
13SW/SD06
uu-cc
13SW/SD30
tt-bb-nn
13SW/SD28
13SW/SD07
13SW/SD32
kk
13SW/SD24
hh
13SW/SD10
g
ww
13SW/SD33
13SW/SD08
ff
dd
13SW/SD19
gg
13SW/SD20
13SW/SD09
13SD17
c
ee-oo
13SW/SD25
13SW/SD18

Legend

- a → Photograph Identification and Direction of Photograph
- Sediment Sample Location
- △ Surface Water Sample Location
- Surface Water/Sediment Sample Location
- Seep Sample Location
- SWMU Boundary
- Building
- Road
- Railroad
- Fence
- Stream/River/Wetland
- Treeline
- Topographic Contours

500 0 500 Feet

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SUMU13.APR PHOTO DIRECTION SW/SD/SP LAYOUT 4/18/05 CF

PHOTOGRAPH DIRECTION MARKERS
SURFACE WATER / SEDIMENT AND SEEP LOCATIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. 7448
APPROVED BY ___ DATE ___
APPROVED BY ___ DATE ___
DRAWING NO. FIGURE A - 1
REV –

DRAWN BY C. FOSTER
DATE 12/29/04
CHECKED BY
DATE
COST/SCHED-AREA
SCALE AS NOTED

NAVFAC

Figure A-1 Photographs
SWMU 13

Figure A-1a: View south of surface water and sediment sampling location 13SW/SD03 collected from a small intermittent stream or drainage ditch in a maintained grassy area.

Figure A-1b:View northwest of surface water and sediment sampling location 13SW/SD04 collected just below the wooden stake and the paint markings for staff gauge No. 3 (SG-03) on the near culvert concrete structure.

Figure A-1c: View north of surface water and sediment sampling location 13SW/SD09 and staff gauge location No. 7 (SG-07) marked on the top of the culvert's concrete structure.

Figure A-1d:View of tadpole hatch in rut water made by rotosonic drilling rig adjacent to monitoring well 13MWT26. Ruts with tadpoles were not restored.

Figure A-1 Photographs
SWMU 13

Figure A-1e: View northeast of the southern most woodlot within the boundary of SWMU 13.

Figure A-1f: View east of the southern most woodlot. This view reveals the woodlots riparian nature.

Figure A-1g: View northwest of surface water and sediment sampling location 13SW/SD10 and staff gauge location No. 8 (SG-08) marked on the top of the culvert's stone structure.

Figure A-1h: View west of the southern most woodlot. This view reveals the woodlots riparian nature as well as the widest point in the intermittent stream.

Figure A-1 Photographs
SWMU 13

Figure A-1i : View southeast of surface water sampling location 13SW/SD11. The sediment sample was collected further down stream (to the northwest) and outside of the SWMU's boundary.

Figure A-1j: View west showing the central woodlot within the boundary of SWMU 13. This woodlot has an intermittent stream running to its north and through its center. These two streams merge at the northwest tip the woodlot prior to draining off the SWMU boundary.

Figure A-1k: View east showing the culvert (~4 feet in diameter) that drains the northern most riparian woodlot found within the boundary of SWMU 13. Also, the surface water and sediment sample for 13SW/SD13 was collected on the downstream side of the aquatic pool shown in this photograph.

Figure A-1l:View west showing downstream of the discharge pipe and pool as shown in Figure A-1k.

Figure A-1 Photographs
SWMU 13

Figure A-1m: View southeast of the northern most woodlot within the boundary of SWMU 13.

Figure A-1n: View east of the northern most woodlot. This view shows the intermittent stream's drainage pattern down gradient of the woodlot.

Figure A-1o: Same view as Figure A-1n except the discharge culvert is shown with more of the intermittent stream's drainage pattern.

Figure A-1p (10/22/03) showing trenched seep sampling location 13SP01.

Figure A-1 Photographs
SWMU 13

Figure A-1q (10/22/03) showing ponded surface water sampling location 13SW/SD16.

Figure A-1r Showing dry trench (checking for seep) location near 13SW/SD15.

Figure A-1s Close up of previous photograph showing the dry trenched location near 13SW/SD15.

Figure A-1t (10/22/03) showing trenched seep sampling location 13SP02.

Figure A-1 Photographs
SWMU 13

Figure A-1u (10/22/03) showing ponded surface water sampling location 13SW/SD14.

Figure A-1v (10/22/03) showing trenched seep sampling location 13SP03.

Figure A-1 w (10/22/03) showing sediment sampling location 13SW/SD29 - streambed dry at this time.

Figure A-1x (10/22/03) showing flowing surface water sampling location 13SW/SD31.

Figure A-1 Photographs
SWMU 13

Figure A-1y (10/22/03) showing ponded seep sampling location 13SP04.

Figure A-1z (10/22/03) showing ponded surface water sampling location 13SW/SD22.

Figure A-1aa (10/22/03) showing ponded surface water sampling location 13SW/SD1202 ~115 feet down stream of the first sampling round location (13SW/SD1201).

Figure A-1bb (10/22/03) showing sediment sampling location 13SW/SD28 - streambed dry at this time.

Figure A-1 Photographs
SWMU 13

Figure A-1cc (10/22/03) showing flowing surface water sampling location 13SW/SD30.

Figure A-1dd (10/23/03) showing ponded surface water sampling location 13SW/SD19.

Figure A-1ee (10/23/03) showing sediment sampling location 13SW/SD25 - streambed dry at this time.

Figure A-1ff (10/23/03) showing the newly constructed storm sewer @ the former first sampling round location (13SW/SD0801) – 13SW/SD0802 was collected from the storm sewer.

Figure A-1 Photographs
SWMU 13

Figure A-1gg (10/23/03) showing ponded surface water sampling location 13SW/SD2001 ~45 feet down gradient of the sediment sample (13SD1201) collected earlier in the year.

Figure A-1hh (10/23/03) showing sediment sampling location 13SW/SD24 - streambed dry at this time.

Figure A-1ii (10/23/03) showing flowing surface water sampling location 13SW/SD27.

Figure A-1jj (10/23/03) showing sediment sampling location 13SW/SD26 - streambed dry at this time.

Figure A-1 Photographs
SWMU 13

Figure A-1kk (10/27/03) showing ponded surface water sampling location 13SW/SD24.

Figure A-1ll (10/27/03) showing ponded surface water sampling location 13SW/SD26.

Figure A-1mm (10/27/03) showing ponded surface water sampling location 13SW/SD15.

Figure A-1nn (10/27/03) showing ponded surface water sampling location 13SW/SD28.

Figure A-1 Photographs
SWMU 13

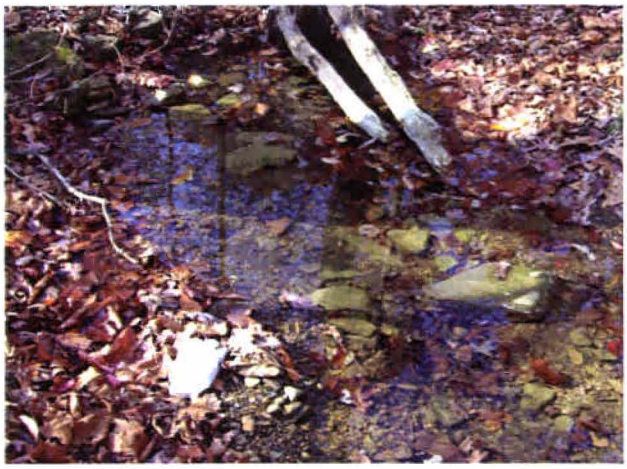

Figure A-1oo (10/27/03) showing flowing surface water sampling location 13SW/SD25.

Figure A-1pp: 13SW/SD01 Upstream (NE)

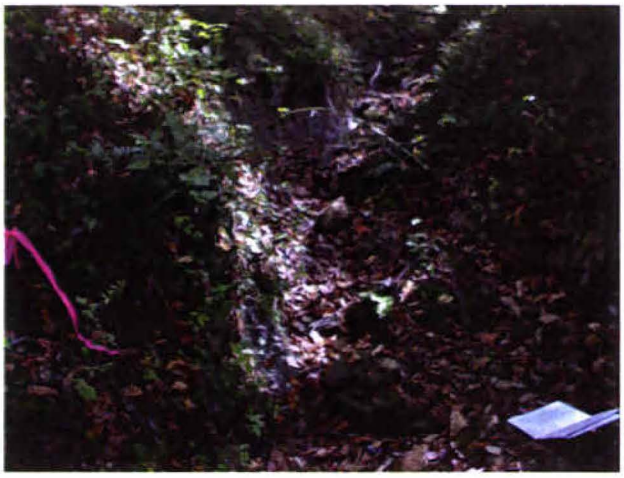

Figure A-1qq: 13SW/SD15 Upstream (SE)

Figure A-1rr: 13SW/SD16 Upstream (S)

Figure A-1 Photographs
SWMU 13

Figure A-1ss: 13SW/SD22 Upstream (SE)

Figure A-1tt: 13SW/SD28 Upstream (SE)

Figure A-1uu: 13SW/SD30 Upstream

Figure A-1vv: 13SW/SD31 Upstream (N)

Figure A-1 Photographs
SWMU 13

Figure A-1ww: 13SW/SD33 Upstream (E)

Figure A-1xx: 13SW/SD34 Downstream (W)

Figure A-1yy: 13SW/SD35 Upstream (NE)

N

13MWT44
13MWT43
13MWT07
13MWT05
13MWT02
13MWT01
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13MWT25
13MWT31
13MWT24
13MWT26
13MWT32

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Legend

- Photograph Identification and Direction of Photograph
- Monitoring Well
- SWMU Boundary
- Building
- Road
- Railroad
- Fence
- Stream/River/Wetland
- Treeline
- Topographic Contours

400 0 400 Feet

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR PHOTO DIRECTION MW LAYOUT 4/26/05 CF

CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE A - 2

REV _

PHOTOGRAPH DIRECTION MARKERS
MONITORING WELL LOCATIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER

DATE 12/29/04

CHECKED BY

DATE

COST/SCHED-AREA

SCALE AS NOTED

Figure A-2 Photographs
SWMU 13

Figure A-2a: View north of rotosonic rig drilling at monitoring well location 13MWT02.

Figure A-2b: View northeast showing the mud tub set up during the rock coring at 13MWT02.

Figure A-2c: Soil cores from 13MWT02 showing yellow orange clayey silt (5'-7' interval) overlying the light gray/gray siltstone (7'-17' interval).

Figure A-2d: View north of drillers finishing the installation of monitoring well 13MWT02.

Figure A-2 Photographs
SWMU 13

Figure A-2e: View west of rotosonic rig drilling at monitoring well location 13MWT04.

Figure A-2f: View northeast of rotosonic rig drilling at monitoring well location 13MWT19.

Figure A-2g: Soil core from 13MWT19 showing mottled clayey silt at the 0-4 foot interval.

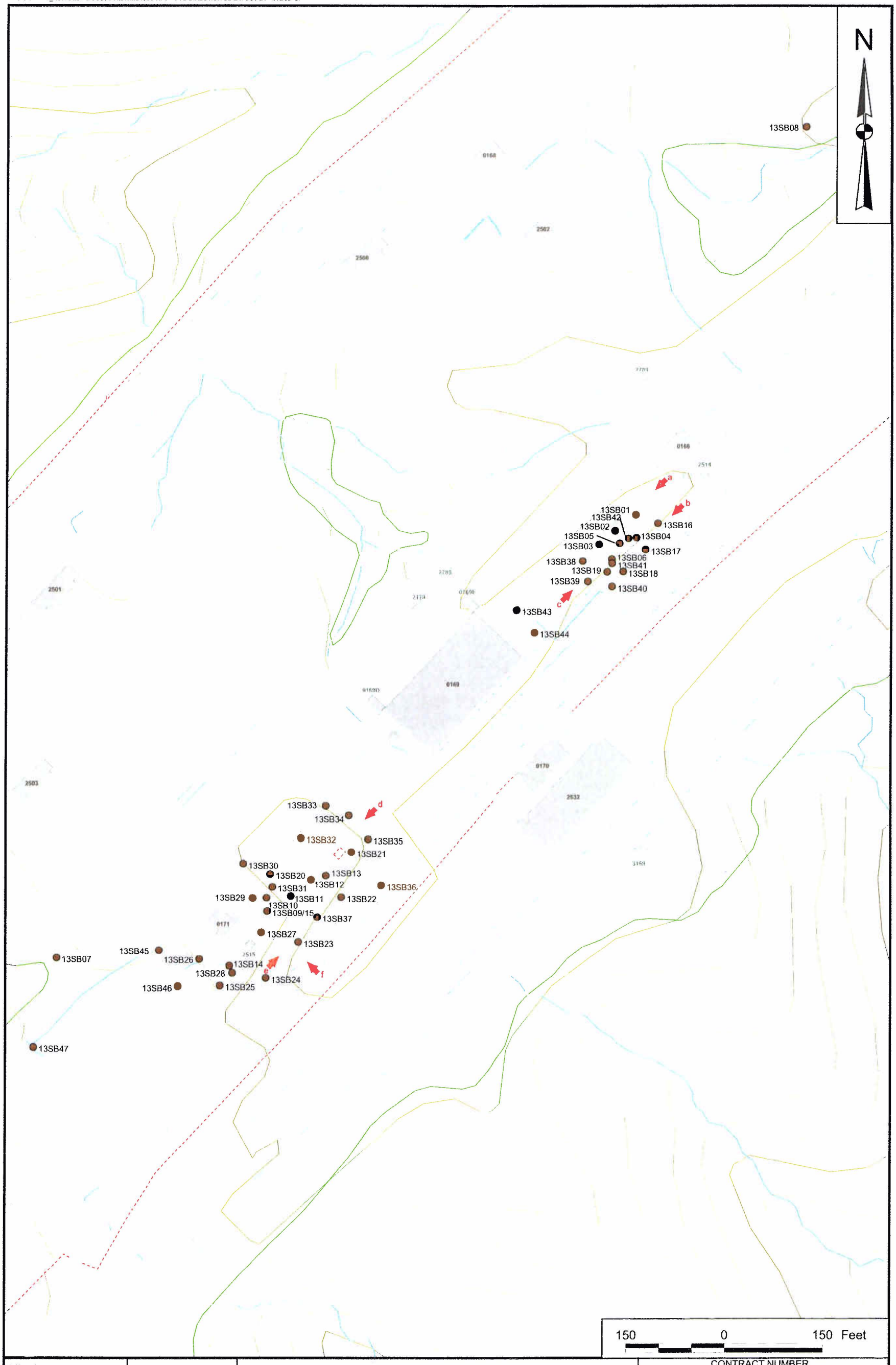
Figure A-2h: View southwest of rotosonic rig drilling at monitoring well location 13MWT20 near soil boring 13SB09 as presented in Figure A-1f.

Figure A-2 Photographs
SWMU 13

Figure A-2i: View west of monitoring well 13MWT25 awaiting cleanup and yellow traffic paint.

Figure A-2j: View southwest of the northern most woodlot behind completed monitoring well 13MWT08. This photograph also shows completed site restoration at this location. Site restoration included the filling of ruts with top soil, tamping, seeding and the spreading of hay straw to protect the seed.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR. PHOTO DIRECTION SB LAYOUT BV 4/18/05 CF



DRAWN BY: C. FOSTER	DATE: 4/15/05	PHOTOGRAPH DIRECTION MARKERS SOIL BORING LOCATIONS SWMU 13 MINE FILL B NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER: 7448
CHECKED BY: —	DATE: —		APPROVED BY: — DATE: —
COST/SCHEDULE-AREA			APPROVED BY: — DATE: —
SCALE: AS NOTED	NAVFAC		DRAWING NO.: FIGURE A - 3 REV: 0

Figure A-3 Photographs
SWMU 13

Figure A-3a: View southwest showing the former location of the Therminol Boiler Building in the vicinity of Building 166.

Figure A-3b: Close up view of Figure 1-3a - showing soil boring locations 13SB04 (to the left), 13SB06 (back center of photo), and 13SB05 (to the right).

Figure A-3c: View northeast showing the former location of the Therminol Boiler Building in the vicinity of Building 166.

Figure A-3d: View southwest showing the former location of the Therminol Boiler Building in the vicinity of Building 171.

Figure A-3 Photographs
SWMU 13

Figure A-1e: View northeast of the southern most woodlot within the boundary of SWMU 13.

Figure A-3f: View northwest showing the down gradient side of the former location of the Therminol Boiler Building in the vicinity of Building 171with soil boring 13SB09 located in the front and 13SB10 located in the background of the photograph.

APPENDIX B
SWMU 13
BORING LOGS, MONITORING WELL CONSTRUCTION DIAGRAMS, AND RELATED MATERIALS
ROUND 1, ROUND 2, ROUND 3

APPENDIX B.1.1
SWMU 13
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 1

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: BMWT01
DATE: 3/30/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1					BR	2" TOP SOIL	ML	5' 0-6'	0.0			
	2					↓	↓						
	3				DRY	YELL	2-6' CLAYEY SILT						
	4					OR ↓							
S-1 1125	5		4.9' / 5'			LT. GRAY	↓			↓		0.0	0.0
	6					YELLOW & LT. GRAY	CLAYEY SILT	↓		0.0			
	7				MOIST	RED	6'-9.5' SILTY SAND	SM	WEATHERED S.S.				
	8				↓	YELL OR	↓	↓	↓				
	9					↓	↓	↓	↓				
S-2 1145	10		4.5' / 5'		HARD DRY	↓	.5' SANDSTONE	R	ROCK @ 9.5'	↓			
↓	11					LT GRAY	WET @ 6' BGS	↓					
	12					↓	5' REAM TO 15'						
R-1	13						SANDY MATERIAL						
	14						IN CUTTINGS						
↓	15					OR GRAY	SILTY MATERIAL	↓					
				T.D. 15'			WELL SET @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 3'						
							BENT TO 1'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: BMWT01

Tetra Tech NUS, Inc.

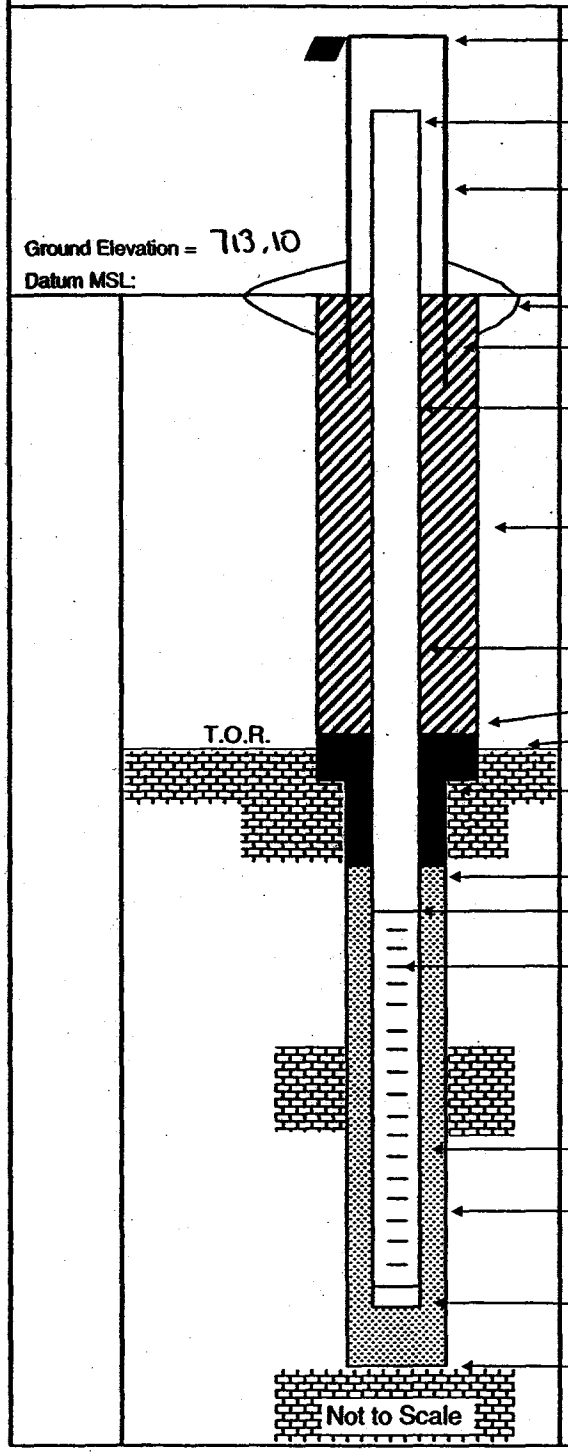
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MW701

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW701
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S	DATE COMPLETED:	3/30/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310541.574
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE Pump	EASTING:	302501 5.943



Elevation of Top of Casing:	715.91
Stick Up of Casing Above Ground Surface:	2.24'
Elevation of Top of Riser:	715.34
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	GROUT
Elevation / Depth Top of Seal:	712.1 / 1'
Elevation / Depth Top of Bedrock:	702.6 / 9.5'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	710.1 / 3'
Elevation / Depth of Top of Screen:	709.1 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	698.10 / 15'
Elevation / Total Depth of Borehole:	698.10 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Roto Sonic

BORING NUMBER: 13MW102
DATE: 3/24/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample**	Borehole**	Drilling**
	1					BR	TOP 5" TOP SOIL	ML	6" TO 7'	0.0			
	2						5'-5' SANDY SILT W/ S.S		FILL				
	3						FRAGS						
	4					YELL BR	3'-5' CLAYEY SILT		MOTTLED				
S1 1030	5		4.7 / 5'			LT. GRAY	↓					0.0	0.0
	6				DRY -		5'-7' SILT W/ SOME	ML		0.0			
S2 1035	7		2' / 2'		STIFF		CLAY		REFUSAL 7'				
	8				HARD -	GRAY	7'-12' SILT STONE		THIN LAM.				
	9		70% RQD		DRY	BR							
C-1	10		C1130		↓	GRAY			ROCK @ 7'				
	11				SOFT -				POSS HOLE 11'				
	12		5' / 5'		MOIST								
	13				SOFT	GRAY	SHALE 12-13.5'						
	14		60% RQD				SILTSTONE 13.5'-15.5'		THIN LAM.				
C-2	15		C1149	COAL			COAL SEAM (14'-14.3')						
	16				HARD		SANDSTONE 15.5'	BR					
	17		4.9' / 5'						@ 17' WL=16.7' BGS				
	18								AFTER 3 HRS.				
	19		62% RQD						FRACT 17'-18'				
C-3	20		C1137						STRATIFIED @ 19.5'				
	21								FRACT 19.5'-20'				
	22		5' / 5'						FRACT 22'-23.5'				
	23						22'-23.5' SANDSTONE	BR					
	24						↓						
C-4	25		C1452		SOFT	DK GRAY	INTERBEDDED SHALE/SS	BR	POSS WATER ZONE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 13MW102

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Rotosonic

BORING NUMBER: 13MW02
DATE: 3/24/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sample/ BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
CA	26		50%		SOFT	DK	INTERBEDDED	SM/CL		0.0	0.0		
↓	27		REC.		↓	GRAY	SHALE + S.S	↓		↓	↓		
				TD 27'									
							WELL SET @ 27' 2" PVC						
							SCREENED 17'-27'						
							SAND TO 15'						
							BENT TO 13'						
							VOL. CLAY TO 4'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: _____

Converted to Well: Yes X No _____ Well I.D. #: 13MW02

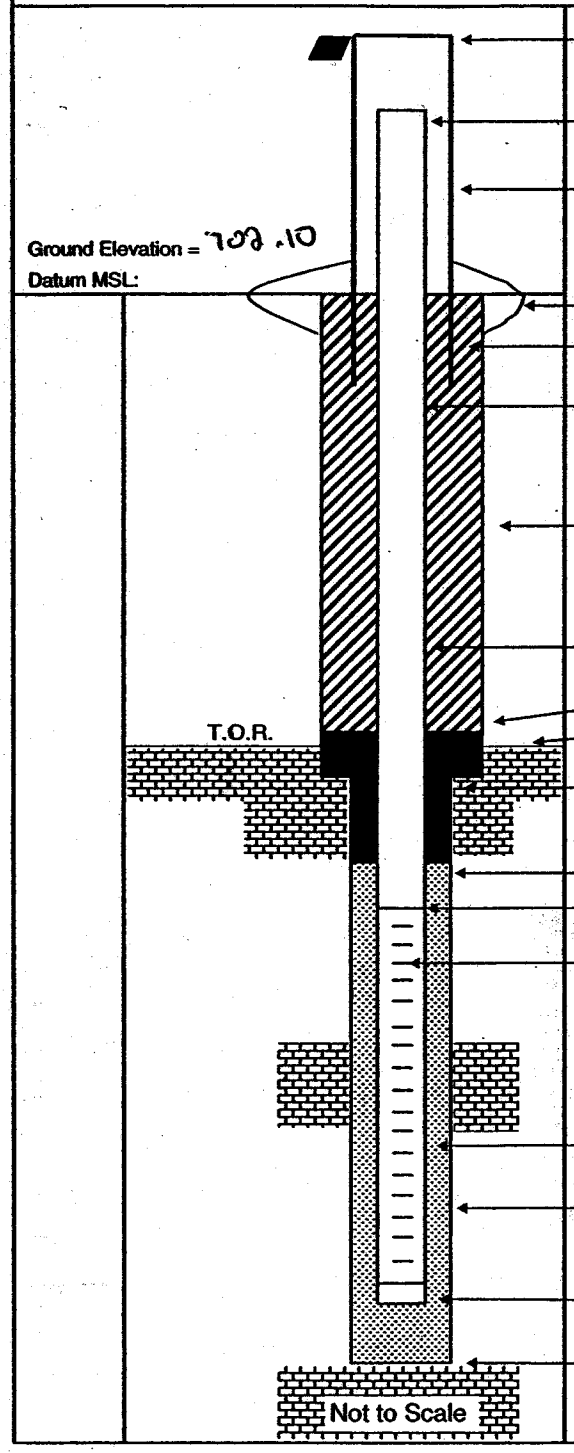
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW102

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW102
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/29/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310776.555
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	BAILER S. STEEL	EASTING:	324743.547



- Elevation of Top of Casing: 705.28
- Stick Up of Casing Above Ground Surface: 2.62'
- Elevation of Top of Riser: 704.72
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: ~~PVC~~ STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 5" (7'-9') / 6" (0-7')
- Type of Backfill: VOL CLAY TO 4'
- Elevation / Depth Top of Seal: 689.1 / 13'
- Elevation / Depth Top of Bedrock: 695.1 / 7.0'
- Type of Seal: BENT CHIPS
- Elevation / Depth of Top of Filter Pack: 687.1 / 15'
- Elevation / Depth of Top of Screen: 685.1 / 17'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: (Core) / Ream: 5"
- Elevation / Depth of Bottom of Screen: 675.1 / 27'
- Elevation / Total Depth of Borehole: 675.1 / 27'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: BMW703
DATE: 3/30/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole **	Driller BZ **
	1						SEE BMW701 FOR LITHOLOGY		5" 0-15'				
						YELL OR	SILTY MATERIAL						
						↓	↓						
1515	5					↓	↓						
						↓	SANDY MATERIAL						
						↓	↓						
1520	16					↓	↓		HARDER @ 16'				
						↓	SANDY MATERIAL						
						↓	↓						
						GRAY	COLOR CHANGE @ 13'						
1530	15					↓	SILTY MATERIAL						
				T.D. 15'			WELL SET @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 3'						
							BENT TO 1'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: _____

Converted to Well: Yes X No _____ Well I.D. #: BMW703

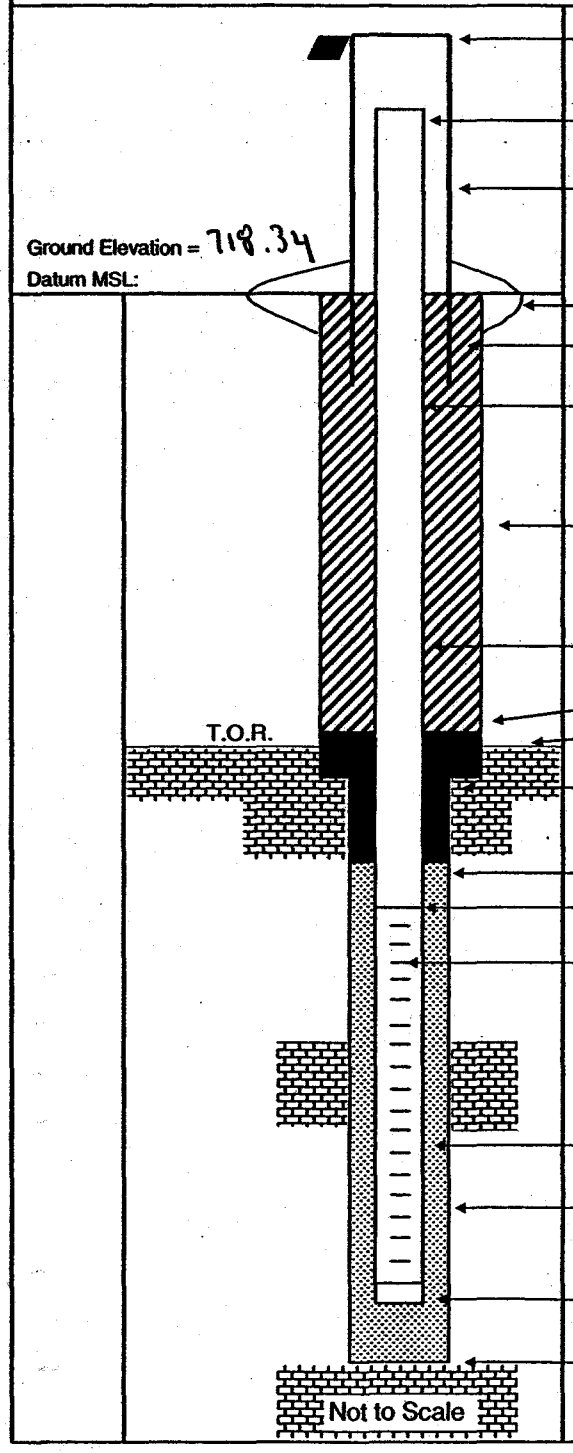
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MWT03

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MWT03
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/30/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310240.946
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	302491.661



Elevation of Top of Casing:	721.60
Stick Up of Casing Above Ground Surface:	2.86'
Elevation of Top of Riser:	721.10
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	GROUT
Elevation / Depth Top of Seal:	717.34 / 1'
Elevation / Depth Top of Bedrock:	709.34 / 10'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	715.34 / 3'
Elevation / Depth of Top of Screen:	713.34 / 5'
Type of Screen:	PVC
Slot Size x Length:	10' x .20
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / (Ream):	5"
Elevation / Depth of Bottom of Screen:	703.34 / 15'
Elevation / Total Depth of Borehole:	703.34 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW104
DATE: 3/30/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole ** BZ	Driller BZ **
	1				MOIST to WET	BR	4" TOPSOIL	ML		0.0			
	2				MOIST	YELL OR LT. BR	4'-7.5' CLAYEY SILT						
	3				M STIFF	LT. GRAY	(MOTTLED)						
	4												
S-1 0-4'	5		5' / 5'										
	6				MOIST		CLAYEY SILT SOME SOLUTION CAVITIES			0.0			
	7				M STIFF								
S-2 4-8'	8		3' / 3'	?	HARD + DRY	BR to GRAY	SANDY SILTSTONE	ML	REFUSAL @ 8'				
	9						SILTY MATERIAL IN CUTTINGS		6" to 5'				
	10								5" 5'-15'				
	11						5" REAM						
	12												
	13												
	14												
	15												
				TD 15'			SET WELL @ 15' 2" PVC SCREENED 5'-15' SAND TO 4' BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 6" to 5' 5" 5'-15'

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No ____ Well I.D. #: 13MW104

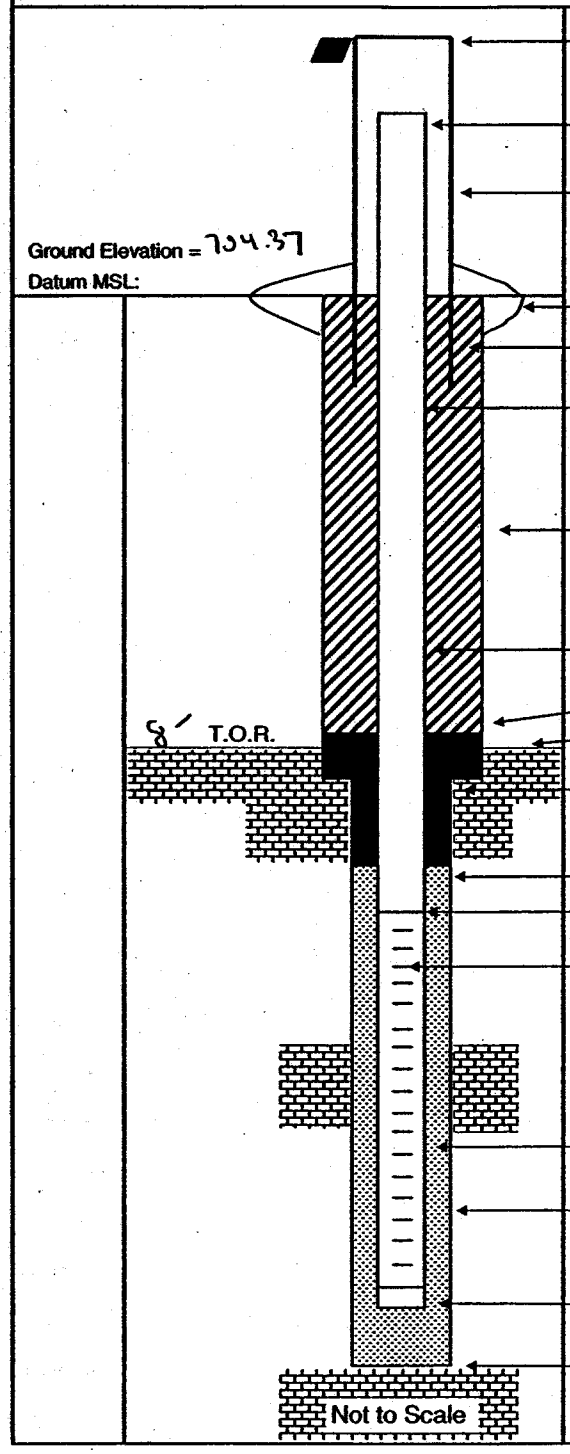
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW704

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW704
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S	DATE COMPLETED:	3/30/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310383.396
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	302454.6-113



Elevation of Top of Casing:	707.32
Stick Up of Casing Above Ground Surface:	2.47'
Elevation of Top of Riser:	706.84
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	700.37 / 2'
Elevation / Depth Top of Bedrock:	696.37 / 8'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	700.37 / 4'
Elevation / Depth of Top of Screen:	694.37 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / (Ream):	5"
Elevation / Depth of Bottom of Screen:	689.37 / 15'
Elevation / Total Depth of Borehole:	689.37 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: BMW105
DATE: 3/29/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1					BR	SEE BORING LOG BMW105						
						↓	FOR LITHOLOGY						
						LT							
						GRAY	5" REAM TO 6'						
6030	5					↓	SILTY MATERIAL						
						YELL	SILT & CLAY						
						OR	MATERIAL						
						↓	↓						
	10					↓	↓						
						↓	↓						
						↓	↓						
						↓	↓						
						↓	↓						
						↓	↓						
	15					↓	↓						
6031	16					↓	↓						
				TD 16'			SET WELL @ 16' 2" PVC						
							SCREENED 6'-16'						
							SAND TO 4'						
							BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): —

Converted to Well: Yes X No _____ Well I.D. #: BMW105

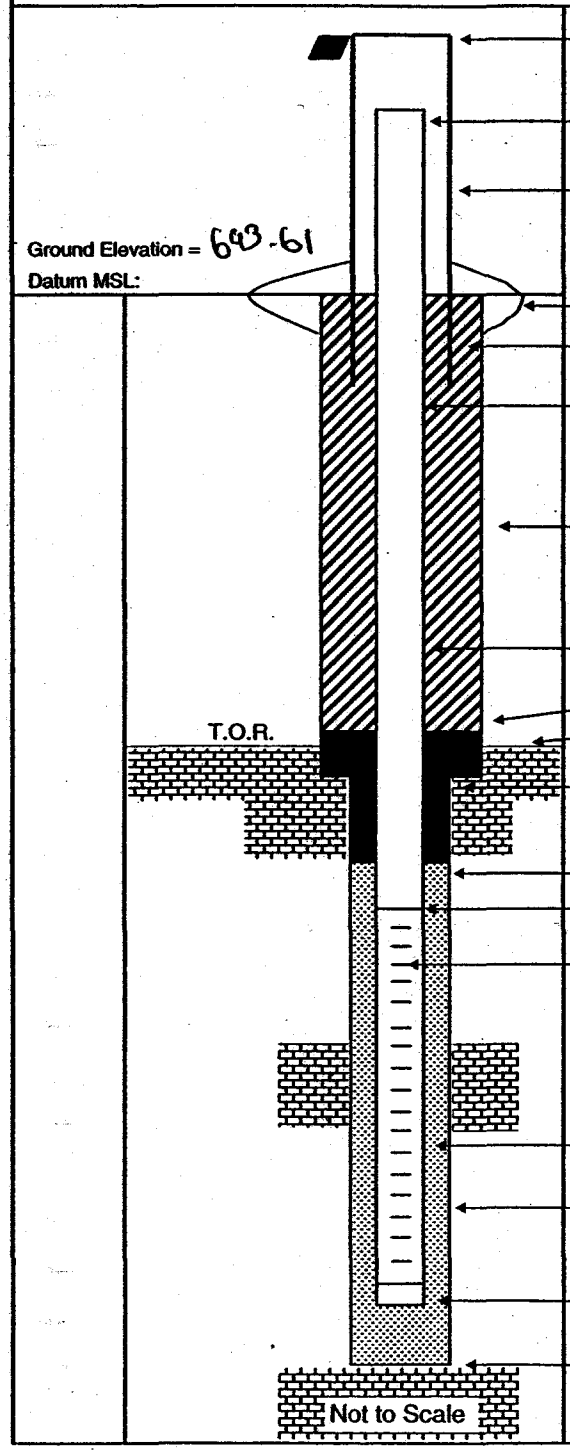
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW05

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW05
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	3/29/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1360758.427
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	302498.025



Elevation of Top of Casing:	697.12
Stick Up of Casing Above Ground Surface:	2.83'
Elevation of Top of Riser:	696.44
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	N/A
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	GROUT
Elevation / Depth Top of Seal:	691.61 / 2'
Elevation / Depth Top of Bedrock:	684.61 / 9'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	689.61 / 4'
Elevation / Depth of Top of Screen:	687.61 / 6'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / (Ream):	5'
Elevation / Depth of Bottom of Screen:	677.61 / 16'
Elevation / Total Depth of Borehole:	677.61 / 16'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13mw T06
DATE: 4/7/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole*	Driller BZ**
	1				MUSTY SOFT	BR	.5' TOP SOIL	ml		0.0			
	2				MUSTY	BR &	5'-4' CLAYEY SILT		MOTTLED				
	3				m. STIFF	LT GRAY							
S-4 M05	4		4' / 4'										
	5						CLAYEY SILT 4-7'	ML		0.0			
	6												
	7						SANDY 6.5'-7'		POSS. SET @ 6.5'				
	8				DRY &	LT	7'-15' SILTSTONE	R					
S-2 M10	9		4.9' / 5'		SOFT	GRAY							
	10				SOFT &	BRN	SILTSTONE W/ SOME			0.0			
	11				MUSTY	LT GRAY	SAND (FINE)						
	12				HARD &	LT	SILTSTONE						
	13				DRY	GRAY							
1	14					LT GRAY							
S-3 1729	15		5.5' / 6'		V. HARD & DRY	PURPLE							
				15' TD			WELL SET @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 3'						
							BENT TO 1'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 5' 0-15'

Drilling Area Background (ppm): 0.0

Converted to Well: Yes + No _____ Well I.D. #: 13mwT06

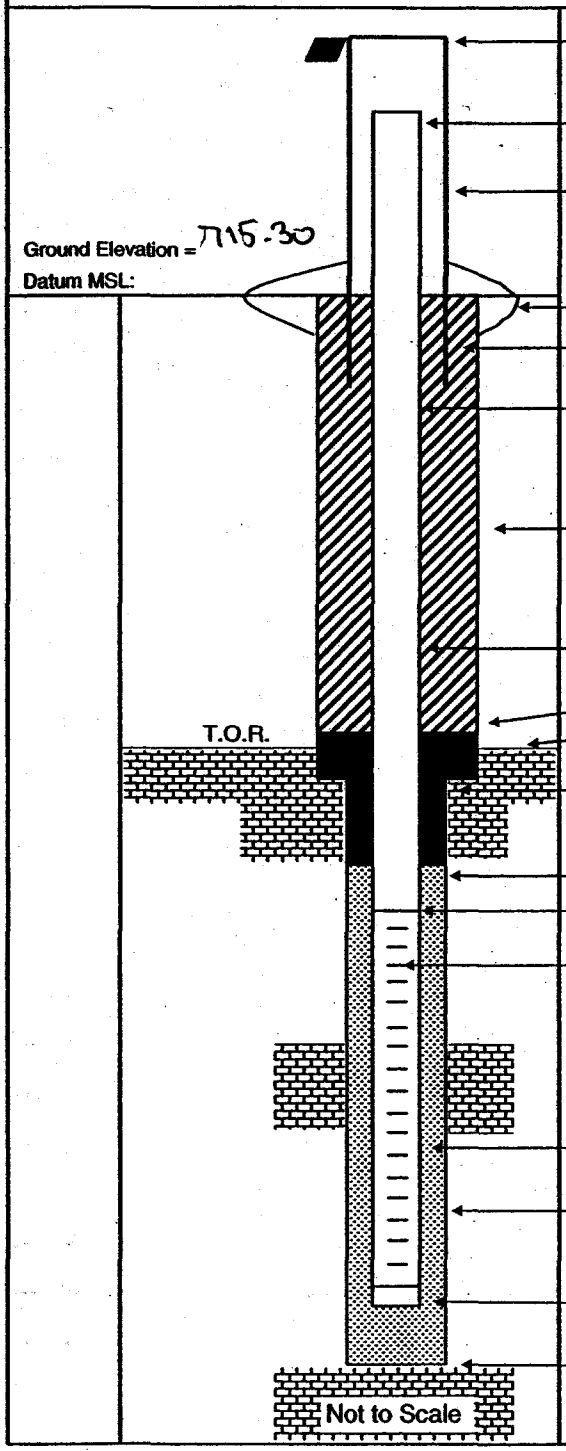
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: BMW706

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	BMW706
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	4/7/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309916.177
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	302445.270



Elevation of Top of Casing:	718.47
Stick Up of Casing Above Ground Surface:	2.63'
Elevation of Top of Riser:	717.93
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	GROUT
Elevation / Depth Top of Seal:	714.3 / 1'
Elevation / Depth Top of Bedrock:	708.3 / 7.0
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	712.3 / 3'
Elevation / Depth of Top of Screen:	710.3 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	700.3 / 15'
Elevation / Total Depth of Borehole:	700.3 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MWT07
DATE: 3/29/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1				MUSTY	BR	TOP 1' TOP SOIL	ML	4'-5'	0.0			
	2				M-STIFF	YELL BR	1'-3' SANDY SILT	↓	WELL SET 6" 35'	↓			
	3				↓	LT GRAY	(MOTTLED)	↓	CLAY 5'-				
	4				DRK	LT	3'-5' SLTSTONE		WEATHERED 3'-4'				
SH 0807	5		4.5' 5'		SOFT	GRAY	PUSH 4' (INCOMPETENT)	PL		↓			
	6				MUSTY	YELL BR	5'-7' SANDY SILT W/ SAND	ML	MOTTLED	0.0			
	7				M-STIFF	GRAY	CLAY	↓	↓	↓			
	8		10'		SOFT & WET	BR	7.5' SILTY CLAY	CL					
	9		ROD		DRK	LT	SLTSTONE W/ SAND	BR	PUSH 9.5'				
24	10		9.5'		SOFT	GRAY	↓	↓		↓			
	11				↓	↓	↓	↓		0.0			
	12				DRK & WET	YELL BR	11.5'-13' SANDSTONE			↓			
	13				MUSTY	LT & DK	SLTSTONE						
	14				SOFT	GRAY	↓						
	15		9.5' 10'		↓	↓	↓	↓		0			
				T.D. 15'			SET WELL @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 4'						
							BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No

Well I.D. #: 13MWT07

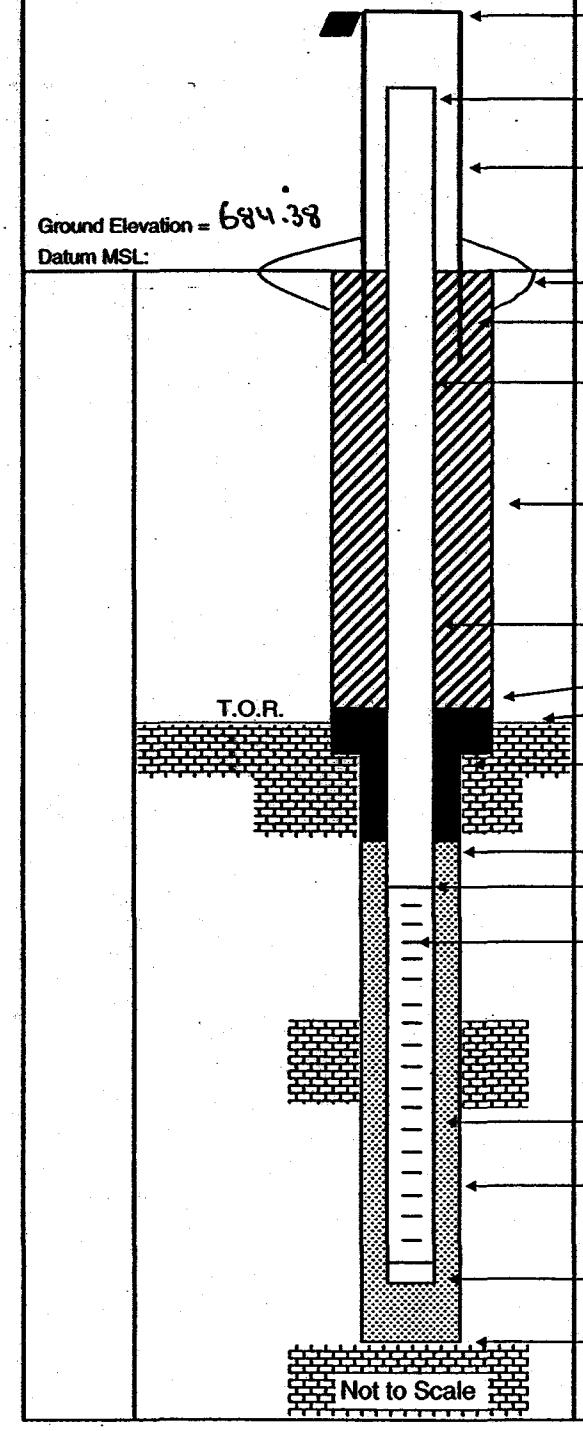
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW107

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW107
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/24/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310594.322
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	3024094.128



- Elevation of Top of Casing: 687.70
- Stick Up of Casing Above Ground Surface: 2.84
- Elevation of Top of Riser: 687.22
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 5"
- Type of Backfill: GROUT
- Elevation / Depth Top of Seal: 682.38 / 2'
- Elevation / Depth Top of Bedrock: 676.88 / 8.5'
- Type of Seal: BENT CHIPS
- Elevation / Depth of Top of Filter Pack: 680.38 / 4'
- Elevation / Depth of Top of Screen: 679.38 / 5'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: (Core) Ream: 5"
- Elevation / Depth of Bottom of Screen: 669.38 / 15'
- Elevation / Total Depth of Borehole: 669.38 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW108 / SB08
DATE: 3/31/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1				MOIST & SOFT	BR	TOP .5' TOP SOIL	ML		0.0			
	2				DRY &	YELL BR	CLAYEY SILT		0-2 @ 0745				
	3				MOIST	GRAY	(MOTTLED)		DUP FB033003-04				
	4				↓	↓	↓	↓					
SB-1 DUP	5		4.5' / 5'		↓	↓	↓	↓		↓			
	6					DK	5-6.5' CLAYEY SILT W/ S.S. PEBBLES	ML		0.0			
	7					YELL BR	6.5-8' CLAYEY SILT		6-8' @ 0800				
	8					↓	(MOTTLED)	↓	MS/MSD				
	9				SOFT &	LT GRAY	8-10' SILTSTONE	MDK	POSS. WATER @ 8'				
SB-2 TS4	10		4.9' / 5'		DRY	↓	↓	BR		↓			
	11				HARD	YELL BR	SANDSTONE 10-10.5'			0.0			
	12				HARD &	LT GRAY	10.5'-13.5' SILTSTONE						
	13				DRY ↓	YELL BR	(MOTTLED)		MOISTURE ALONG				
	14				HARD &	LT/DK	THIN LAMINATED SILTSTONE		SIDE WALLS				
SB-3 DUP	15		5' / 5'		DRY	GRAY	13.5'-15' ↓	↓	6" TO 5' 5" REAM	↓			
				TD 15'			WELL SET @ 15'		5'-15'				
							SCREENED 5'-15'		BENTONITE CHIPS				
							SAND TO 4'		WATER.				
							BENT TO 2'		HOLE CAVED AFTER BLOWOUT				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No Well I.D. #: 13MW108

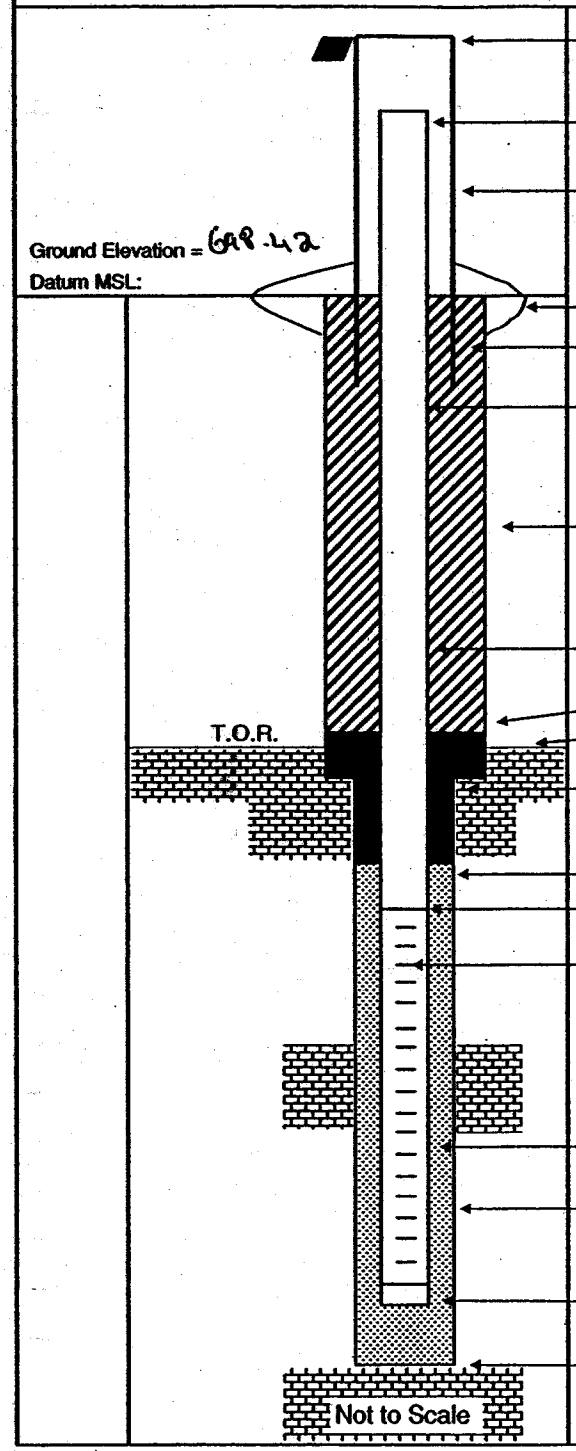
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: BMW13B

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	BMW13B/SB08
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	3/30/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310247.860
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATER PUMP	EASTING:	302437.560



- Elevation of Top of Casing: 701.11
- Stick Up of Casing Above Ground Surface: 2.14
- Elevation of Top of Riser: 700.56
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" (0-5') 5" (5'-15')
- Type of Backfill: GROUT
- Elevation / Depth Top of Seal: 696.42 / 2'
- Elevation / Depth Top of Bedrock: 690.42 / 8'
- Type of Seal: BENTONITE
- Elevation / Depth of Top of Filter Pack: 694.42 / 4'
- Elevation / Depth of Top of Screen: 693.42 / 5'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / Ream: 5"
- Elevation / Depth of Bottom of Screen: 683.42 / 15'
- Elevation / Total Depth of Borehole: 683.42 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: BMW109
DATE: 4/1/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVES.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						YELL	FOR COMPLETE LITHOLOGY						
						OR	SEE BMW110						
							5" REAM TO 20'						
							SILTY MATERIAL						
	5												
									HARDER DRILLING @ 6'				
						LT			COLOR CHANGE @ 7'				
						GRAY							
	10												
						DK	SILTY MATERIAL						
						GRAY							
	15												
							SHALEY MATERIAL						
	20												
							WELL SET @ 20' 2" PVC						
							SCREENED 10'-20'						
							SAND TO 8'						
							BENT TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: BMW109

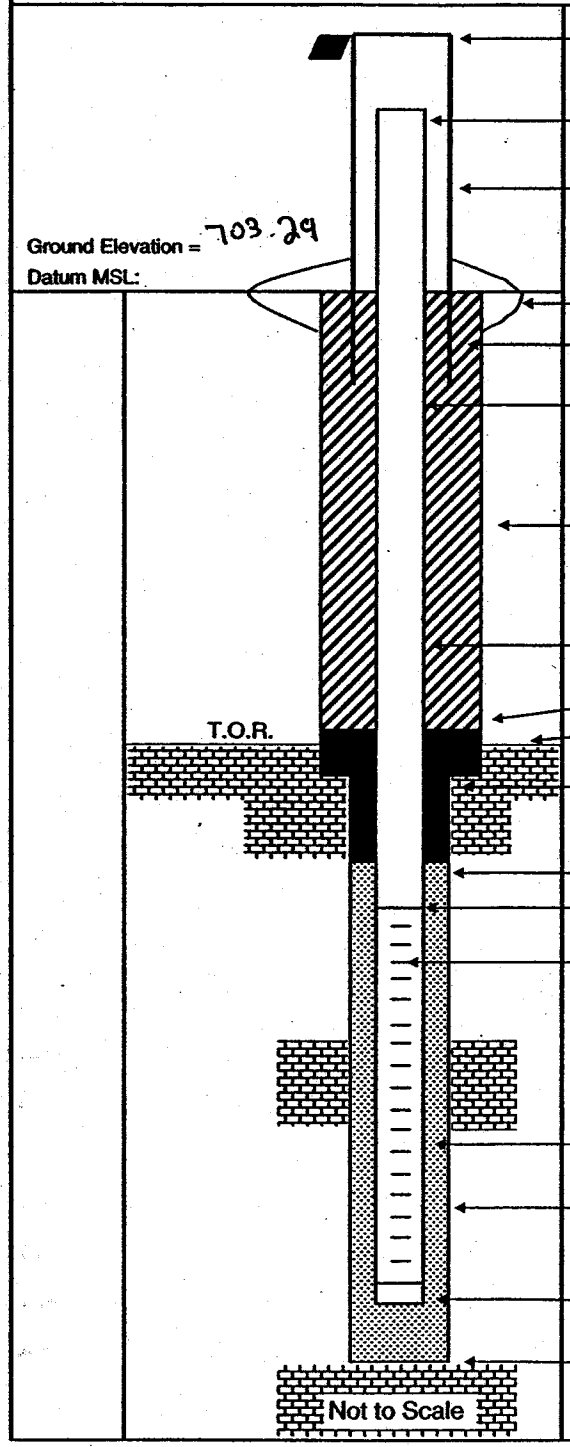
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW709

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW709
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES.	DATE COMPLETED:	4/1/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	130466J.066
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	302404A.030



- Elevation of Top of Casing: 706.37
- Stick Up of Casing Above Ground Surface: 2.61'
- Elevation of Top of Riser: 705.90
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 5"
- Type of Backfill: GROUT
- Elevation / Depth Top of Seal: 701.29 / 2'
- Elevation / Depth Top of Bedrock: 697.29 / ≈ 6'
- Type of Seal: BENT CHIPS
- Elevation / Depth of Top of Filter Pack: 695.29 / 8'
- Elevation / Depth of Top of Screen: 693.29 / 10'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / (Ream): 5"
- Elevation / Depth of Bottom of Screen: 683.29 / 20'
- Elevation / Total Depth of Borehole: 683.29 / 20'

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of ___

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: B3MW02
DATE: 3/27/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Drillor BZ**
	1				MOIST &	BR	TOP. 5' TOP SOIL		HIT CONCRETE @	0.0	0.0		
	2				MOIST		5' CLAY & SILT W/ S.S. GRAV.	ML	3' WIDE OFFSET				
	3					LT BR	2-5.5' SANDY SILT W/ SOME CLAY	ML	HIT CONCRETE AGAIN				
	4					GRAY							
S-1 1337	5		4.9' / 5'									0.0	0.0
	6					DK GRAY	SANDY SILT	ML		0.0			
	7				SOFT & DRY	LT	SILTSTONE 5.5'-14.5'	RF	ROCK @ 5.5'				
	8					GRAY		BR					
	9												
S-2 1351	10		5' / 5'			DK GRAY	(COAL CHANGE)						
	11			?	MOIST?		SILTSTONE		COLD TO THE	0.0			
	12				STIFF				TOUCH. (WET)				
	13												
	14												
S-3 1403	15		4.9' / 5'		DRY & LOOSE	BLK	5' COAL SEAM		6" TO 15'				
	16					BLK	BLACK MATERIAL IN		5" SEAM @				
	17						CUTTINGS (COAL)						
	18					GRAY	SHALEY MATERIAL						
	19												
A-1 1520	20								BLOW OUT HOLE				
	21					GRAY	SHALEY MATERIAL		WATER @ 19' BGS				
	22												
	23					DK GRAY	SILTY MATERIAL						
	24												
A-2 1530	25								BLOW OUT HOLE WL 19' BGS.				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 6' OFFSET: SET WELL @ 25' 10' SCREEN SAND TO 13' BENT TO 11' WL CLAY TO 4'

Converted to Well: Yes X No ___ Well I.D. #: B3MW02

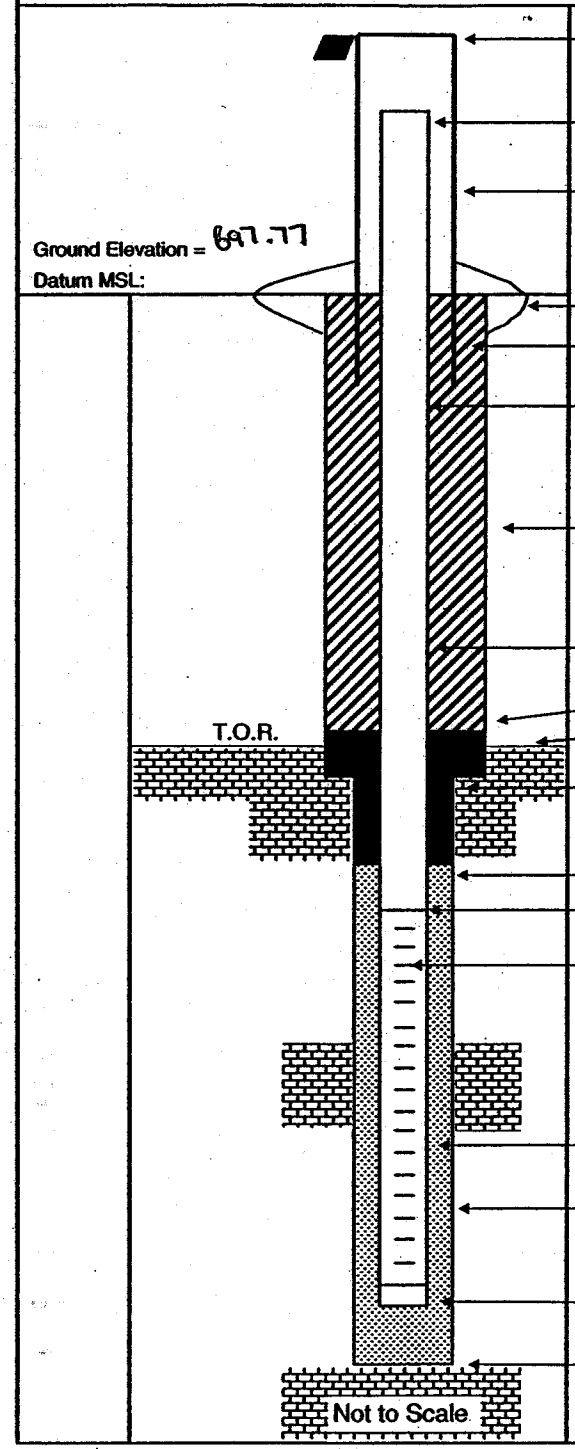
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 13MW10

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW10
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/27/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1304479.643
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	3024001.262



Elevation of Top of Casing:	700.64
Stick Up of Casing Above Ground Surface:	2.38
Elevation of Top of Riser:	700.15
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	6" (0-15') 5" (15'-25')
Type of Backfill:	VOL CLAY TO 4'
Elevation / Depth Top of Seal:	686.77 / 11'
Elevation / Depth Top of Bedrock:	692.77 / 5.5'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	684.77 / 13'
Elevation / Depth of Top of Screen:	682.77 / 15'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	672.77 / 25'
Elevation / Total Depth of Borehole:	672.77 / 25'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 13 MW T11
DATE: 3/28/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness *	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole **	Driller BZ
						PRE	REFER TO 13 MW T12						
							FOR COMPLETE LITHOLOGY						
							6" CASING TO 5'						
	5						5" REAM TO 15'						
							0-7' SILTY MATERIAL						
									HARDER DRILLING @ 7'				
						GRAY	SANDY MATERIAL						
	10												
	15												
				TD 15'			SET WELL 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 4'						
							BENT CHIPS 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): —

Converted to Well: Yes X No _____ Well I.D. #: 13 MW T11

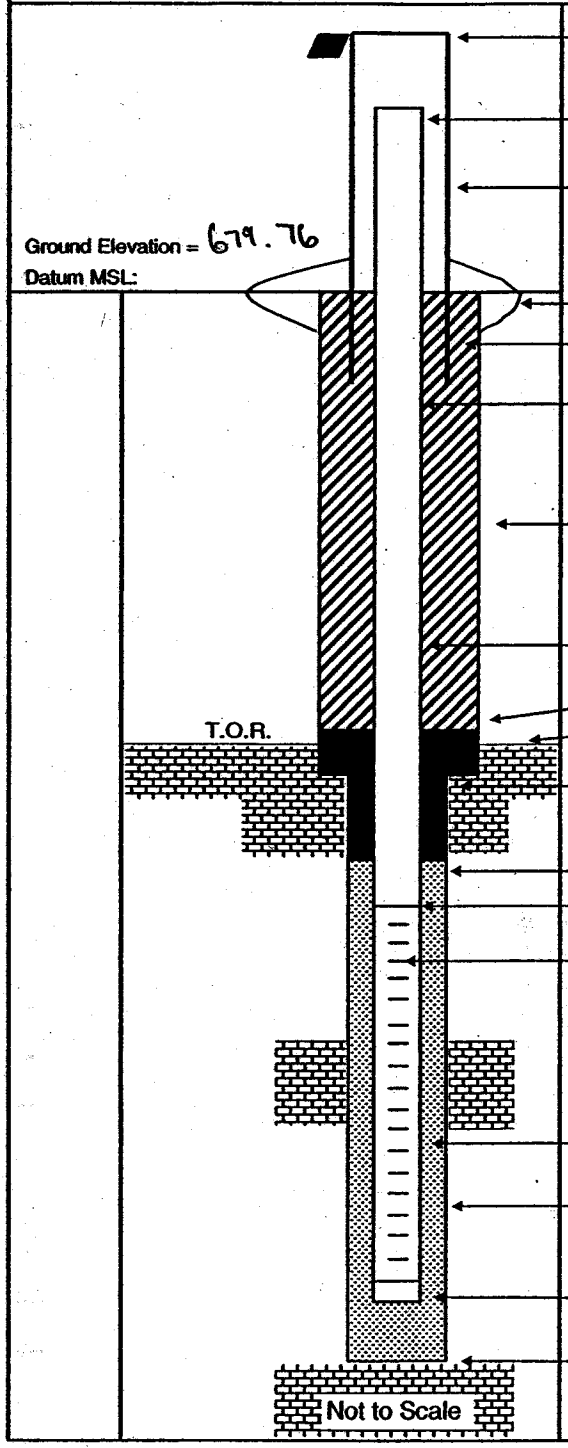
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW711

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW711
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/28/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	130233.731
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	Whale Pump	EASTING:	302350.087



- Elevation of Top of Casing: 682.82
- Stick Up of Casing Above Ground Surface: 2.53
- Elevation of Top of Riser: 682.29
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" (0-5') / 5" (5'-15')
- Type of Backfill: GROUT
- Elevation / Depth Top of Seal: 677.76 / 2'
- Elevation / Depth Top of Bedrock: 672.76 / 7'
- Type of Seal: BENT. CHIPS
- Elevation / Depth of Top of Filter Pack: 675.76 / 4'
- Elevation / Depth of Top of Screen: 674.76 / 5'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / (Ream): 5"
- Elevation / Depth of Bottom of Screen: 664.76 / 15'
- Elevation / Total Depth of Borehole: 664.76 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Rotosonic

BORING NUMBER: 13MW112
DATE: 3/27/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density / Consistency & Rock Hardness	Color	Material classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Drilling BZ
	1			11	MOIST -	BR	TOP .5' TOPSOIL	ML	16" 0-10'	0.0			
	2				M. STIFF	LT.	5-7' SILTY CLAY W/SS. FRAGS	CL	FILL 5'-5'				
	3				DRY	BR	SOME SAND						
	4												
S-1 0930	5		4.7' / 5'									0.0	0.0
	6					BR	NO SS OR SAND	CL		0.0			
	7					RED							
	8				HARD	YELL BR	7-10' SANDSTONE W/	WR	ROCK @ 7'				
	9					GRAY	CLAYSTONE SEAMS						
S-2 0939	10		5' / 5'		DRY								
	11					GR.	SAND STONE 10-10.5'	BR		0.0			
	12		70% RQD			GRAY	SLTY STONE 10.5-11.5'						
C-1	13		@ 10M		SOFT - WET				POSSIBLE WATER @ 13'				
	14												
	15		5' / 5'			YELL							
	16				HARD	GR	SAND STONE 14.5'-16'			0.0			
	17		64% RQD			GRAY	16-19.5' SLTSTONE		MODERATE FRACT. 16'-19.5'				
C-2	18		@ 1027										
	19												
	20		4.9' / 5'				19.5-20' SANDSTONE						
				TD 20'			WELL SET @ 20' 2" PVC						
							SCREENED 10-20'						
							SAND 8'						
							BENT ~ 4'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: 13MW112

Tetra Tech NUS, Inc.

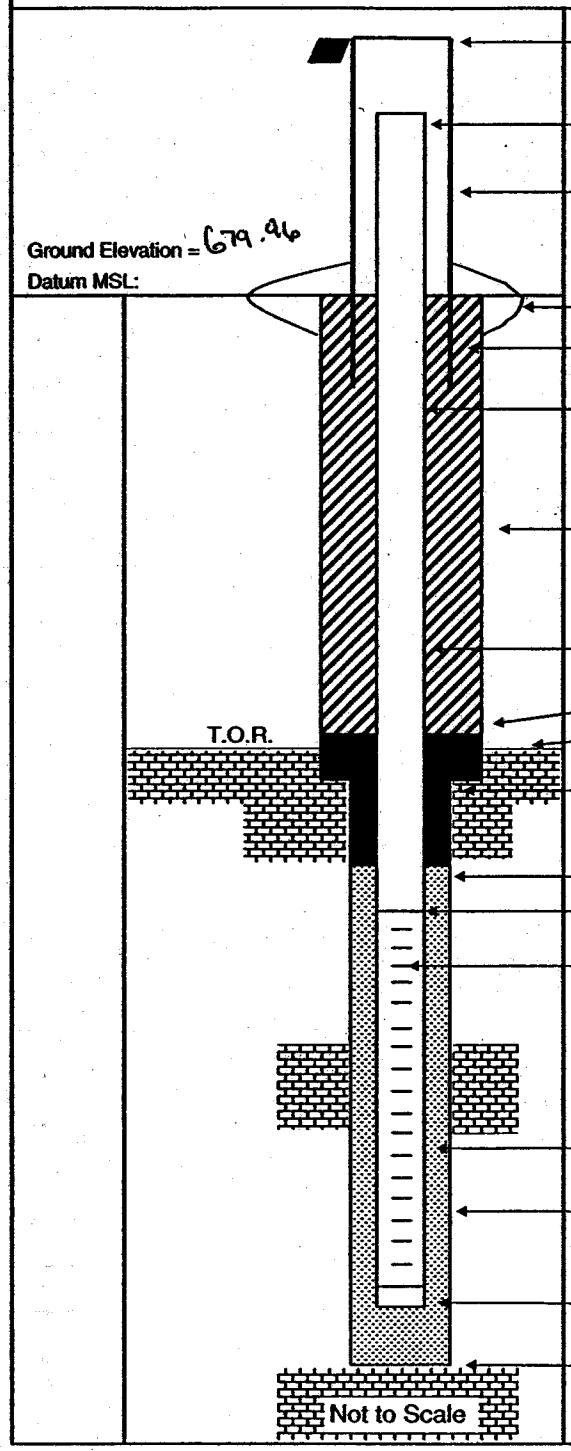
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MW712

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW712
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	3/27/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1310080.207
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	302357M.945



Elevation of Top of Casing:	682.66
Stick Up of Casing Above Ground Surface:	2.16
Elevation of Top of Riser:	682.12
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	6" (0-10') / 5" (10'-20')
Type of Backfill:	GROUT/CEMENT
Elevation / Depth Top of Seal:	675.96 / 4'
Elevation / Depth Top of Bedrock:	672.96 / 7'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	671.96 / 8'
Elevation / Depth of Top of Screen:	669.96 / 10'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	659.96 / 20'
Elevation / Total Depth of Borehole:	659.96 / 20'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: [redacted] HSA B-36
BORING NUMBER: 13MW713
DATE: 4/23/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DENNIS SZAK

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Bz*	Borehole**	Drillers Bz**
	1	3/3				BR	.5' TOP SOIL	M					
S-1 1240	2	3/4	1.5'/2'			↓	.5'-3.5' SILTY CLAY	CL		0.0			
	3	3/5				↓	↓	L					
S-2 1242	4	7/7	2'/2'			YELL	3.5'-6' SANDY SILT	ML		0.0		0.0	0.0
	5	1/3				GR & GRAY	↓	↓					
S-3 1249	6	3/5	1.6'/2'			↓	↓	↓		0.0			
	7	14/35			MOIST &	YELL	6'-8' F-SAND	SP					
S-4 1302	8	27/31	2'/2'		V. DENSE	GR	↓	↓		0.0			
	9	23/20			WET &	↓	F-SAND W/ SOME SILT &	SM	WATER @ 10'				
S-5 1309	10	7/5	2'/2'		DENSE	↓	S.S. FRGS. (8'-10.5')	↓		0.0			
	11	17/22				BLK	COAL 10.5'-12.5'						
S-6 1321	12	36/21	2'/2'		DRY	↓	↓			0.0			
	13	29/30			HARD	COAL	12.5'-13' SHALE		REFUSAL @ 13'	0.0			
S-7 1335	14	50/4"	5'/.8'				SHALE @ 13'		ROCK @ 13.5'				
	15						WELL AUGER TO 14'						
	16						SHALE MATERIAL IN						
	17						CUTTINGS						
	18						↓						
1350	19					↓	↓						
				T.D. 19'			WELL SET @ 15' 2" PVC						
							SCREENED 8'-18'						
							SAND 6'						
							BENT 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: 13MW713

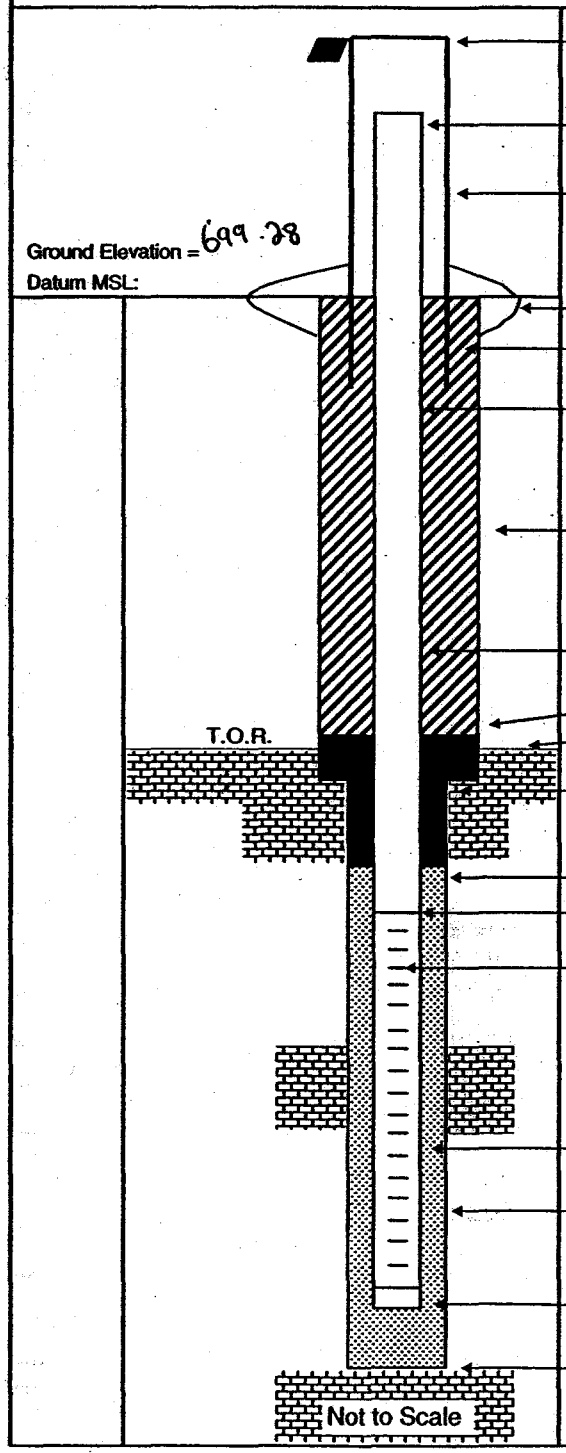
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW13

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW13
PROJECT No.:	9060 CTO 0279	DRILLER:	DENNIS STAUB	DATE COMPLETED:	4/23/03
SITE:	SWMU 13	DRILLING METHOD:	HSA ~~ROTOSONIC~~	NORTHING:	1309441.220
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERRA	EASTING:	302463.605



- Elevation of Top of Casing: 702.40
- Stick Up of Casing Above Ground Surface: 2.70
- Elevation of Top of Riser: 701.98
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6"
- Type of Backfill: CEMENT
- Elevation / Depth Top of Seal: 697.28 / 2'
- Elevation / Depth Top of Bedrock: 686.78 / 12.5'
- Type of Seal: BENTONITE
- Elevation / Depth of Top of Filter Pack: 693.28 / 6'
- Elevation / Depth of Top of Screen: 691.28 / 8'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / ~~Ream~~: 6"
- Elevation / Depth of Bottom of Screen: 681.28 / 18'
- Elevation / Total Depth of Borehole: 680.28 / 19'

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of ___

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MWT14
DATE: 3/31/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ
	1					BR	5' TOP SOIL	ML	4" SAMPLE TO 17.5'	0.0			
	2						5'-3' CLAYEY SILT						
	3												
	4					YELL. BR.	3-5' SANDY SILT W/ GRAVEL						
S-4 0914	5		4.5' 5'			LT. GRAY	CLAY						
	6				MOIST + MOTTLED	BR	5-6.5' SANDY SILT W/ S.S FRAGS	ML	WEATHERED S.S.	0.0			
	7				SOFT	LT GRAY	6.5-7' SILT						
	8				WET +	BR	7-9.5' SILT + SAND W/ S.S	SM	THIN LAMINATION				
	9			▼?	MOTTLED		FRAGS		BOTTOM @ 9'				
S-2 0934	10		4.5' 5'			LT GRAY	9.5-10' SILTSTONE		BACK @ 9.5'	0.0			
	11				SOFT +	DK	10-15' SHALEY SILTSTONE						
	12				DRY	& LT							
	13					GRAY							
	14												
S-3 0935	15		5' 5'										
	16					LT. DK	15-17' SHALE						
	17					GRAY							
S-4 0944	17.5		2' 2.5'	▼	HARD	GRAY	17-17.5' SANDSTONE		REFUSAL @ 17.5'				
	18						SAND + SILT						
	19						MATRIX						
R-1	20												
	21												
	22												
0945	23												
				TD 23'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 5' TO 23' SET WELL @ 23' SCREENED 13'-23' SAND TO 11' BEAD TO 9' VOL CHIPS TO 8'

Converted to Well: Yes X No ___ Well I.D. #: 13MWT14

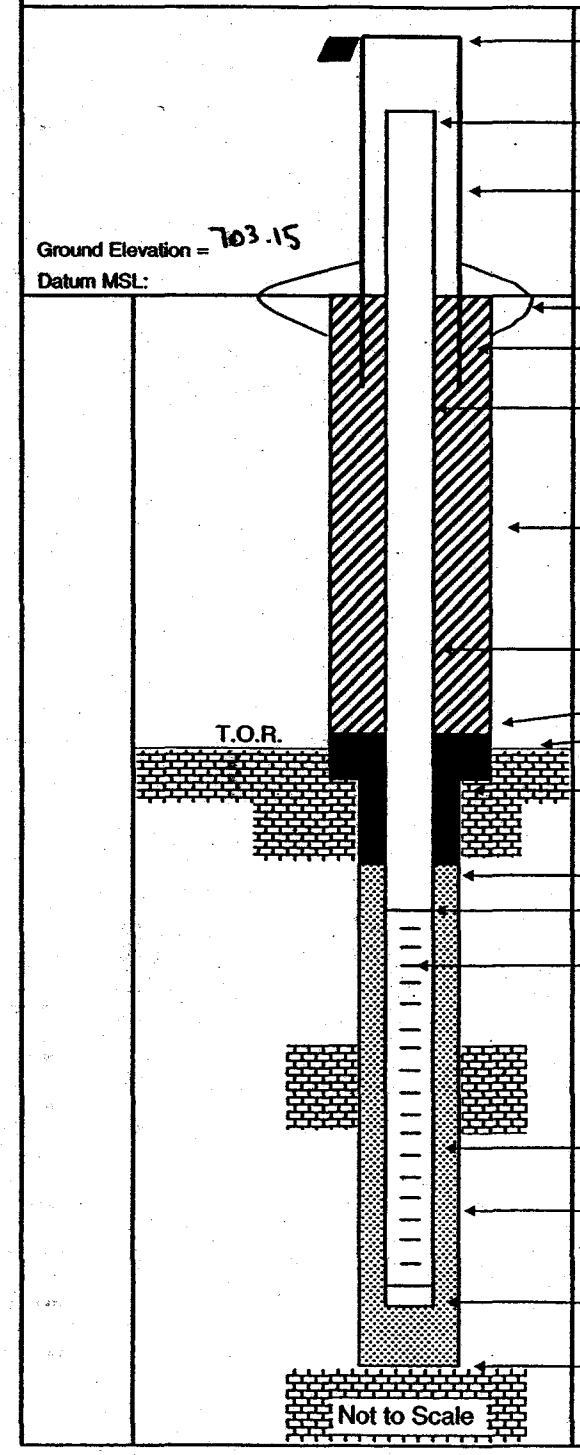
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 13MW14

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW14
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES.	DATE COMPLETED:	3/31/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309142.732
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	302410.167



Elevation of Top of Casing:	705.98
Stick Up of Casing Above Ground Surface:	2.35
Elevation of Top of Riser:	705.50
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	VOL CLAY (2'-4')
Elevation / Depth Top of Seal:	694.15 / 9'
Elevation / Depth Top of Bedrock:	693.65 / 9.5'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	692.15 / 11'
Elevation / Depth of Top of Screen:	690.15 / 13'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	680.15 / 23'
Elevation / Total Depth of Borehole:	680.15 / 23'

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of ___

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 13MW T15
DATE: 3/25/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1				DRY M.STIFF	BR	SLTY CLAY 0-2.5'	CL	6" GRAVEL 0-15'	0.0			
	2						T-SAND						
	3					YELL	CLAY W/ SLT 2.5-7.5'						
	4					OL				1.7			
S1 0227	5		4.5 / 5'							0.0			
	6					YELL OR LT		CL	MOTTLED	0.0			
	7												
	8					GRY							
	9						CLAY W/ INTERBEDDED						
S-2 1236	10		5' / 5'				SLT SEAMS (HARD FORM)						
	11							CL		0.0			
	12												
	13												
	14				SOFT	GRAY	SILTSTONE 15-18'	RK	RK				
13 1245	15		5' / 5'		DRY				6" TO 15'				
	16						SLTY MATERIAL		5" TO 25'				
	17								WL @ 17' @ 1741				
	18								AFTER FLUSHING				
	19					BLACK	BLACK MATERIAL WITHIN		@ 25'				
C-1	20						OUT OF THE HOLE						
	21					GRAY	SLTY MATERIAL						
	22												
	23					LT							
	24					GRAY							
	25												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 4" TO 15' FOLLOWED BY 6" WELL SET @ 25' (15-25')
SAND TO 13
BENT TO 11 WELL CAVE TO 4'

Converted to Well: Yes X No _____ Well I.D. #: _____

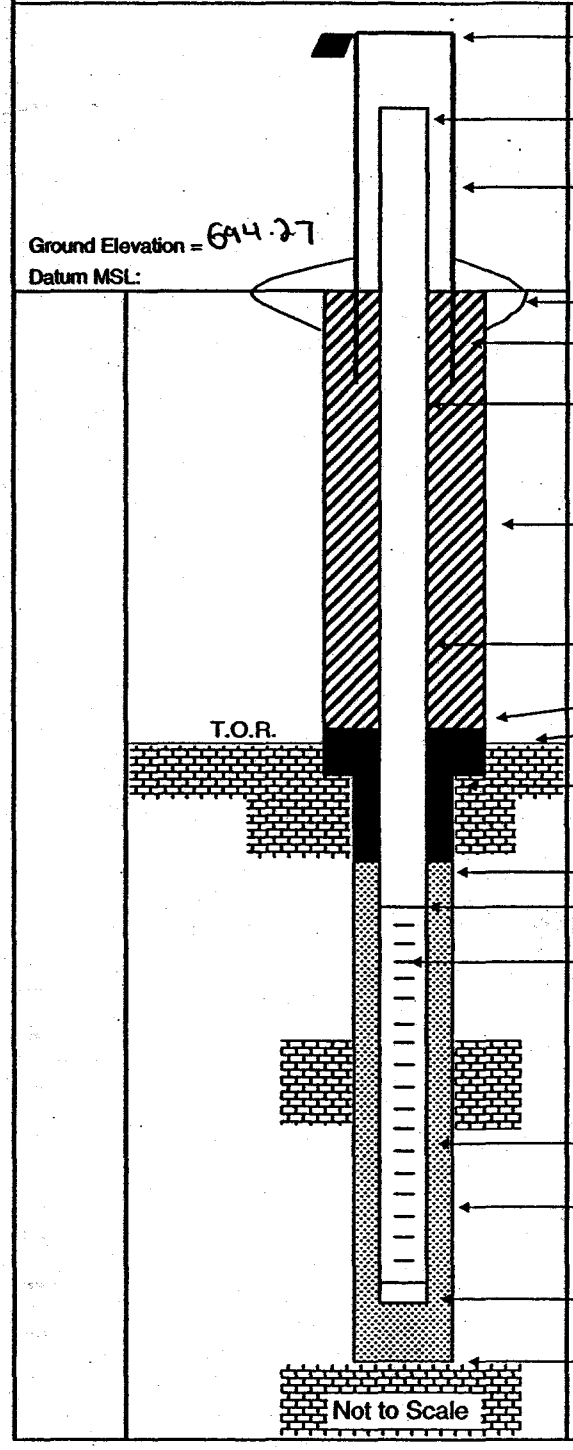
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13mwT15

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13mwT15
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/25/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	130455.65.519
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	3023717.803



- Elevation of Top of Casing: 697.16
- Stick Up of Casing Above Ground Surface: 2.38'
- Elevation of Top of Riser: 696.65
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" (0-15') 5" (15'-25')
- Type of Backfill: VOL-CLAY (4'-11')
- Elevation / Depth Top of Seal: 693.27 / 11'
- Elevation / Depth Top of Bedrock: 681.27 / 13'
- Type of Seal: BENT CHIPS
- Elevation / Depth of Top of Filter Pack: 681.27 / 13'
- Elevation / Depth of Top of Screen: 679.27 / 15'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / (Ream): 5"
- Elevation / Depth of Bottom of Screen: 669.27 / 25'
- Elevation / Total Depth of Borehole: 669.27 / 25'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: 13MWT16
DATE: 5/27/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole **	Driller BZ **
	0						DRIVE 6" CASING TO 15'				0.0		0.0
							WASHED OUT HOLE						
							- REFER TO 13MWT17						
							FOR COMPLETE						
							LITHOLOGY						
							0-5' SANDY MATERIAL						
							5'-10' CLAYEY MATERIAL						
									HARD DRILLING				
							10-15' SILTY MATERIAL		@ 10'				0.0
							↓						
	15										↓		
				T.D. 15'			SET WELL @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 4'						
							BENT TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 13MWT16

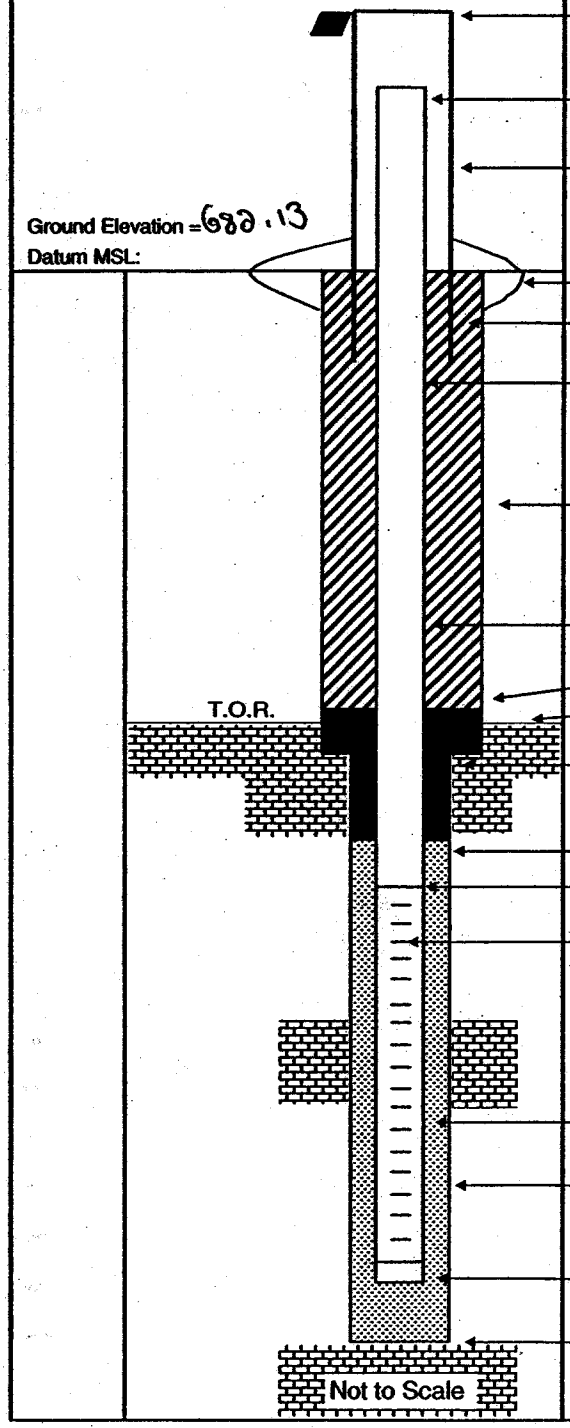
Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET

WELL No.: 13MW116

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW116
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/27/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309854.376
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	3023341.916



Elevation of Top of Casing:	684.93
Stick Up of Casing Above Ground Surface:	2.22
Elevation of Top of Riser:	684.35
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	GROUT
Elevation / Depth Top of Seal:	680.13 / 2'
Elevation / Depth Top of Bedrock:	672.13 / 10'
Type of Seal:	BENT CHIPS
Elevation / Depth of Top of Filter Pack:	679.13 / 4'
Elevation / Depth of Top of Screen:	679.13 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / (Ream)	5"
Elevation / Depth of Bottom of Screen:	667.13 / 15'
Elevation / Total Depth of Borehole:	667.13 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW717
DATE: 3/26/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ**	Borehole**	Drilling Area BZ**
	1				DRY + LOOSE	BLK	CINDERS + GRAVEL .5'	GM	4" SAMPLE 0-.5'	0.0			
	2				↓	↓	↓	↓	.5 - 2' FILL	↓			
	3					BR	SANDSTONE FRAGS						
	4					↓	↓						
S-1 ROCK	5		15" 5'		↓	↓	↓	↓		↓			
	6				DRY M. STIFF	YELL OR + LT	SILTY CLAY 5 - 8.5	CL	MED PLASTICITY	0.0			
	7				↓		↓	↓		↓			
	8					GRAY							
	9				STIFF	↓	CLAYEY SILT 8.5-10'	ML					
S-2 1540	10		5' 5'		↓	↓	↓ T-SAND	↓		↓			
	11			WATER		YELL OR + LT GRAY	SILTY - SANDSTONE	PT	WET 10-11.5'	0.0			
	12				↓		FRAGS 10-13'		CAVE SET 6" 10.8'				
	13				DRY + LOOSE	BLK	COAL SEAM 13-13.5'		+ BEAM 8'-15'				
	14				↓	GRAY	13.5'-15' SILTSTONE		POSS. WATER @ 10'				
S-3 1550	15		5' 5'		↓	↓	HIGH WEATHERED			↓			
	16					GRAY	15'-18' SILTY MATERIAL						
	17						COMING OUT OF THE						
	18					↓	CASING	↓					
				TD 18'									
							WATER @ 11 @ 1558						
							WELL SET @ 18' 2" PVC						
							SCREENED 8'-18'						
							SAND TO 6'						
							BENT TO 3'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 1

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No ___ Well I.D. #: 13MW717

Tetra Tech NUS, Inc.

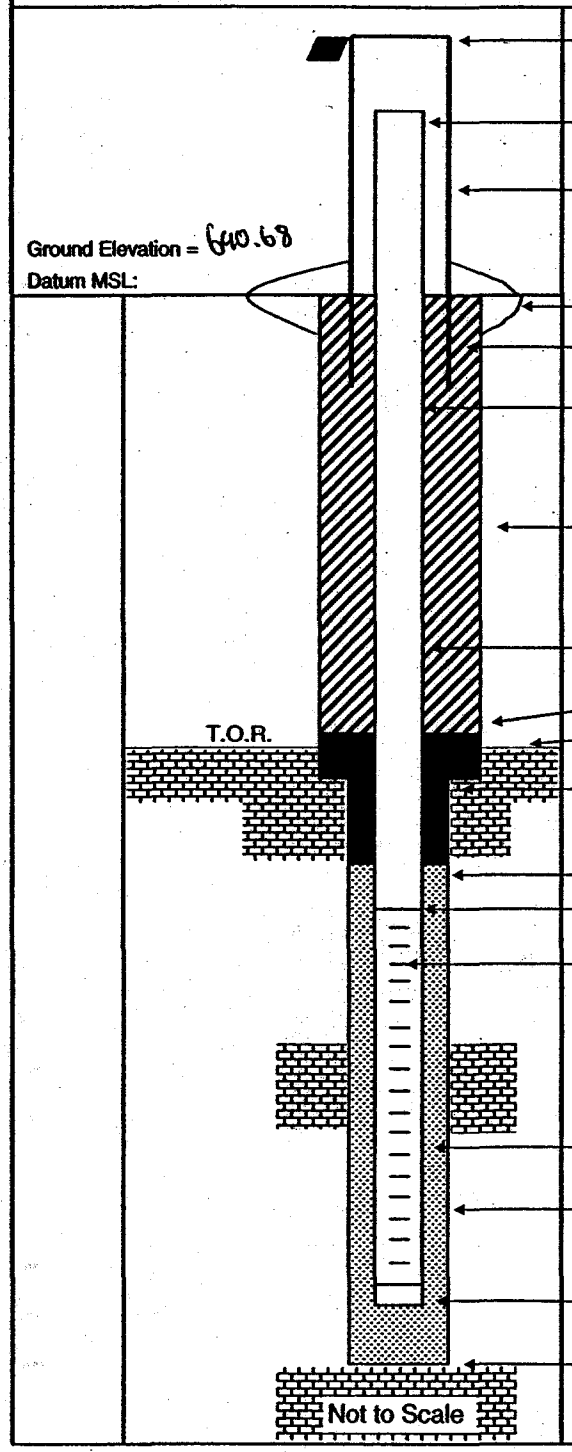
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MW17

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW17
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/26/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309605.372
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERRA	EASTING:	3023123.966



Elevation of Top of Casing:	663.69
Stick Up of Casing Above Ground Surface:	2.33'
Elevation of Top of Riser:	663.01
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	6" 0-8' / 5" 8-18'
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	657.68 / 3'
Elevation / Depth Top of Bedrock:	650.68 / 10'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	654.68 / 6'
Elevation / Depth of Top of Screen:	652.68 / 8'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5" CORE 10'-15' / 5" REAM 15'-18'
Elevation / Depth of Bottom of Screen:	642.68 / 18'
Elevation / Total Depth of Borehole:	642.68 / 18'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Roto Sonic
BORING NUMBER: 13MW118
DATE: 3/25/03 - 3/26/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole*	Drilling BZ*
	1				M.STIFF	YELL	0-8' SILTY CLAY	CL	MOTTLED	0.0			
	2				DRY	GR			6" CASING 0-20'				
	3					LT GRAY							
	4												
S-4 1634	5		4.5' / 5'										
	6									0.0		0.0	0.0
	7												
	8												
25	9				M.STIFF		8-10' INTERBEDDED	ML					
S-2 1638	10		5' / 5'		↓		CLAY & SILT	↓					
	11				M.STIFF	YELL	WEATHERED SILTSTONE	WR		0.0			
	12				MOIST	GR	(10'-15')						
	13					GRAY							
	14												
S-3 1654	15		4.5' / 5'			PURPLE ↓							
	16				HARD	LT	SILTSTONE 15'-20'	BR	COMPETENT ROCK	0.0			
	17					GRAY			@ 15'				
	18												
	19								DRY 0-20'				
S-4 1716	20		5' / 5'										
	21				HARD	LT	SANDSTONE 20-21.5'	MS		0.0			
	22		22' / 2.50			BR							
1/26 C.1	23		0804		WET	LT GRAY	SHALE 21.5'-25'	BR	POSSIBLE WATER				
	24				HARD				ZONE.				
	25		5' / 5'										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: _____

Converted to Well: Yes + No _____ Well I.D. #: 13MW118

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: Rotosonic
BORING NUMBER: B MW 19
DATE: 3/26/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	26				SOFT	LT GRAY	25'-27' SILTSTONE	VFR		0.0			
	27				↓	↓	↓	↓		↓			
	28					LT BR	27'-29.5' SANDSTONE	BR					
	29					↓		↓					
4	30		9.5' / 10'			BLK	29.5'-30' COAL	-					
				TD 30'									
							WELL SET @ 30' 2" PVC						
							SCREENED 20'-30'						
							STAND TO 18'						
							BENT TO 16'						
							VOLCUT TO 3'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: _____

Converted to Well: Yes X No _____ Well I.D. #: BMW19

Tetra Tech NUS, Inc.

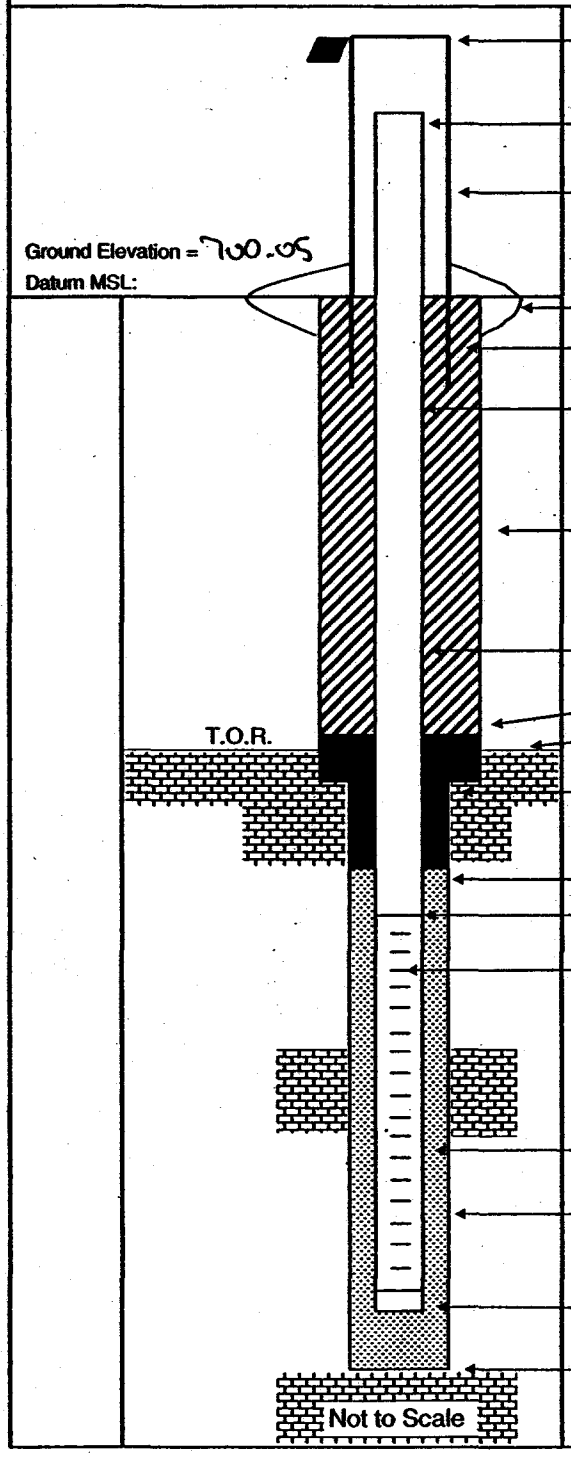
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MW118

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW118
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S	DATE COMPLETED:	3/26/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309326.980
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WHALE PUMP	EASTING:	3023203.416



Elevation of Top of Casing:	703.43
Stick Up of Casing Above Ground Surface:	3.87'
Elevation of Top of Riser:	703.93
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	6" 0-15' / 5" 15'-30'
Type of Backfill:	VOL CLAY (3'-16')
Elevation / Depth Top of Seal:	684.05 / 16'
Elevation / Depth Top of Bedrock:	685.05 / 15'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	683.05 / 17'
Elevation / Depth of Top of Screen:	680.05 / 20'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: (Core) Ream:	5"
Elevation / Depth of Bottom of Screen:	670.05 / 30'
Elevation / Total Depth of Borehole:	670.05 / 30'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW719
DATE: 3/31/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample#2	Borehole	Drill Area
	1				MOIST + SOFT	BR	.5' TOP SOIL	ML		0.0			
	2				MOIST M.STIFF	DARK LT	.5'-4' CLAYEY SILT + GRAVEL		(MOTTLED)				
	3				↓	GRAY	↓		FILL ↓				
S4 13MW	4		3.9' 4'		↓	↓	4-5.5' SANDY SILT W/ SOME CLAY	↓	WEATHERED S.S	↓			
	5				DRY + M.STIFF		SANDY SILT + SS CHUNKS		6"-TO 5'	0.0			
	6				HARD		5.5'-6' CLAYSTONE SEAM						
	7				DRY + M.DENSE	BR + TAN	SANDY SILT 6'-7'						
	8				MOIST +	↓	SANDSTONE 7'-9'		WEATHERED @ 7'				
S-2 12.52	9		5' 5'		M.DENSE	YELL UR	↓	DK	HARD 8-9'	↓			
▼	10				MOIST +		SANDY SILT 9-11'	ML	5" CLAY 9-10'				
	11		61" RQD		M.STIFF		↓	↓					
C1	12		@13.46		WET + SOFT		.5' SILT 11-11.5'	ML					
	13				WET + M.DENSE		11.5'-13' SILTY SAND + SSTONES	SM	POSS WATER @ 13'				
	14		4.8' 5'		STIFF + DRY	↓	SILTSTONE	DK	THIN LAM.				
▼	15					GRAY	SILTY SHALE	DR					
	16					↓	↓	↓					
C2	17		80% RQD										
	18		@14.20										
▼	19		4.7' 5'			↓	↓	↓					
				T.D. 19'			WELL SET @ 19' 2" PVC						
							SCREENED 9'-19'						
							SAND TO 7'						
							BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 13MW719

Tetra Tech NUS, Inc.

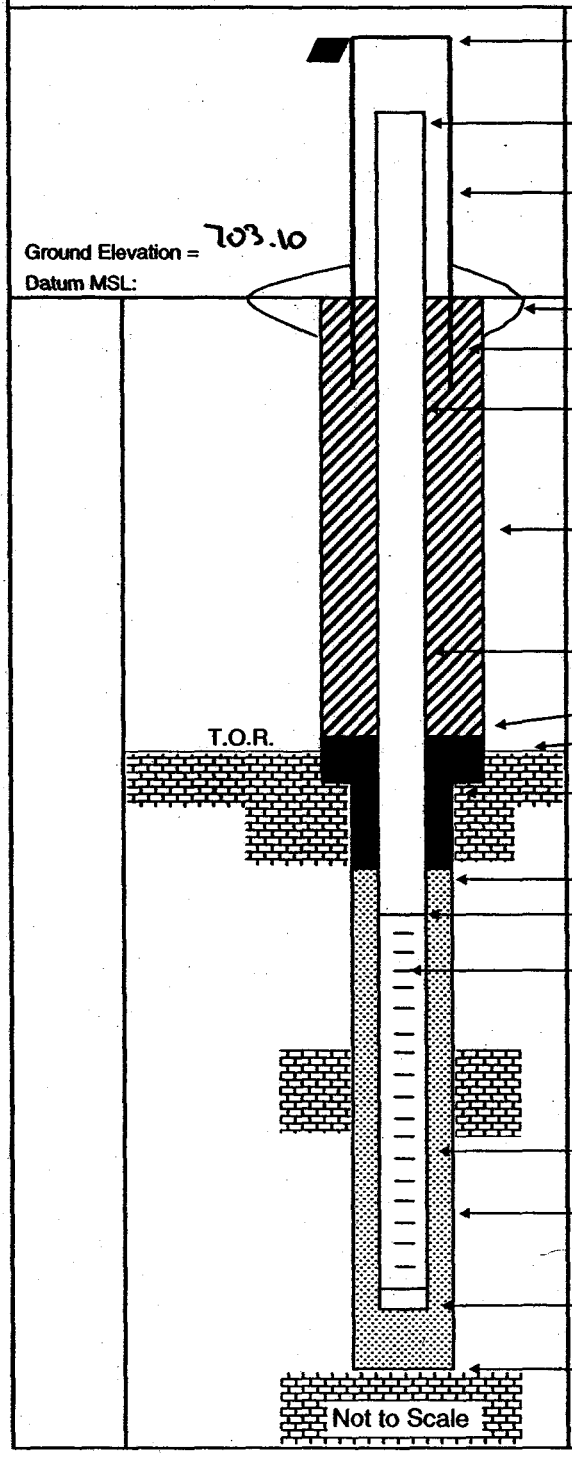
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MW14

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW14
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/31/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1308843.971
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERRA	EASTING:	302983.4.565



- Elevation of Top of Casing: 706.32
- Stick Up of Casing Above Ground Surface: 2.72'
- Elevation of Top of Riser: 705.82
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" to 5'
  5" 5'-19'
- Type of Backfill: CEMENT
- Elevation / Depth Top of Seal: 701.1 / 2'
- Elevation / Depth Top of Bedrock: 690.1 / 13'
- Type of Seal: BENT-CHIPS
- Elevation / Depth of Top of Filter Pack: 696.1 / 7'
- Elevation / Depth of Top of Screen: 694.1 / 9'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock:
  (Core) / Ream: 5"
- Elevation / Depth of Bottom of Screen: 684.1 / 19'
- Elevation / Total Depth of Borehole: 684.1 / 19'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW720
DATE: 3/20/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1				FRIABLE SOFT	BR	.5' TOP SOIL	ML		0.0			
	2				MOIST	YELL OR	5-6' CLAYEY SILT & SAND	ML/SC					
	3				MOIST	LT	(FILL)	SC					
	4					GRAY			MOTTLED (1-5')				
S-1 0917	5		4.7' / 5'										
	6					YELL OR	CLAYEY SILT	ML		0.0			
	7			11-11'	HARD	LT	6-13.5' SILTSTONE	BR	THIN LAMINATION				
	8					DK GRAY							
	9												
S-2 0935	10		4.5' / 5'				SHALEY 9'-10'						
	11						SILTSTONE 10'-13.5'			0.0			
	12												
	13												
	14				WET & SOFT								
S-3 0947	15		4.5' / 5'		HARD & FRIABLE		SANDSTONE 13.5'-15.5'	MS	WATER @ BOTTOM OF HOLE: 13.2' @ 0949	0.0			
	16				DRY								
	17				SOFT &	LT DK	15.5-20' SILTY SHALE	WR					
	18				DRY	GRAY							
	19												
S-4 0934	20		5' / 5'										
				T.D. 20'			WELL SET @ 20' 2" PVC						
							SCREENED 10'-20'						
							SAND TO 8'						
							BENT TO 7'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 13MW720

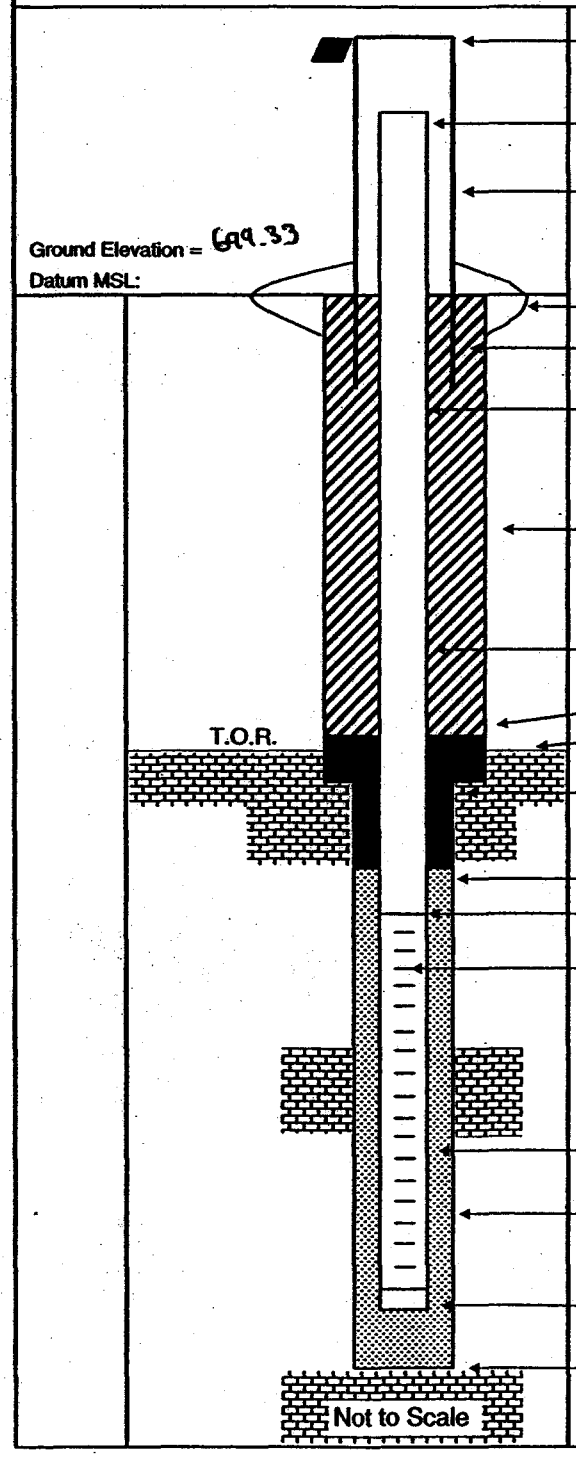
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW720

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW720
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	4/1/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309066.757
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERRA	EASTING:	302352.233



Elevation of Top of Casing:	702.65
Stick Up of Casing Above Ground Surface:	2.74
Elevation of Top of Riser:	702.01
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	697.33 / 2'
Elevation / Depth Top of Bedrock:	693.33 / 6'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	691.33 / 8'
Elevation / Depth of Top of Screen:	689.33 / 10'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	679.33 / 20'
Elevation / Total Depth of Borehole:	679.33 / 20'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MWT21
DATE: 3/28/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					BR	SEE 13MWT17 FOR		5' 0-15'				
							COMPLETE LITHOLOGY						
							STICK MATERIAL						
1051	5					↓							
						GRAY							
1100	10						↓		HARD DRILLING				
							STICK MATERIAL		@ 10'				
1105	15					↓	↓						
				T.D 15'			WELL SET @ 15' 2" PVC						
							SCREENED 5'-15'						
							SAND TO 4'						
							BENT 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: 13MWT21

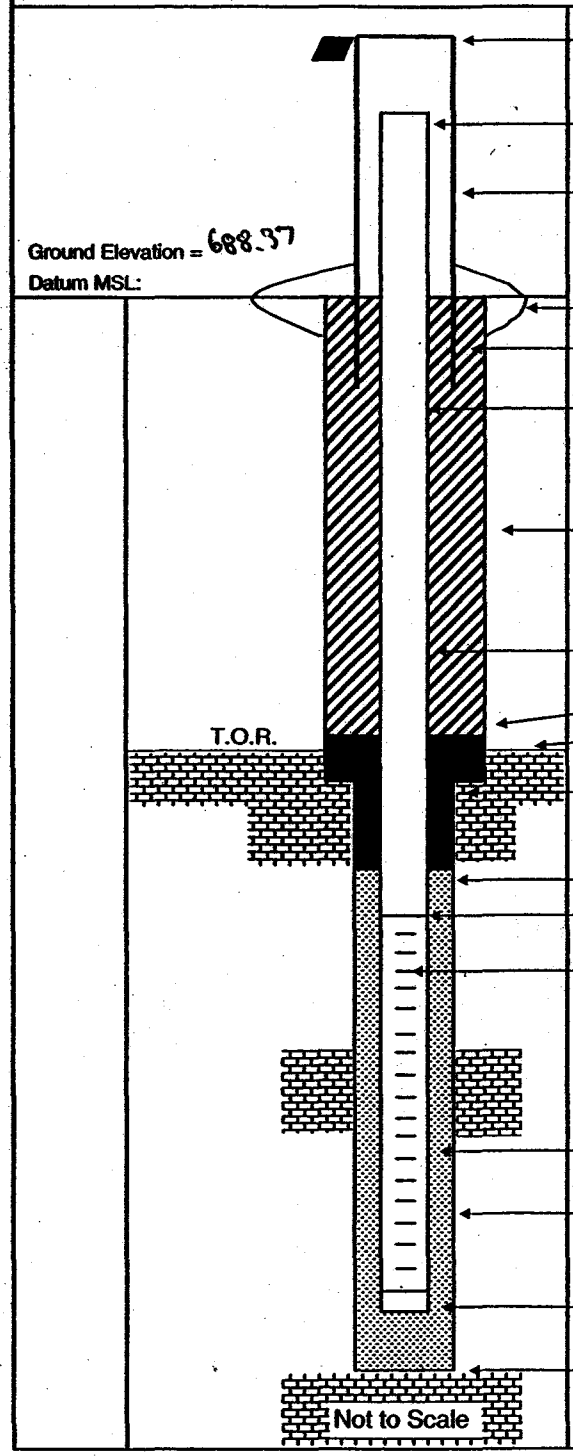
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW121

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW121
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES	DATE COMPLETED:	2/28/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309391.009
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERRA	EASTING:	3022916.218



Elevation of Top of Casing:	691.26
Stick Up of Casing Above Ground Surface:	2.37
Elevation of Top of Riser:	690.74
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	N/A
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	686.37 / 2'
Elevation / Depth Top of Bedrock:	678.37 / 10'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	684.37 / 4'
Elevation / Depth of Top of Screen:	683.37 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	673.37 / 15'
Elevation / Total Depth of Borehole:	673.37 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: BMW22
DATE: 3/28/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					DR	.5' TOP SOIL	ML		0.0	0.0		
	2					YELL BR	CLAYEY SILT .5-3'						
	3					↓	↓						
	4					YELL BR & GRAY	SANDY SILT 3'-5'		MOTTLED				
S-1 0910	5		5' / 5'			GRAY	↓ SOME WEATHERED RK	↓					0.0
	6					↓	5-6' ↓	ML		0.0			
	7				SOFT &	YELL BR & GRAY	6-11' SILTY STONE	BR	COAL IN THE				
	8				DRY		↓		TUFF. RESS				
	9				HARD &	LT GRAY	↓		WATER @ 7'	↓			
S-2 0914	10		4.9' / 5'		DRY	↓	↓			0.0			
	11					↓	SILTY STONE			0.0			
	12					LT GRAY	11-15' S.S			↓			
	13					↓	↓						
	14					BR			WATER UP TO 14'				
S-3 0919	15		4.9' / 5'			BLK	↓	↓	@ 15'8"	↓	↓		0.0
-				T.D. 15'			SET WELL @ 15' 2" PVC		6" TO 5' REAM				
							SCREENED 5'-15'		5'-15' (5")				
							SAND TO 4'						
							BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: _____

Converted to Well: Yes X No _____ Well I.D. #: BMW22

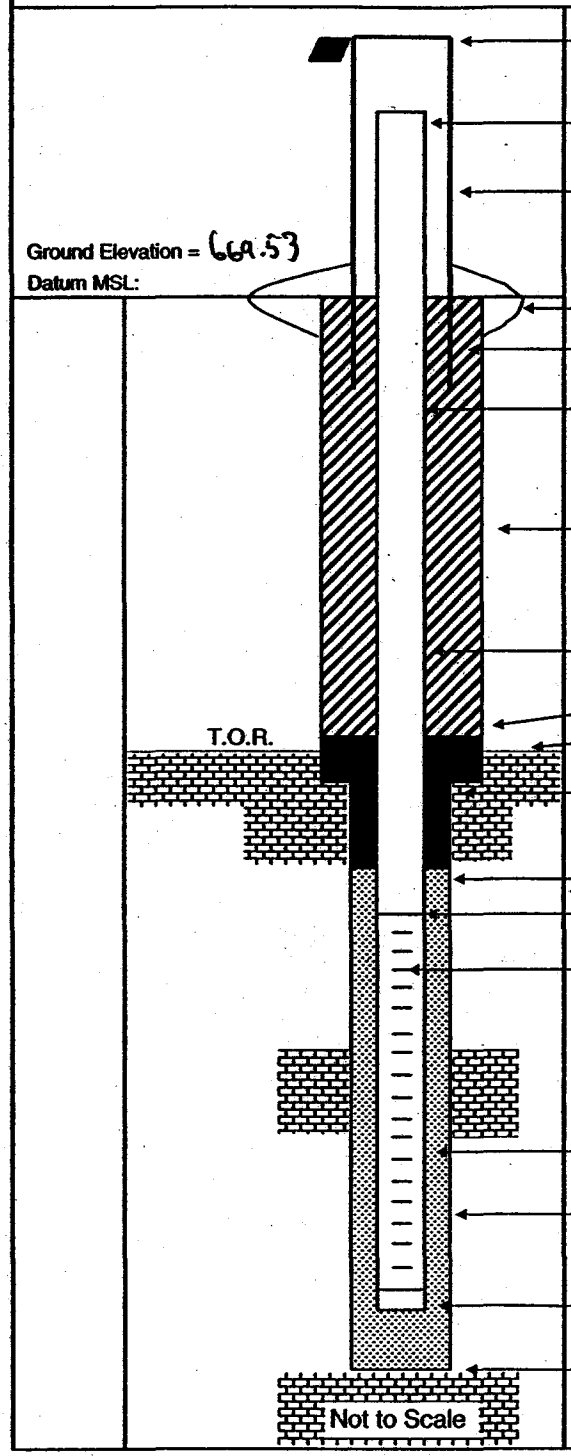
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW-22

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW22
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/28/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	130843 6.338
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	3022785.672



- Elevation of Top of Casing: 672.38
- Stick Up of Casing Above Ground Surface: 2.43
- Elevation of Top of Riser: 671.96
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" 0-5' / 5" 5-15'
- Type of Backfill: CEMENT
- Elevation / Depth Top of Seal: 667.53 / 2'
- Elevation / Depth Top of Bedrock: 663.53 / 6'
- Type of Seal: BENT CHIPS
- Elevation / Depth of Top of Filter Pack: 665.53 / 4'
- Elevation / Depth of Top of Screen: 664.53 / 5'
- Type of Screen: PVC
- Slot Size x Length: .02 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / Ream: 5"
- Elevation / Depth of Bottom of Screen: 654.53 / 15'
- Elevation / Total Depth of Borehole: 654.53 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW23
DATE: 4/1/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler**	Borehole**	Driller**
	1				DAMD	BR	TOP .5' TOP SOIL	ML		0.0			
	2				MOIST	BR	5'-5.5' CLAYEY SILT						
	3				M-STIFF	↓							
	4					LT GRAY			MOTTLED (3'-5')				
SA 1225	5		4.5' / 5'			↓		↓					
	6					BR	CLAYEY SILT	ML		0.0			
	7				MOIST M-STIFF	YEL	5.5'-10.5' SANDY SILT						
	8					BR							
	9					LT GRAY							
S-2 1233	10		5' / 5'			↓		↓	WET SAND SEAM @ 10'				
	11				DRY M-STIFF	↓	SANDY SILT	ML	BOREH @ 10.5'	0.0			
	12					DK GRAY	SILTSTONE 10.5'-13.2'	RX	THIN LAM.				
	13					↓	↓						
	14					LT GRAY	13.2'-15' SILTSTONE W/SS						
S-3 1242	15		4.5' / 5'			LT GRAY	SEAMS 2 1" THICK						
	16			▼?		↓	SILTSTONE W/SS						
	17			STATIC		BR	SANDSTONE		POSS WATER @ 16				
	18					LT. GRAY							
	19												
S-4 1252	20		4.5' / 5'			↓	↓	↓					
	21				WET -								
S-5 1312	22'		1.5' / 2'			↓	↓	↓					
				T.D. 22'			WELL SET @ 21.5' 2" PVC		1.5' OF SAND FELL				
							SCREENED 11.5'-21.5'		BACK FW.				
							SAND TO 9.5' BENT TO 7'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 5" TO 22'

Converted to Well: Yes X No _____ Well I.D. #: 13MW23

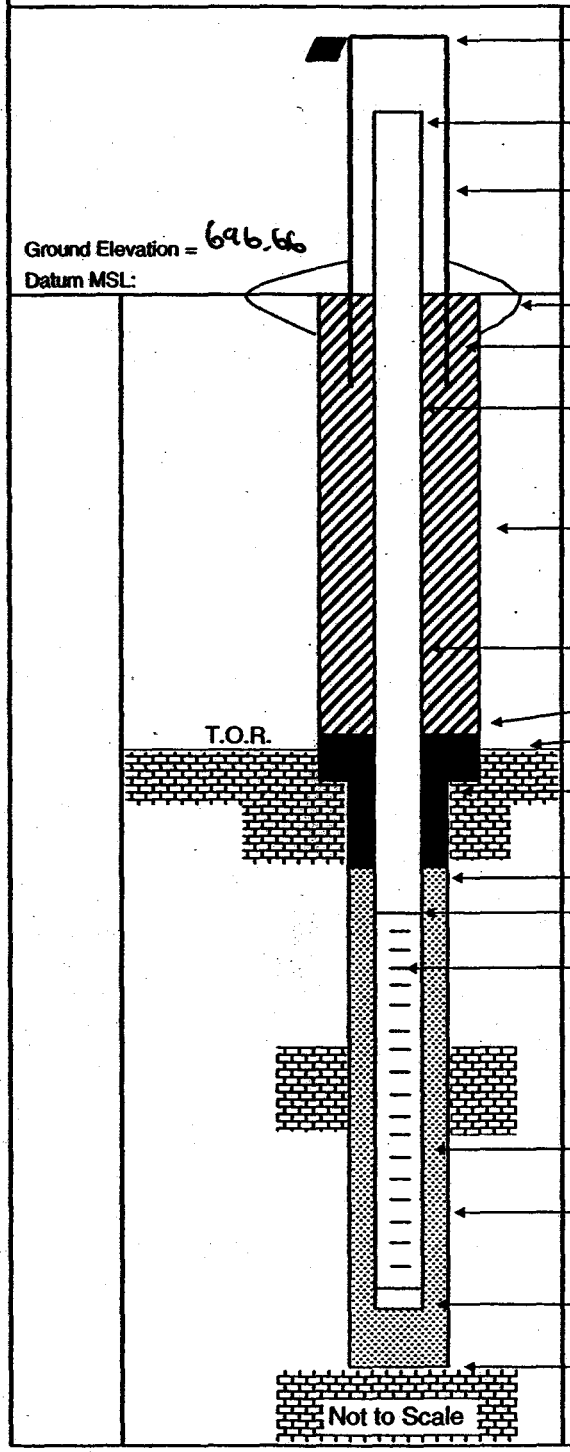
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: BMW23

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	BMW23
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES.	DATE COMPLETED:	4/1/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1308708.016
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERA	EASTING:	302324S.117



- Elevation of Top of Casing: 699.69
- Stick Up of Casing Above Ground Surface: 2.48
- Elevation of Top of Riser: 699.14
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 5"
- Type of Backfill: VOL CLAY (2-7.5')
- Elevation / Depth Top of Seal: 689.16 / 7.5'
- Elevation / Depth Top of Bedrock: 685.96 / 10.5'
- Type of Seal: BENT. CHIPS
- Elevation / Depth of Top of Filter Pack: 687.16 / 9.5'
- Elevation / Depth of Top of Screen: 685.16 / 11.5'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: (Core) / Ream: 5"
- Elevation / Depth of Bottom of Screen: 675.16 / 21.5'
- Elevation / Total Depth of Borehole: 674.66 / 22.0'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MW724
DATE: 4/1/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole*	Driller BZ**
	1					YELL	SEE BORING LOG 13MW724	MN	LOGGED SOIL				
						OR	+ 13MW723 FOR COMPLETE		CUTTINGS				
							LITHOLOGIC DETAILS						
							5" REAM 0-22'						
	5					↓	-SILTY CUTTINGS						
						YELL							
						OR							
	10					↓		↓					
						GRAY	SILTY MATERIAL	M	ROCK @ 10'±				
							SILTSTONE?		HARDER TO				
									REAM: SLOWER				
									PROGRESS				
	15												
	20					↓							
						GRAY			FLUSHED OUT				
	22					↓		↓	HOLE. WATER				
				TD 22'			WELL SET @ 22' 2" PVC		@ 19.0'				
							SCREENED 12'-22'						
							STAND TO 10'						

BENT TO 8' VOLCLAY TO 7'

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): –

Remarks: 5" REAM 0-22'

Converted to Well: Yes X No ___ Well I.D. #: 13MW724

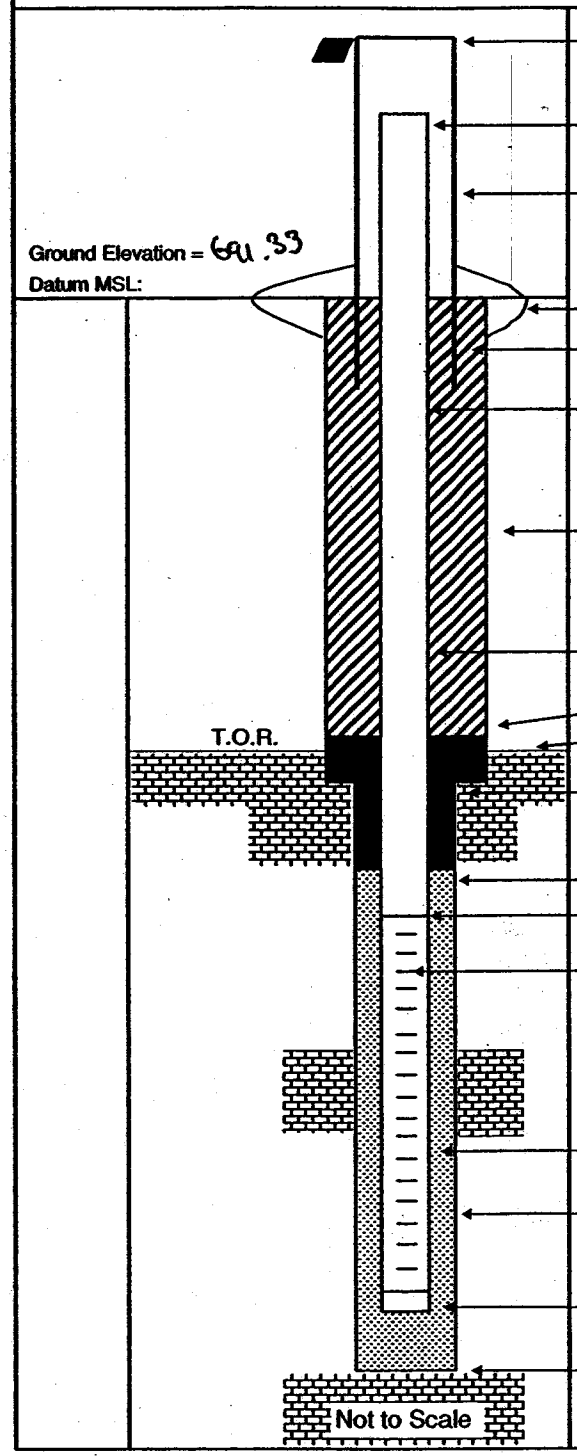
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW724

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW724
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVES.	DATE COMPLETED:	4/1/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1308397.230
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATERRA	EASTING:	302296.484



Elevation of Top of Casing:	694.39
Stick Up of Casing Above Ground Surface:	2.6
Elevation of Top of Riser:	693.93
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	VOL CLAY (2.5')
Elevation / Depth Top of Seal:	683.33 / 8'
Elevation / Depth Top of Bedrock:	680.33 / 11'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	681.33 / 10'
Elevation / Depth of Top of Screen:	679.33 / 12'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / (Ream.)	5"
Elevation / Depth of Bottom of Screen:	669.33 / 22'
Elevation / Total Depth of Borehole:	669.33 / 22'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: BMWT25
DATE: 3/28/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole** BZ	Driller BZ**
	1					BR	TOP 5' TOPSOIL	ML		0.0			
	2					LT	5'-4' SILTY CLAY W/	CL					
	3					BR	↓ F-C SAND	↓					
	4					↓	↓	↓					
S4 1302	5		4.5' / 5'			YELLOW BROWN	SANDY SILT W/ T-CLAY	ML	MOTTLED	↓			
	6				MOIST →	↓	CLAYEY SILT	↓	↓	0.0			
	7				STIFF		↓ 4-8'						
	8				SOFT + WET	↓	↓	↓	WET @ 8'				
	9				STIFF → DRY	YELLOW BROWN	SAND & SILT 8-9'	ML	WEATHERED ROCK				
S-2 1310	10		4.5' / 5'		DRY → SOFT	LT GRAY	SILTSTONE 9-15'	RX	BLACK CLAY LAYER @ 9' x 2" WIDE	↓			
	11					↓	↓			0.0			
	12												
	13												
S-3 1323	14		4 / 4'			↓	↓		REFUSAL @ 14'	↓			
	15						5" REAM TO 15'	↓	RUN 5" TO 15'				
				T.D. 15									
							SET WELL @ 15' 2" PVC						
							SCREENED FROM 5'-15'						
							SAND TO 4'						
							BENT CHIPS TO 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: SAMPLED 0-14' 1' OF REAM.

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No ____ Well I.D. #: BMWT25

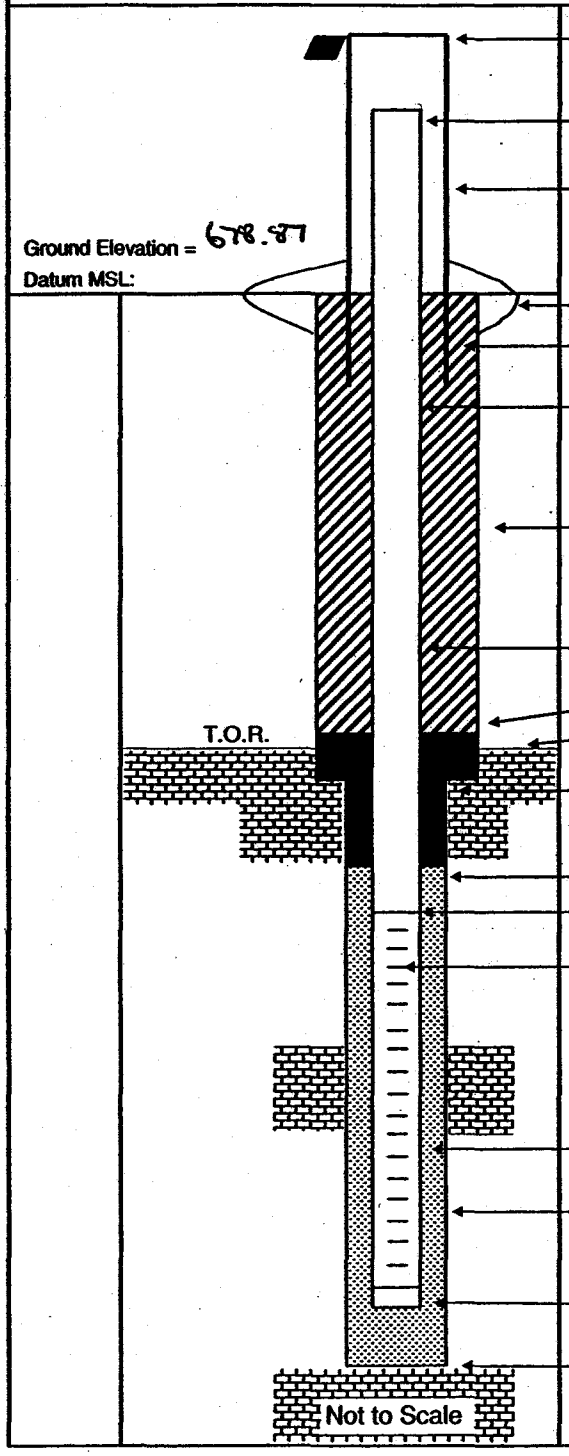
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: BMW125

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	BMW125
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	7/28/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1309635.618
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATTERA	EASTING:	302677.444



Elevation of Top of Casing:	682.00
Stick Up of Casing Above Ground Surface:	2.78
Elevation of Top of Riser:	681.57
I.D. of Surface Casing:	4" SQUARE
Type of Surface Casing:	STEEL
Type of Surface Seal:	4'x4'x6" PAD
I.D. of Permanent Casing:	NA
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	5"
Type of Backfill:	CEMENT
Elevation / Depth Top of Seal:	676.87 / 2'
Elevation / Depth Top of Bedrock:	668.87 / 9'
Type of Seal:	BENT. CHIPS
Elevation / Depth of Top of Filter Pack:	674.87 / 4'
Elevation / Depth of Top of Screen:	673.87 / 5'
Type of Screen:	PVC
Slot Size x Length:	.20 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	No. 20-40 SAND
Diameter of Hole in Bedrock: Core / Ream:	5"
Elevation / Depth of Bottom of Screen:	663.87 / 15'
Elevation / Total Depth of Borehole:	663.87 / 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC
BORING NUMBER: 13MWT26
DATE: 3/28/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1				MOIST	BR	TOP .5 TOP SOIL	ML		0.0			
	2				M STIFF		.5'-6.5' SANDY SILT						
	3												
	4												
S-1 1452	5		4.7 5'									0.0	0.0
	6					BR	SANDY SILT			0.0			
	7					YELL BR	6.5'-8.5' SANDY SILT W/ SOME						
	8					GRAY	CLAY & S.S. FRAGS		SOME MOISTURE				
	9								@ 8' WET				
S-2 1456	10		5' 5'				MORE S. @ 10'		MUCH				
	11						CASING PLUGGED UP						
	12						SANDY SILT W/ SOME						
	13		e				CLAY & SS FRAGS						
	14			?		LT GRAY	13.5-17' SANDSTONE		SSP 13.5'				
S-3 1514	15		2' 5'						DRILLER OBSERV.				
	16				HARD	BR		MS	SET 6" TO 10'				
	17		e1543										
G-1	18		40%		SOFT+	LT. DK	ALTERNATING BEDS OF	VBR	CLAYEY 17'-19'				
	19		RQD		HARD.	GRAY	SANDSTONE & SILTSTONE						
	20		5' 5'		SOFT	LT GRAY	1' SANDSTONE BRITTLE						
				T.D. 20'			WELL SET @ 20' 2" PVC						
							SCREENED 10'-20'						
							SAND TO 8'						
							BENT CHIPS TO 3'						
							NO VOC CLAY.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DRY @ 15' AFTER REAMING. WL @ 19' AFTER BLOW OUT

Drilling Area Background (ppm): 0.0

Converted to Well: Yes X No _____ Well I.D. #: 13MWT26

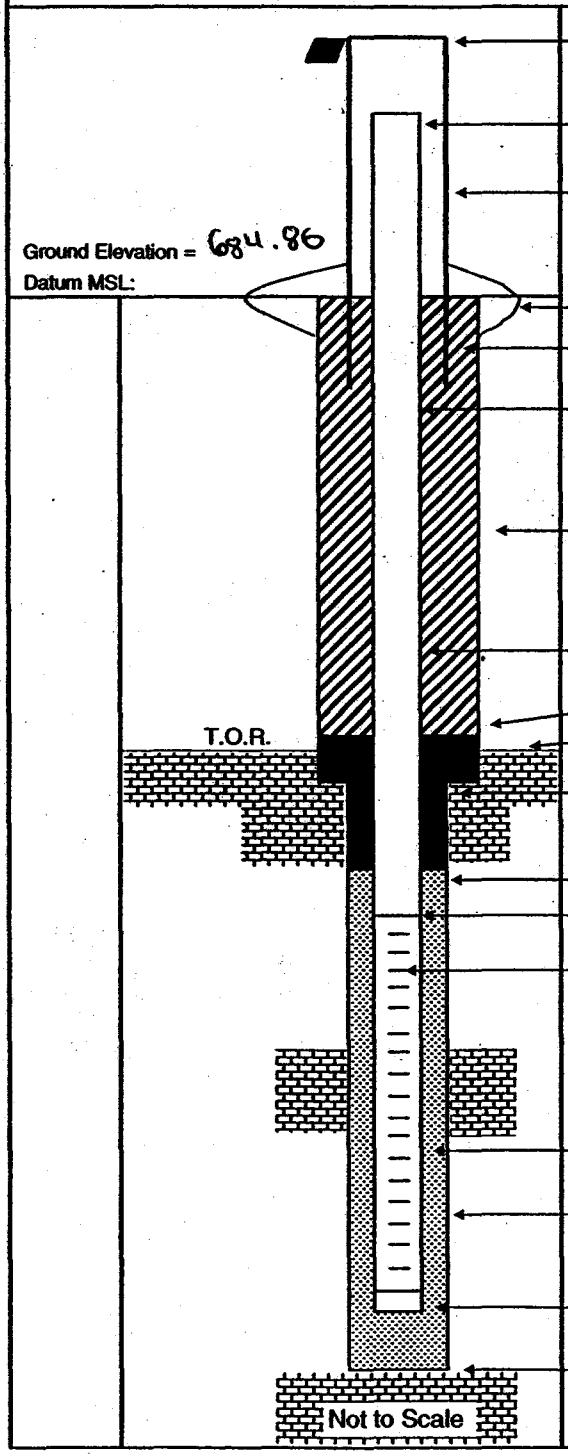
Tetra Tech NUS, Inc.

BEDROCK MONITORING WELL SHEET

WELL No.: 13MW736

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MW736
PROJECT No.:	9060 CTO 0279	DRILLER:	DAVE S.	DATE COMPLETED:	3/28/03
SITE:	SWMU 13	DRILLING METHOD:	ROTOSONIC	NORTHING:	1308232.686
GEOLOGIST:	B. BALKOVEC	DEV. METHOD:	WATER	EASTING:	302690.142



- Elevation of Top of Casing: 687.92
- Stick Up of Casing Above Ground Surface: 2.63'
- Elevation of Top of Riser: 687.49
- I.D. of Surface Casing: 4" SQUARE
- Type of Surface Casing: STEEL
- Type of Surface Seal: 4'x4'x6" PAD
- I.D. of Permanent Casing: NA
- I.D. of Riser: 2"
- Type of Riser: PVC
- Borehole Diameter: 6" 0-10' / 5" 10-20'
- Type of Backfill: CEMENT
- Elevation / Depth Top of Seal: 681.86 / 3'
- Elevation / Depth Top of Bedrock: 672.36 / 12.5
- Type of Seal: BENT. CHIPS
- Elevation / Depth of Top of Filter Pack: 676.86 / 8'
- Elevation / Depth of Top of Screen: 674.86 / 10'
- Type of Screen: PVC
- Slot Size x Length: .20 x 10'
- I.D. of Screen: 2"
- Type of Filter Pack: No. 20-40 SAND
- Diameter of Hole in Bedrock: Core / Ream: 5"
- Elevation / Depth of Bottom of Screen: 664.86 / 20'
- Elevation / Total Depth of Borehole: 664.86 / 20'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB01
DATE: 3-25-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ**	Borehole**	Drilling BZ**
0	1		2.3/		—	GR-BRN	SANDY SILT	SM	MOIST	3.6	3.6	36	36
	2		4.0						FE STAINED	↓	↓	↓	↓
	3								FILL				
4	4								MORE FE				
	5						TD 4.0'		BTM. BTM DAMP				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS010002 @ 1240							
						SAMPLED 13SB010204 @ 1245							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT W/ MACRO CORE

Drilling Area Background (ppm): 3.6

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB02
DATE: 3-25-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Drill Rig BZ**
0	1		2.5/		—	GR BRN	SANDY SILT	SM	MOIST.	2.1	2.1	2.1	2.1
	2		4.0						FE STAINED	↓	↓	↓	↓
	3								FILL				
4	4								DAMP @ BTM				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
							SAMPLED 13SS020002						
							@ 1255						
							SAMPLED 13SB020204						
							@ 1300						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 2.1

Remarks: DPT W/ MACRO CORE

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB03
DATE: 3-25-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample B2	Borehole	Drill Rig
	1		2.8/			GR BRN	SANDY SILT	SM	moist @ TOP	1.8	1.8	1.8	1.8
	2		4.0						FILL	↓	↓	↓	↓
	3								DAMP @ BTM				
	4								Fe STAINED @				
	5						TD 4.0		HARD @ BTM BTM				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS030002 @ 1310							
						SAMPLED 13SB030204 @ 1315							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT W/ MACRO CORE

Drilling Area Background (ppm): 1.8

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT
BORING NUMBER: 13SB04
DATE: 3-25-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Sample BZ**	Driller BZ**
	1		1.8/			GR BRN	SANDY SILT	SM	MOIST@TOP	22	22	22	22
	2		4.0							↓	↓	↓	↓
	3								FILL				
	4								FE STAINED @ BTM				
	5						TD 4.0		DAMP@BTM				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SB040002							
						@ 1415							
						SAMPLED 13SB040204							
						@ 1420							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT W/ MACRO CORE

Drilling Area Background (ppm): 2.2

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13 SB05
DATE: 3-25-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole	Drilling BZ
	1		1.2/			GR BRN	SANDY SILT	SM	SAT @ TOP	1.8	1.8	1.8	1.8
	2		4.0							↓	↓	↓	↓
	3								FILL				
	4								DAMP @ BTM FE STAINED				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS050002 @ 1350							
						SAMPLED 13SB050209 @ 1355							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.8

Remarks: DPT W/ MACRO CORE

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB06
DATE: 3-25-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness*	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler Bz	Borehole**	Driller BZ**
0	1		2.5/			GR. BRN	SILTY SAND	SM	MOIST @ TOP	1.9	1.9	1.9	1.9
	2		4.0						FILL				
	3												
4	4								DAMP @ BTM FE STAINED				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS060002 @ 1330							
						SAMPLED 13SB060204 @ 1335							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT W/ MACRO CORE

Drilling Area Background (ppm): 1.9

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT
BORING NUMBER: 13SB07
DATE: 3-26-03
GEOLOGIST: M G COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Drill Rig BZ**
0	1		3.8/			DK BRN	TOPSOIL - .5' SILTY LITTLE	SM	DAMP	1.7	1.7	1.7	1.7
	2		4.0				SAND		FILL - 5.5'	↓	↓	↓	↓
	3												
4	4												
	5		3.3/						SATURATED				
	6		4.0						SS FRAG				
	7			5.5		RD BRN	SILT, LITTLE		GREY MOTTLING	1.7	1.7	1.7	1.7
8	8								DAMP				
	9												
	10								WEATHERED RK				
11	11						REFUSAL @ 11'		SHALY @ BTM				
	12												
	13												
	14												
	15												
						SAMPLED 13SS070002 @ 1320							
						SAMPLED 13SB070810 @ 1350							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 1.7

Remarks: GEOPROBE MACRO CORE
HOLE BACK FILLED W/ HOLEPLUG

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTOSONIC

BORING NUMBER: BMW108 / SB08
DATE: 3/31/03
GEOLOGIST: BOB BALKOVEC
DRILLER: DAVE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	1				MOIST & SOFT	BR	TOP .5' TOP SOIL	ML		0.0			
	2				DRY &	YELL OR	CLAYEY SILT		0-2 @ 0745				
	3				MOIST	GRAY	(MOTTLED)		DUP FD033003-04				
	4				↓	↓	↓						
4-4 DRY	5		4.5' / 5'		↓	↓	↓	↓		↓			
	6					BR	5-6.5' CLAYEY SILT W/ S.S. PEBBLES	ML		0.0			
	7					YELL OR	6.5-8' CLAYEY SILT		6.5' @ 0800				
	8					↓	(MOTTLED)	↓	MS/MSD				
	9				SOFT &	LT GRAY	SILTSTONE	DK	POSS. WATER @ 9'				
3-2 DRY	10		4.9' / 5'		DRY	↓	↓	BR		↓			
	11				HARD	YELL OR	SANDSTONE 10-10.5'			0.0			
	12				HARD &	LT GRAY	10.5'-13.5' SILTSTONE						
	13				DRY ↓	& YELL OR	(MOTTLED)		MOISTURE ALONG				
	14				HARD &	LT/DK	THIN LAMINATED SILTSTONE		SOIL WALLS				
3-7 DRY	15		5' / 5'		DRY	GRAY	13.5'-15' ↓	↓	6" TUS' 5" REAM	↓			
				TD 15'			WELL SET @ 15'		5'-15'				
							SCREENED 5'-15'		DRILLER LOSING				
							SAND TO 4'		WATER.				
							BENT TO 2'		WL @ 9' ↓ PVC				
									AFTER BLOWOUT				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: BMW108

Tetra Tech NUS, Inc.

BORING LOG

Page 1 of 1

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB09/15
DATE: 3-26-03
GEOLOGIST: M.G COCHRAN
DRILLER: J'AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Background	Drilling BZ**
0	1		1.7/			BL	COMPOST,		MANURE ODOR, MOIST	2.1	2.1	2.1	2.1
	2		4.0			BRN	SILTY SAND		FILL				
	3												
4	4								DAMP@BTM				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS090002 @ 945							
						SAMPLED 13SB090204 @ 950							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 2.1

Remarks: GEOPROBE MACRO CORE
BACKFILLED W HOLE PLUG

Converted to Well: Yes ____ No V Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54LT
BORING NUMBER: 13SB10
DATE: 3-26-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole	Driller BZ
	1					BL BRN	TOPSOIL .5' SANDY SILT	SM	no MOIST	1.9	1.9	1.9	1.9
	2								FILL				
	3												
	4								DAMP @ BTM				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS100002 @ 930							
						SAMPLED 13SB100204 @ 935							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACRO CORE

Drilling Area Background (ppm): 1.9

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEO PROBE 54LT

BORING NUMBER: 13SB11
DATE: 3-26-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Blender #2	Blender**	Driller #2
0	1		2.6/		RO	BL BRN	TOPSOIL SILTY SAND	SM	MOIST@TOP	1.9	1.9	1.9	1.9
	2		4.0						FILL				
	3								DAMP@BTM				
4	4								HARD@BTM				
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS110002 @ 915							
						SAMPLED 13SB110204 @ 920							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACRO CORE

Drilling Area Background (ppm): 1.9

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEO PROBE 54LT

BORING NUMBER: 13SB12
DATE: 3-26-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Drillers BZ**
G	1		2.3/			BRN	SANDY SILT	SM	DAMP	2.1	2.1	2.1	2.1
	2		4.0						FILL	↓	↓	↓	↓
	3								BLACK @ 1.5-2.0,				
4	4								RK FRAG IN				
	5						TD 4.0		BTM				
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
							SAMPLED 13SS12 0002 @ 830						
							SAMPLED 13SB12 0204 @ 835						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACRO CORE

Drilling Area Background (ppm): 2.1

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: GEOPROBE 54 LT

BORING NUMBER: 13SB13
DATE: 3-25-03
GEOLOGIST: M G. COCHRAN
DRILLER: J. AKERS

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole **	Driller BZ
0	1		3.1/			BRN	SANDY SILT	SM	DAMP	0	0	0	0
	2		4.0						FILL				
	3												
4	4												
	5						TD 4.0						
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
						SAMPLED 13SS130002 @ 750							
						SAMPLED 13SB130204 @ 755							

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: GEOPROBE MACRO CORE

Drilling Area Background (ppm): 0

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: HAND AUGER
BORING NUMBER: 13SB14
DATE: 4/10/03
GEOLOGIST: BOB BALMOVET
DRILLER: Jeff Akers

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1		1' / 1'			BR	SAND SILT w/ SOME TOPSOIL	ML	MOIST	0.0			
	2			T.D. 1'									
	3						REFUSAL @ 1'						
	4						2 OFFSETS						
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
							SAMPLED 13SB140001						
							@ 1210						
							SAMPLED						
							@						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

APPENDIX B.1.2
SWMU 13
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 2

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA SONIC

BORING No.: 13MWT27
DATE: 11-5-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							YEL BRN SILT + CLAY TR SAND		TOP SOIL				
							SILT + f g SAND	SC/SM					
							VARIEGATED		DECOMPOSED				
							YEL BRN ORG GREY		BD ROCK				0
S-1	5						LAM.						
							↓		GRADES TO A				
						YEL BRN	f-g SAND + SILT	SC	LESS DEC.				
						ORG BRN	- MOTTLED		↓ BD RK				0
						GREY	- LAM.	↓	STRONGLY WEATHERED				
	10		10/10	TOP OF BD RK		YEL ORG	SANDSTONE	BR					
					MED HARD		IRREGULAR LAM.						
							ABUNDANT FESTAIN						
							SOME VUGS			10			0
							PLANT FOSSILS						
S-2	15	90%											
								↓					
					SOFT		COAL.	V.BR	BRITTLE				
					SOFT		V. LIGHT GREY CLAY		UNCONSOLIDATED	12			0
					↓		↓ GRADING TO A	↓					
	20		10/10		MED HARD		V. LIGHT GREY SAND STONE, VUGS	BR	PLANT FOSSILS				
					↓		↓	↓					
				TD@21'			SAND: 7-21						
							SCREEN 10-20						
							BENTONITE: 2-7						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: DRILLED TO 21 TO INSTALL SCREEN 10-20'

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT27

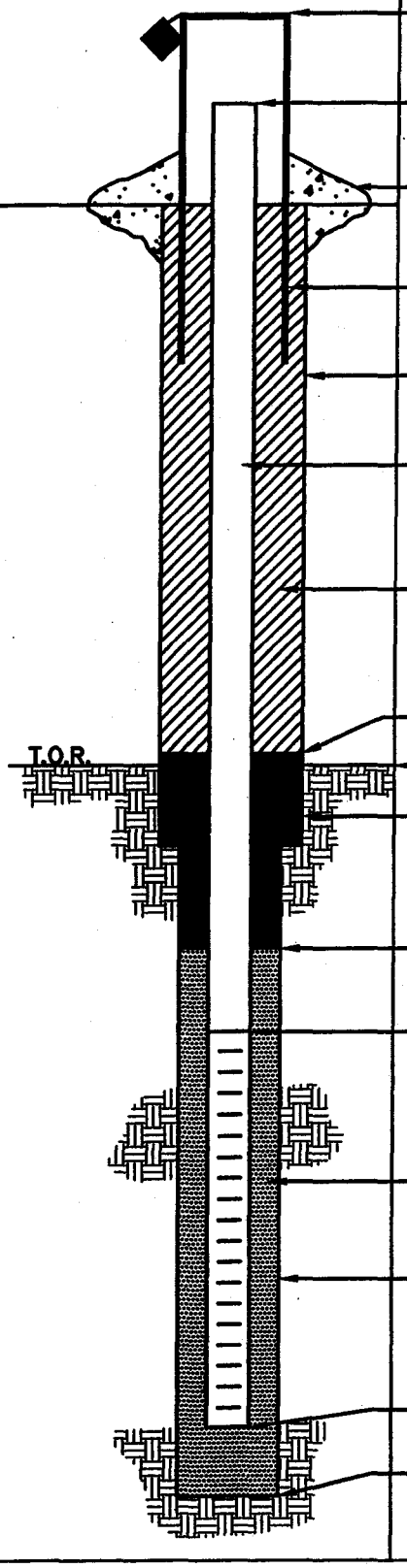
WELL NO.: 13MWT27

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON K
PROJECT NO. 9060	BORING 13MWT27	DRILLING METHOD ROTO SONIC
DATE BEGUN 11-5-03	DATE COMPLETED 11-5-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/ SURGE/PUMP
GROUND ELEVATION 696.09	DATUM NAVD 88	

ACAD: FORM_MWINBR.dwg 07/20/99 INL



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 698.18/~3.0

ELEVATION/HEIGHT TOP OF RISER: 698.18/~2.5

TYPE OF SURFACE SEAL: 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH 40 PVC

TYPE OF BACKFILL: BENTONITE CHIPS
CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SEAL: 692.09 / 4'

ELEVATION/DEPTH TOP OF BEDROCK: 687.09 / 9'

TYPE OF SEAL: BENTONITE CHIPS
CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SAND: 689.09 / 7'

ELEVATION/DEPTH TOP OF SCREEN: 686.09 / 10'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30
SEP/ 18B

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 676.09 / 20'
ELEVATION/DEPTH BOTTOM OF SAND: 675.09 / 21'
ELEVATION/DEPTH BOTTOM OF HOLE: 675.09 / 21'
BACKFILL MATERIAL BELOW SAND: SAND

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: ROTO-SONIC

BORING No.: 13MWT28
DATE: 11-3-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	16							SM/SC	DRILLED TO				
	17								0-17.5 W/ SPL				
	18							↓	CUTTINGS YEL BRN SILT				
	19			TOP OF BDRK	SOFT	DK	YEL BRN MUDSTONE W/ ROCK FRAG.	VBR	+ FOUND CLAY ~10'				
	20						MOTTLED GREY		MOTTLED GREY 10-20 WEATHERED				0
					SOFT	BLK	COAL, BRITTLE	VBR	BD RK COAL ~18'	10			
S-1		9/0			MED SOFT		MED GREY SANDSTONE,	BR					
							↓						
					MED		MED GREY SANDSTONE	VBR					
	25				SOFT								
			7/10				V. THIN BEDDED			8			0
					MED		↓						
					HARD		MED TO LIGHT GREY SANDSTONE	BR					
	30						IRREGULAR LAM.						
							OCC VUGS ~ 1/4"						
S-2		5/0					HOR. FRAC.			9			
													0
	35												
			4.5/10							12			0
	40												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.8

Remarks: CASING TO 38.5, 6" ID INSTALLED W/ 11" OD

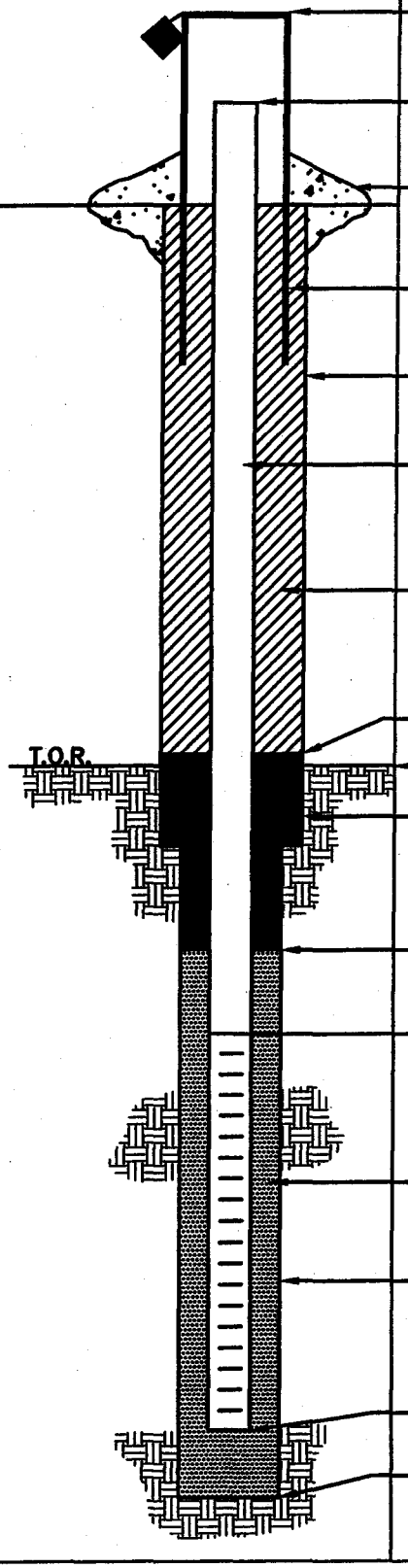
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT28

WELL NO.: 13MWT28

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: NSWC CRANE	LOCATION: SWMU 13	DRILLER: JON KEIFER
PROJECT NO.: 9060	BORING: 13MWT28	DRILLING METHOD: ROTO-SONIC
DATE BEGUN: 11/19/03	DATE COMPLETED: 11/19/03	
FIELD GEOLOGIST: SCOTT GRIER		DEVELOPMENT METHOD: BAILER/SURGE/PUMP
GROUND ELEVATION: 703.54	DATUM: NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 705.53 / 2.0

ELEVATION/HEIGHT TOP OF RISER: 705.55 / 2.0

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4"x4" STEEL

DIAMETER OF HOLE: 11" down to 38.5

ISOLATION CASING 6" DIA. DEPTH: 38.5

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: 2" PVC

TYPE OF BACKFILL: BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 700.54 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 685.04 / 18.5

TYPE OF SEAL: BENTONITE PURE GOLD CHIPS GEL CET00

ELEVATION/DEPTH TOP OF SAND: 628.54 / 75

ELEVATION/DEPTH TOP OF SCREEN: 625.54 / 78

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 20 x 10'

I.D. SCREEN: 2" - 20 slot

TYPE OF SAND PACK: QTZ MED SAND

DIAMETER OF HOLE IN BEDROCK: _____

CORE/REAM: 4" / 5"

ELEVATION/DEPTH BOTTOM SCREEN: 615.54 / 88

ELEVATION/DEPTH BOTTOM OF SAND: 615.54 / 88

ELEVATION/DEPTH BOTTOM OF HOLE: 615.54 / 88

BACKFILL MATERIAL BELOW SAND: N/A

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER
DRILLING RIG: VERSA-SONIC

BORING No.: 13 MWT 28
DATE: 11/19/03
GEOLOGIST: S. GRIER
DRILLER: J. KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	38				~~HARD~~ MED	GREY DARK	SILTY SANDSTONE		GREY W/ BLACK LAMS	0.0			0.8
							GREY SANDSTONE W/ BLACK LAMS OF SILT						
					VERY HARD	GREY	SANDSTONE ~~SOFT~~ W/ BLK LAMS						
					HARD	GREY-BLACK	SILTY SANDSTONE GREY S.S. W/ BLACK LAMS OF SILT INCREASING SILT						
C1													
	48	1 10/0	9/10							10.0			0.8
C2													
	58	5%	10/10							11.0			0.8
					MED SOFT ~~HARD~~	BLACK	BLACK SHALE THINLY LAMINATED		FISSILE THIN LAMS				
					HARD	GREY	SILTY SANDSTONE						
					MED. SOFT	BLACK	SHALE INCREASING SILT		FISSILE THIN LAMS				

* When rock coring, enter rock brokeness. 100

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.9

Remarks: 0930 cleaned out hole - H_2O level = 77.0'
1100 H_2O level = 76.45

Converted to Well: Yes ✓ No _____ Well I.D. #: 13 MWT 28

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13 MWT 28
DATE: 11/19/03
GEOLOGIST: SCOTT GRIER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	63	63			MED HARD	BLACK	~~STIFF SAND~~ SHALE BLACK, BRITTLE	BR	FISSILE - THIN LAMS				
							SILTY SANDSTONE	SM					
C3							DECREASING SILT						
	68	3%	9/10							80			0.0
					VERY HARD	GREY	GREY SANDSTONE						
					MED SOFT ~~BRITTLE~~	BLACK	SHALE THIN LAMINATIONS						
C4													
	78	3%	8.5/10							65			0.0
					VERY HARD	GREY BROWN BLACK	SANDSTONE (VARVED)						
					MED SOFT HARD	BLACK	SHALE THIN LAMS		FISSILE - THIN LAMS				
									Screen set @ 98' → 78'				
C5													
	88	5%	75/10		VERY HARD	GREY BROWN	SANDSTONE (VARVED)			02			0.0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: 1130 hole is blown out + H2O level = 86'
1230 H2O level = 85.5'

Converted to Well: Yes ✓ No _____ Well I.D. #: 13 MWT 28

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT29
DATE: 11-4-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						BRN	SILT	SM		-	-	0	0
	4												
S1		4/5	2.0/		M. DENSE	BRN	CLAYEY SILT	SM	DAMP	0	0	0	0
	6	6/4	2.0			GR BRN			FILL TO 9'?				
				9.0 XXX									
	9												
S2		6/6/3	1.4/		SOFT	RD BRN	SHALE, WEATHERED		HARD DRILLING	0	0	0	0
	11		2.0										
									HSA REFUSAL @ 13.5'				
									H_2O IN CHIPS FROM HOLE				
									H_2O ZONE @ 18' PER DRILLER				
							TD 20'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: HSA 4 1/4" I.D. 8 1/2" O.D. TO 13.5', 4" ROLLER BIT W/ AIR @ 13.5' THRU HSA. 4" ROLLER BIT

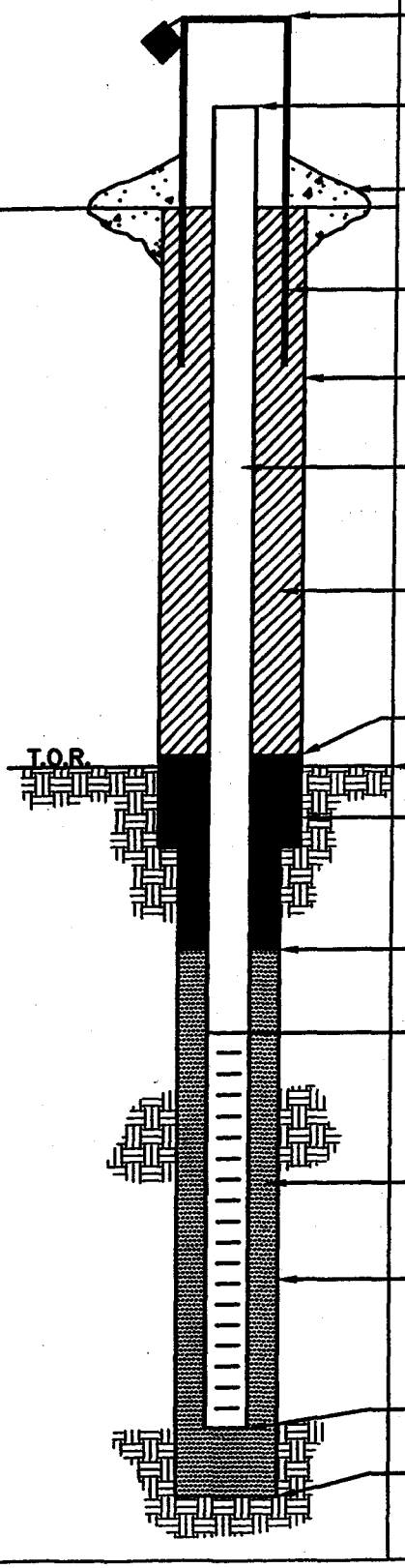
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT29

WELL NO.: 13MWT29

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: CRANE	LOCATION: CRANE, IN.	DRILLER: J. WALSH	
PROJECT NO.: 4060	BORING: 13 MW T29	DRILLING METHOD: HSA / A. R.	
DATE BEGUN: 11-4-03	DATE COMPLETED: 11-4-03		
FIELD GEOLOGIST: M. G. COCHRAN		DEVELOPMENT METHOD: BAILER/SURGE/PUMP	
GROUND ELEVATION: 698.10	DATUM: NAVD 88		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 700.50 / 2.4

ELEVATION/HEIGHT TOP OF RISER: 700.44 / 2.34

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 8½ → 13', 4" → TD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC

TYPE OF BACKFILL: BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 695.1 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 689.1 9'

TYPE OF SEAL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 691.1 / 7

ELEVATION/DEPTH TOP OF SCREEN: 689.1 / 9

TYPE OF SCREEN: PVC SCH 40

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 679.1 / 19

ELEVATION/DEPTH BOTTOM OF SAND: 678.1 / 20

ELEVATION/DEPTH BOTTOM OF HOLE: 678.1 / 20

BACKFILL MATERIAL BELOW SAND:

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT30
DATE: 11-6-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						DK BRN	CLAYEY SILT			-	-	0	0
						LT GRN	CLAYEY SILT						
									HARD DRILLING @ 15'				
				15		LT BRN							
						BL	COAL						
						LT GRY							
							TD 25.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): -

Remarks: 4 1/4 ID / 8 1/2 OD HSA TO 15', 4" A.R.W ROLLER BIT THEREAFTER. LOGGED DRILL CUTTINGS

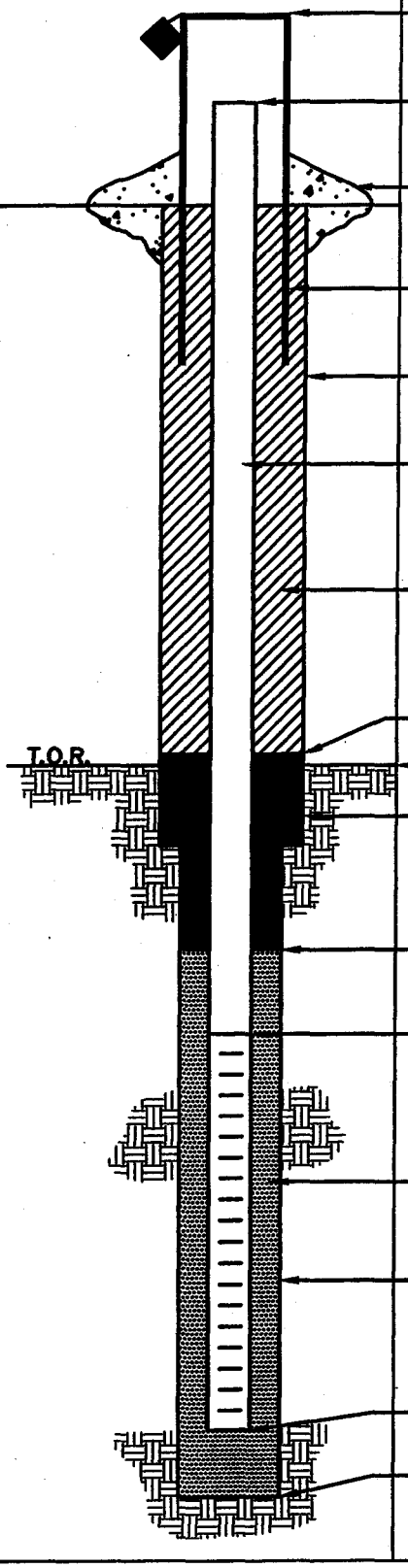
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT30

WELL NO.: 13MWT30

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE	LOCATION CRANE, IN	DRILLER BONSER-MORNER	
PROJECT NO. 9060	BORING 13MWT30	DRILLING METHOD HSA / AR	
DATE BEGUN 11-6-03	DATE COMPLETED 11-6-03		
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD BAILER/PUMP/SURGE	
GROUND ELEVATION 696.57	DATUM NAVD 88		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 698.97 / 2.5

ELEVATION/HEIGHT TOP OF RISER: 698.94 / 2.5

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4"

DIAMETER OF HOLE: 8 1/2" TO 15', 4" TO TD

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SEAL: 693.57 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 681.57 / 15

TYPE OF SEAL: CETCO PURE GOLD MEDIUM CHIPS

ELEVATION/DEPTH TOP OF SAND: 684.57 / 12

ELEVATION/DEPTH TOP OF SCREEN: 682.57 / 14
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: BEST MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 672.57 / 24
ELEVATION/DEPTH BOTTOM OF SAND: 671.57 / 25
ELEVATION/DEPTH BOTTOM OF HOLE: 671.57 / 25
BACKFILL MATERIAL BELOW SAND: N/A

ACAD: FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT31
DATE: 11-5-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						LT BRN	CLAYEY SILT	SM	LOOKS NATL. DAMP			0	0
				10.0					HARD DRILL @ 10'				
	12.5												
		36	.4/.8		SOFT	GREY	SHALE,		LAMINATED, DAMP	0	0	0	0
	14.5	50/3"											
							TD 20.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 4¼ ID / 8½ OD HSA TO 14.5', 4" ROTARY BIT W AIR TO TD. STANDBY FOR ½ HR AT 20' TO WAIT FOR H2O. 2" H2O IN HOLE

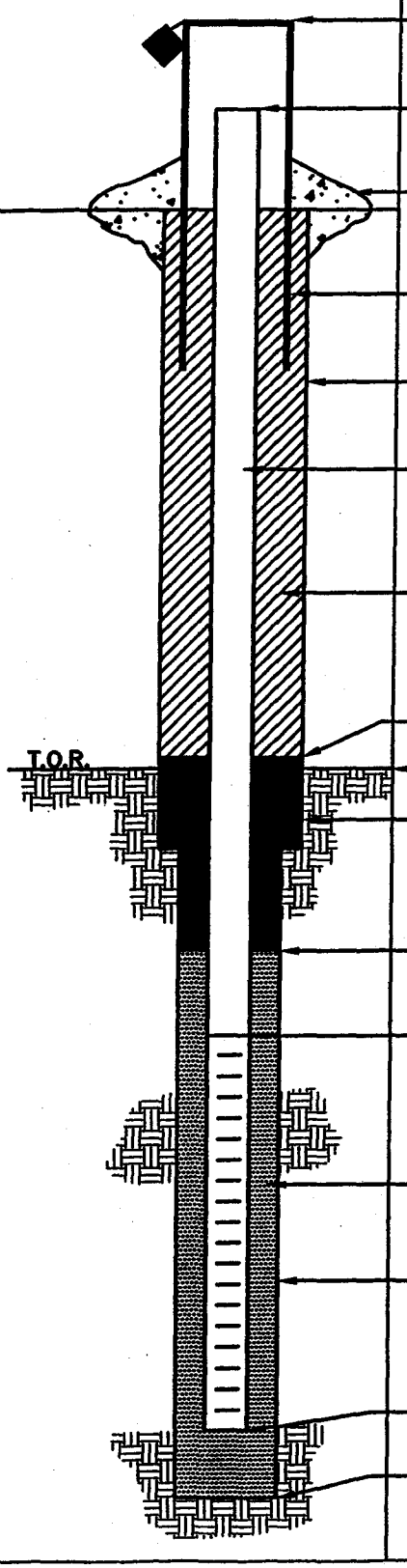
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT31

WELL NO.: 13MWT31

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE	LOCATION CRANE IN	DRILLER BOWSER-MORNER
PROJECT NO. 9060	BORING 13MWT31	DRILLING METHOD HSA / AR
DATE BEGUN 11-5-03	DATE COMPLETED 11-5-03	
FIELD GEOLOGIST M. G. COCHRAN		DEVELOPMENT METHOD BAILER/PUMP/SURGE
GROUND ELEVATION 693.56	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 696.15/2.59

ELEVATION/HEIGHT TOP OF RISER: 696.21/2.65

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 8 1/2" TO 14.5', 4" TO TD

RISER PIPE I.D.: 2" ID

TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 690.56/3'

ELEVATION/DEPTH TOP OF BEDROCK: 683.56/10'

TYPE OF SEAL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 685.56/8'

ELEVATION/DEPTH TOP OF SCREEN: 683.56/10

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 673.56/20

ELEVATION/DEPTH BOTTOM OF SAND: 673.56/20

ELEVATION/DEPTH BOTTOM OF HOLE: 673.56/20

BACKFILL MATERIAL BELOW SAND: N/A

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT32
DATE: 10-28-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON K

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						MOD	YEL BRN SILT + SAND GRADING TO	SC/SM					
S-1 1521						LT YEL BRN	WEATHERED SAND STONE @ 2.5						
				TOP OF BD RK									
							STRONGLY WEATHERED						
	5						SAND STONE			2			0
							SANDSTONE		NO RECOVERY @ 5-10				
							WEATHERED		WEATHERED				
									BDRK ? YEL BRN				
									@ CUTTINGS	5			
	10												0
					MED HARD	YEL	BRN SANDSTONE	BR					
							MED BEDDING		IRON STAINING				
									LAMINATIONS	10			0
S-2	15	18%			SOFT		SAND + SILT	V BF	STRONGLY WEATHERED				
					MED HARD	YEL	BRN SANDSTONE	BR	V. BR				
							LOW ∠ FRAC						
							Fe STAINED LAM.		H_2O = 26'4" @				
									1652 (BTC)	12			0
	20		8/10										
							LESS Fe STAINING		WL = 9' BGS 10-29-03				
S-3					MED SOFT	LT	GREY SILTSANDSTONE	V BF	-SCREEN 8-18				
		20%			SOFT	DK	GREY SILTSTONE GRADING TO MUDSTONE		-SAND 5-20	7			0
									-BENT CHIP 20-25				
			5/5			BLK	SHALEY		-SEAL 2-5				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: STARTED USING AIR ONLY, HIT BDRK @ 2.5' WILL CONVERT TO H_2O, SHALLOW WELL
TD = 25'

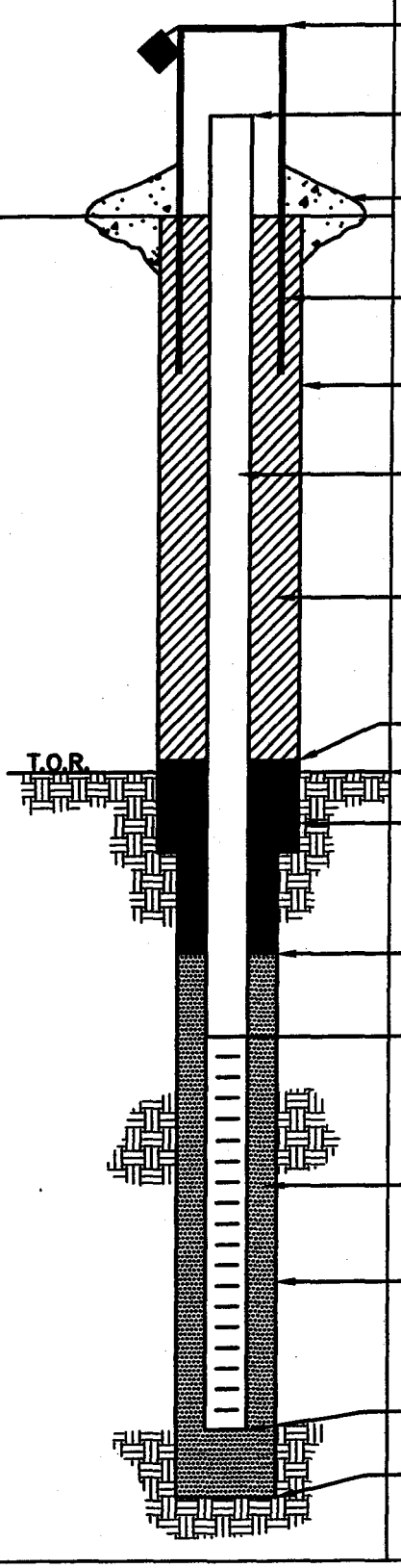
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT32

WELL NO.: 13TMWT32

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT32	DRILLING METHOD ROTO-SONIC
DATE BEGUN 10-28-03	DATE COMPLETED 10-29-03	DEVELOPMENT METHOD BAILER/PUMP/SURGE
FIELD GEOLOGIST FRED W. RAMSER		
GROUND ELEVATION 693.62	DATUM NAVD	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 696.06 / 2.44

ELEVATION/HEIGHT TOP OF RISER: 696.04 / 2.42

TYPE OF SURFACE SEAL: CONCRETE 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4"

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH 40 PVC 2"Ø

TYPE OF BACKFILL: BENTONITE CHIPS CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SEAL: 691.62 / 2'

ELEVATION/DEPTH TOP OF BEDROCK: 691.12 / 2.5'

TYPE OF SEAL: BENTONITE CHIPS CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SAND: 688.62 / 5'

ELEVATION/DEPTH TOP OF SCREEN: 685.62 / 8'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM: CORE BIT (4.25 IN DIA)

ELEVATION/DEPTH BOTTOM SCREEN: 675.62 / 18'
ELEVATION/DEPTH BOTTOM OF SAND: 673.62 / 20'
ELEVATION/DEPTH BOTTOM OF HOLE: 668.62 / 25'
BACKFILL MATERIAL BELOW SAND: BENTONITE CHIPS

ACAD:FORM_MWNBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT33
DATE: 11-6-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample: BZ	Borehole**	Driller BZ**
	0												
S1		2/4	1.5/		LOOSE	DK BRN	CLAYEY SILT	SM	DAMP, LOOKS NAT	0	0	0	0
	2	6/7	2.0				TR SAND @ BTM						
S2		7/9	1.5/		M DENSE	LT BRN	SANDY SILT	SM	DAMP. LOOKS NAT.	0	0	0	0
	4	9/12	2.0										
S3		6/7	1.1/		M DENSE	LT BRN	SILT, TR CLAY	SM	DAMP,	0	0	0	0
	6	8/13	2.0										
S4		10/12	1.7/		M DENSE	LT BRN	SILT, MICACEOUS	SM		0	0	0	0
	8	18/26	2.0										
S5		28/46	1.3/		V DENSE	LT BRN	SILTY SAND /	SM	FE STAINED LAMINATED AT	0	0	0	0
	10	38/100/5"	2.0	10.0 XXX			SAPROLITE		BTM,				
C1			3.9/										
B1/		39/6	10.0		SOFT	DK GREY	SHALE,		DAMP, SLIGHT FE STAINING IN 1 VERT FRAC AT BTM.	0	0	0	0
10.0									BLOCKY				
					1		TD 20'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: HSA TO 10' 4¼ ID, 8½ OD. 4' A.R. CORE FROM 10' TO TD. 2" H2O IN HOLE AT BTM OF RUN

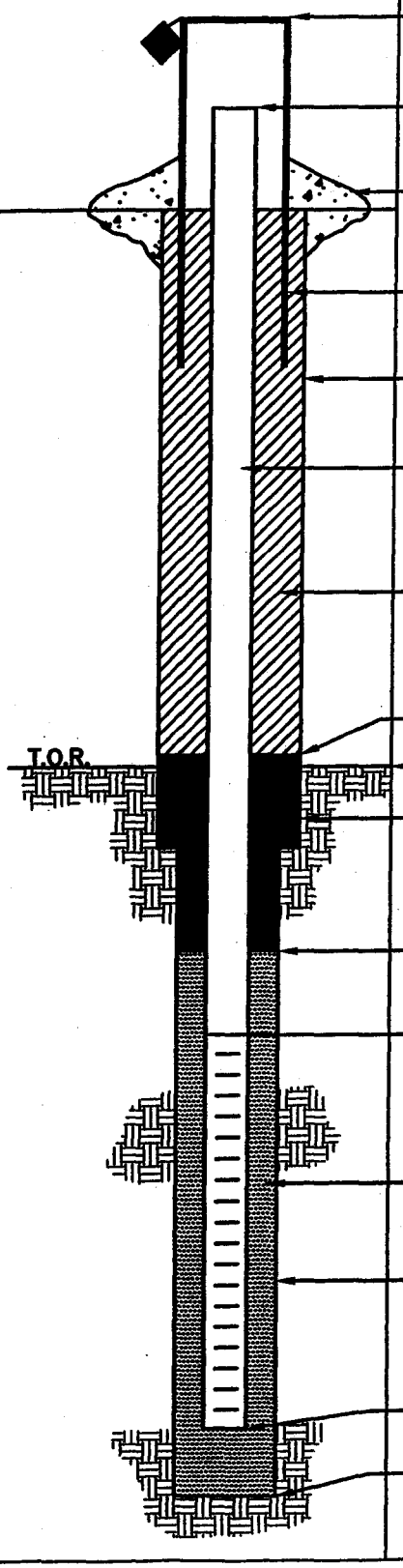
Converted to Well: Yes V No _____ Well I.D. #: _____

WELL NO.: 13MWT33

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE	LOCATION CRANE IN	DRILLER BOWSER-MORNER	
PROJECT NO. 9060	BORING 13MWT33	DRILLING METHOD HSA / AR	
DATE BEGUN 11-6-03	DATE COMPLETED 11-6-03		
FIELD GEOLOGIST M. G. COCHRAN		DEVELOPMENT METHOD BAILER/PUMP/SURGE	
GROUND ELEVATION 700.14	DATUM NAVD		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 702.05/2.0

ELEVATION/HEIGHT TOP OF RISER: 701.97/1.9

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8 1/2 TO 10'; 4" TO TD

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM PELLETS

ELEVATION/DEPTH TOP OF SEAL: 697.14/3

ELEVATION/DEPTH TOP OF BEDROCK: 690.14/10

TYPE OF SEAL: CETCO PURE GOLD MEDIUM PELLETS

ELEVATION/DEPTH TOP OF SAND: 692.14/8

ELEVATION/DEPTH TOP OF SCREEN: 690.14/10
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: 020 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: BEST MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 680.14/20
ELEVATION/DEPTH BOTTOM OF SAND: 680.14/20
ELEVATION/DEPTH BOTTOM OF HOLE: 680.14/20
BACKFILL MATERIAL BELOW SAND:

ACAD:FORM_MWINBR.dwg 07/29/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT34
DATE: 11-11-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						BRN/BL	SILT		FILL, BORING LOCATED IN	-	-	.6	0
									REMEDIATION AREA				
									FILL - 4'				
	4												
S1		10/10	.9/			RD BRN	SILTY SAND	SM	LOOKS NTL	.6	0	.6	0
	6	47/50	2.0	6.0					WEATHERED SS @ BTM				
	8												
S2		18/50/3	.4/			LT GREY	SHALY SILTSTONE		DAMP WEATHERED.	.6	.6	6	.6
	10		.7										
									WT H2O @ 12.5'				
							TD 20.5'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.6

Remarks: 8 1/2 OD 4 1/4 ID HSA TO 10', 4" ROLLER BIT TO TD.

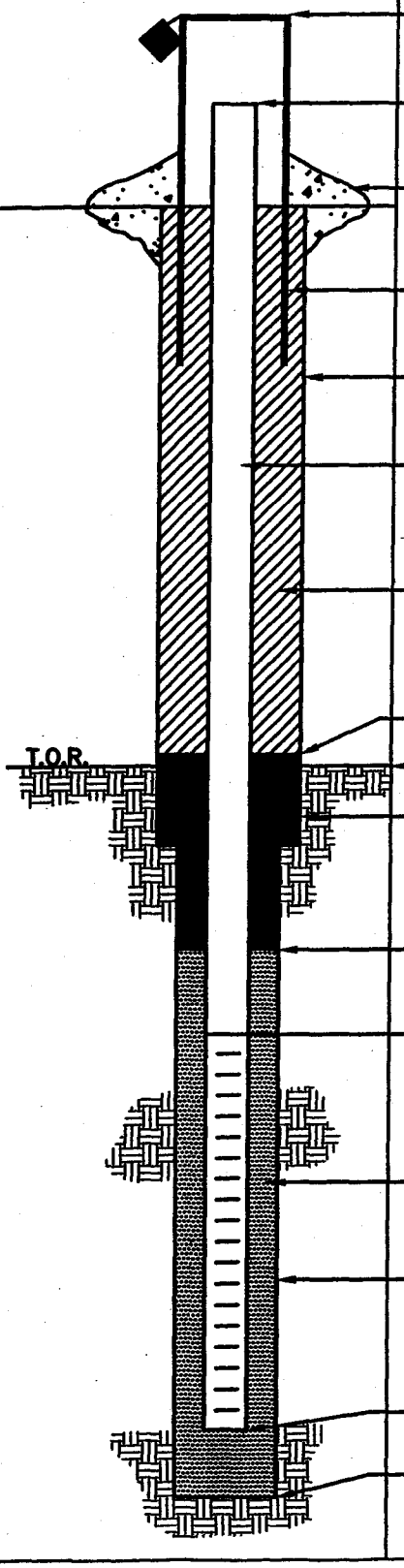
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT34

WELL NO.: 13MWT34

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NWSC CRANE	LOCATION CRANE IN.	DRILLER ROWSER MORNER	
PROJECT NO. 9060	BORING 13MWT34	DRILLING METHOD HSA/AR	
DATE BEGUN 11-11-03	DATE COMPLETED 11-11-03		
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD BAILER/SURGE/PUMP	
GROUND ELEVATION 693.35	DATUM NAVD		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 695.83/2.5

ELEVATION/HEIGHT TOP OF RISER: 695.93/2.5

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8 1/2 TO 10', 4" TO TD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH 40 PULE

TYPE OF BACKFILL: CETCO PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 690.35/3

ELEVATION/DEPTH TOP OF BEDROCK: 687.35/6

TYPE OF SEAL: CETCO PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 685.35/8

ELEVATION/DEPTH TOP OF SCREEN: 683.35/10

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 673.35/20

ELEVATION/DEPTH BOTTOM OF SAND: 672.85/20.5

ELEVATION/DEPTH BOTTOM OF HOLE: 672.85/20.5

BACKFILL MATERIAL BELOW SAND: N/A

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT35
DATE: 10-28-03
GEOLOGIST: FRED WRAMSER
DRILLER: JON K.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
									YEL-BRN				
									MOTTLED GREY 0-10'				
									10-20 YEL BRN CHANGING TO				
	19								MED BRN GREY TO 20'	2			
	20				MED	GREY	SAND STONE	BR	TRACE AMOUNT				0
					HARD		MED BEDDED		CHARCOAL/PLANT FOSSILS				
					SOFT	DK	IRREGULAR LAMINATION						
						GREY	SILT + CLAY W/ ROCK FRAG.		FRAGS = SHALE SILTSTONE				
		15%			MED SOFT		SILTSTONE ALT LAMINATION BLK	V.BR	BLK = CHARCOAL GREY = SILTSTONE	5			0
S-1	25				HARD	GREY	+ GREY SANDSTONE		TRACE				
1048							MED BEDDED		CHARCOAL/ PLANT FOSSIL				
							W/IRREGULAR LAM.						
							SILT STONE ALT		CHARCOAL	6			0
			8 10'				LAMINATION BLK+GREY	V.BR	+ SILTSTONE				
	30				MED SOFT	DK	ALT V. THIN BEDS	V.BR	W/PLANT FOSSILS				
						GREY	OF SILT + SAND STONE		AND CHARCOAL				
							- CHARCOAL LAYER @ 31-32'		BRITTLE				
										3			0
S-2		10%			SOFT	BLK	TO DK GREY MUDSTONE	BR	ISOLATION				
1100	35						MED F. BEDDING		CASING INSTALLED				
							W/LAM.		TO 39' BGS				
							- V. WEATHERED			21			0
	39												
	40												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: STARTED W/ ADVANCE 8" DRILL PIPE 0-10' BEGIN TO USE H_2O @ 10' DEEP WELL

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT35

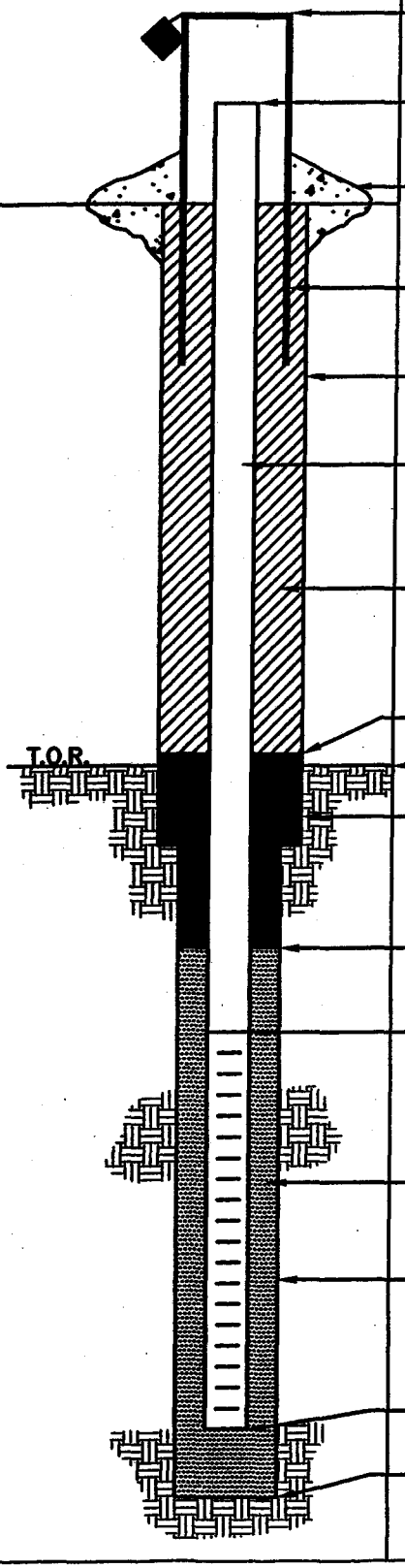
WELL NO.: 13MWT35

Tetra Tech NUS, Inc.

BEDROCK

MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: NSWC CRANE	LOCATION: CRANE, IN	DRILLER: BOWSER MORNER	
PROJECT NO.: 9060	BORING: 13MWT35	DRILLING METHOD: SONIC / A.R.	
DATE BEGUN: 10-28-03	DATE COMPLETED: 11-19-03	DEVELOPMENT METHOD: PUMP/BAILER SURGE	
FIELD GEOLOGIST: M.G. COCHRAN			
GROUND ELEVATION: 679.51	DATUM: NAVD 88		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 681.73/2.22

ELEVATION/HEIGHT TOP OF RISER: 681.73/2.22

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8 1/2 IN

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH 40

TYPE OF BACKFILL: CETCO VOLCLAY COARSE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 676.51/3

ELEVATION/DEPTH TOP OF BEDROCK: 672.51/7

TYPE OF SEAL: CETCO VOLCLAY COARSE CHIPS

ELEVATION/DEPTH TOP OF SAND: 624.51/55

ELEVATION/DEPTH TOP OF SCREEN: 622.51/57

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: MED QTZ SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 612.51/67

ELEVATION/DEPTH BOTTOM OF SAND: 610.51/69

ELEVATION/DEPTH BOTTOM OF HOLE: 610.51/69

BACKFILL MATERIAL BELOW SAND: NA

ACAD:FORM_MWNBR.dwg 07/28/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT35
DATE: 11-19-03
GEOLOGIST: M.G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	40			41	M HARD	LT GREY	SANDSTONE			0	0	0	0
					SOFT	LT GREY	SHALY SILTSTONE		V. F. LAM; SLIGHT FISSLE, DAMP.				
C1									BROKEN, HOR FRACS.				
9.5/		95%	10.0/										
10.0			10.0						VERT FRACS @ 45' + 46',				
									DRY ALONG FRAC FACES				
					SOFT	LT GREY	SILTSTONE		MORE BLOCKY THAN ABOVE				
	49												
									H_2O IN HOR + VERT FRACS @ 51-53'				
C2													
9.0/		90%	10.0/		SOFT	LT GREY	SILTSTONE		LOCALIZED SHALY ZONES,	0	0	0	0
10.0			10.0						MOSTLY DAMP EXCEPT 51-53'				
									BLOCKY				
	59												
						DK GREY	SHALE		SATURATED, FISSLE, V. BR.				
				62.5									
						LT GREY	SANDSTONE		LOW ∠ FRACS THRU OUT				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT35

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT35
DATE: 11-19-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
C3									SATURATED TO 67'; DRY	0	0	0	0
1.0/		10%	9.5/						67-69'				
10.0			10.0										
▲	69												
							TD 69.0'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 8" IN BTM OF HOLE @ 69' AFTER 1 HR STANDBY

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT35

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT36
DATE: 11-5-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					BRN	SILT + CLAY		BKGD NATURAL	-	-	0	0
									REFER TO LOG OF 13MWT37 FOR LITH. OF AREA				
	5												
						BRN	SHALE ?						
	10												
	15												
	20												
	25						TD 26.0'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 4 1/4" ID 8 1/2" OD HSA TO REFUSAL AT 8'. 4" ROLLER BIT W AIR FROM 8' TO TD. LOGGED HOLE W/ DRILL CUTTINGS

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT36

WELL NO.: 13MWT36

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE	LOCATION CRANE IN	DRILLER J. WALSH
PROJECT NO.	BORING 13MWT36	DRILLING METHOD HSA / A.R
DATE BEGUN 11-5-03	DATE COMPLETED 11-5-03	
FIELD GEOLOGIST M.G.COCHRAN		DEVELOPMENT METHOD BAILER/ SURGE/PUMP
GROUND ELEVATION 664.91	DATUM NAVD 88	

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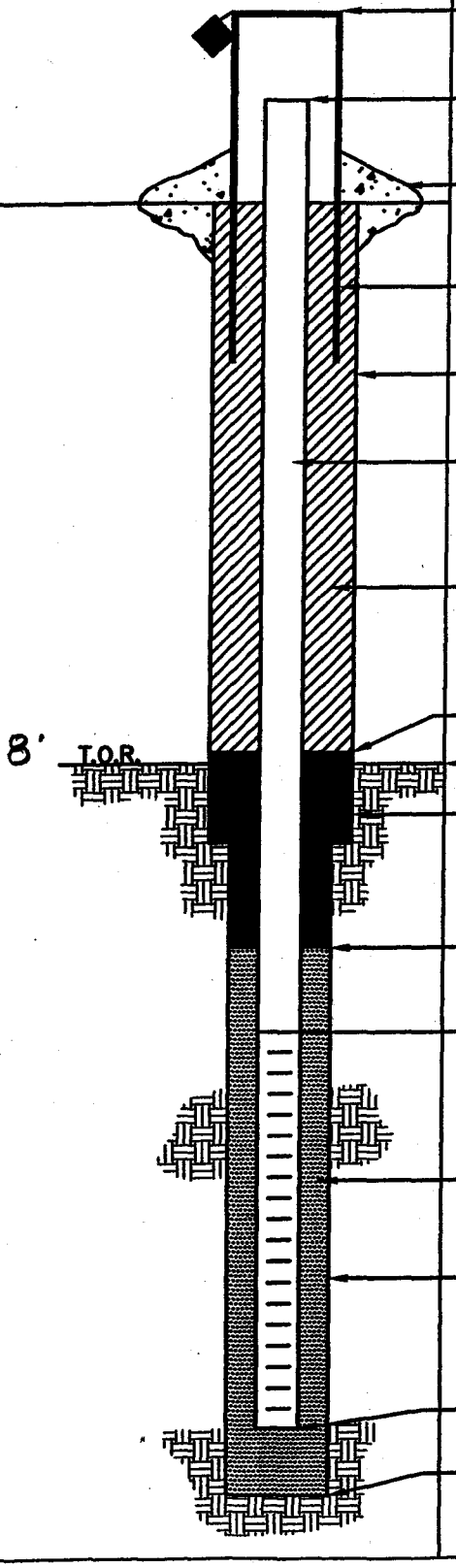

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 667.17 2.26

ELEVATION/HEIGHT TOP OF RISER: 667.21/2.3

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4"x4" SQ STEEL

DIAMETER OF HOLE: 8 1/2" TO 8.4" TOTD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH 40

TYPE OF BACKFILL: BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 661.91/3

ELEVATION/DEPTH TOP OF BEDROCK: 656.91/8

TYPE OF SEAL: CETCO PURE GOLD BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 651.91/13

ELEVATION/DEPTH TOP OF SCREEN: 649.91/15

TYPE OF SCREEN: PVC SCH 40

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 639.91/25

ELEVATION/DEPTH BOTTOM OF SAND: 638.91/26

ELEVATION/DEPTH BOTTOM OF HOLE: 638.91/26

BACKFILL MATERIAL BELOW SAND:

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT37
DATE: 10-24-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON K

Sample No. and Type or RQD *	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
					MED DENSE	MED YEL BRN	SILT + SAND	SM	DRY				
1S									TRACE	0			
0910		N/A				YEL BRN	SILT + SAND	SM	SANDSTONE CLASTS				
									MOTTLING IRON STAINING				
	5		5/5		↓		↓ DEC. BEDROCK	↓	LAYERING DRY	0			
				TOP OF ROCK	SOFT	YEL BRN	SAND + SILT	VBR	WEATHERED BDRK				
							W/ ROCK FRAG'S.			0			
2S 940		N/A											
					MED STIFF	PALE GREY	CLAY		PLASTIC	0			
	10		4.5/5		HARD	VERY LIGHT GREY	SAND STONE 9.8'		STRONGLY WEATHERED FE. STAIN LAYERING				
					MED HARD		SAND STONE	BR					
							HOR + LOW Δ FRACTURES		RARE HIGH Δ FRAC				
							IRON STAINED						
3S 0950	15	25%					CROSS BEDDING + HOR. LAYERING						
							VARIEGATED VERY PALE ORANGE TO DARK YELLOWISH ORANGE		COLOR Δ OCCURS DOWN WARD DARKER/ ABUNDANT STAIN MAY BE INDICATION OF H_2O				
	20		2.0/10						~17'				
					MED HARD		MOD YEL BRN SAND STONE	BR					
S4 1010		0%					HOR + LOW Δ FRAC.						
	25		2.5/5.0										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: H_2O @ 11Ft BGS 10-25-03

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT37

WELL NO.: 13MWT37

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT37	DRILLING METHOD ROTO-SONIC
DATE BEGUN 10-24-03	DATE COMPLETED 10-24-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/PUMP/SURGE
GROUND ELEVATION 659.96	DATUM NAVD 88	

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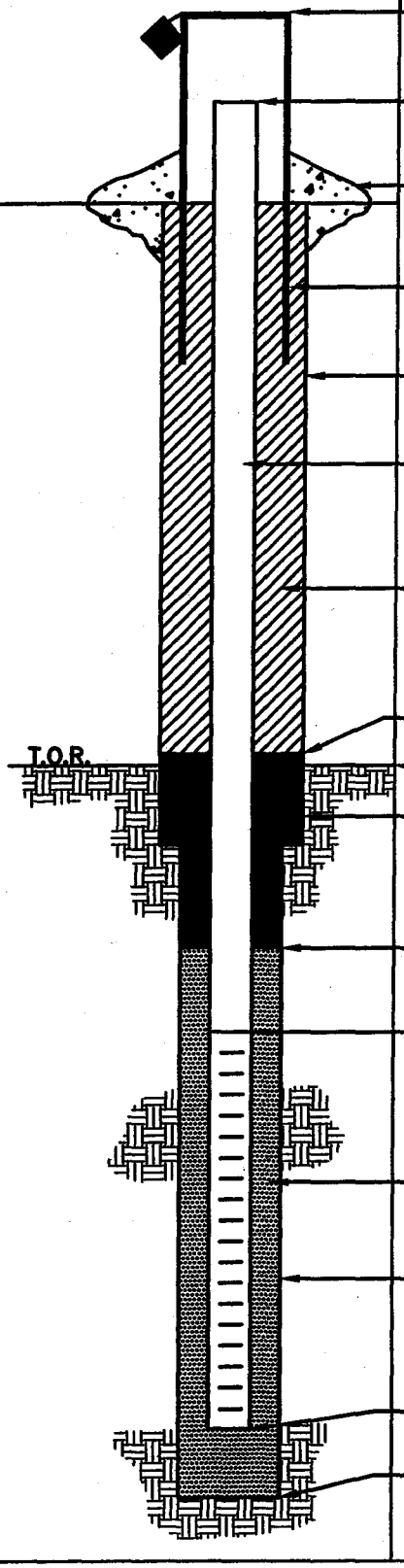

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 662.38/3.0

ELEVATION/HEIGHT TOP OF RISER: 662.29/2.5'

TYPE OF SURFACE SEAL: CONCRETE 4'x4'x6"

I.D. OF SURFACE CASING: 4"x4" SQ

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH 40 PVC 2"Ø

TYPE OF BACKFILL: CEMENT/BENTONITE GROUT

ELEVATION/DEPTH TOP OF SEAL: 651.46/8.5

ELEVATION/DEPTH TOP OF BEDROCK: 650.16 9.8'

TYPE OF SEAL: BENTONITE CHIPS CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SAND: 648.46/11.5

ELEVATION/DEPTH TOP OF SCREEN: 645.46/14.5
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: ~~~4~~ FOR ~5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 635.46/24.5
ELEVATION/DEPTH BOTTOM OF SAND: 634.96/25.0
ELEVATION/DEPTH BOTTOM OF HOLE: 634.96/25.0
BACKFILL MATERIAL BELOW SAND:

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT38
DATE: 10-24-03 / 11-4-03
GEOLOGIST: FRED W. RAMSER
DRILLER: DENNIS SINK

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
					MED HARD	YEL BRN	(PALE) SANDSTONE	V.BR	SEE LOG				
							IRON STAINING + LAYERING		13MWT37				
					MED	DK TO	SILTY SANDSTONE		FOR LITHO.				
					SOFT	MOD GREY	(25'-26' CLAY+SILT PLASTIC)		DESCRIPTION				
S1 1625	25	0%							OF 0'-25'				
					MED	LT	SANDSTONE						
	30		G / 10		HARD	GREY							
					SOFT	DK	MUDSTONE W/	BR	DECOMPOSED				
						GREY	ROCK FRAGS +		ROCK, WET				
							COARSE SAND		-SLIGHTLY				
S-2			*				VERY		COHESIVE				
1640	35	30%					SOFT		STRONGLY WEATHERED				
									-MOIST				
					SOFT	GREYISH BLACK	MUDSTONE /						
							W ROCK FRAGS						
							VERY SOFT						
	40		9 / 10										
					SOFT	GREYISH BLK	MUDSTONE		STARTED 11-4-03				
							V. THIN BEDDED TO	V.BR					
							-THINLY LAMINATED						
							-MOSTLY CLAY						
S-3	45						STONE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: INSTALLED ~6" ISOLATION CASING 10-25-03 1000 HRS TO 39' BGS

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT38

RUN | RECOVERY | RQD

WELL NO.: 13MWT38

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER	
PROJECT NO. 9060	BORING 13MWT38	DRILLING METHOD ROTO-SONIC	
DATE BEGUN 10-24-03	DATE COMPLETED 11-4-03	DEVELOPMENT METHOD BAILER/PUMP/SURGE	
FIELD GEOLOGIST FRED W. RAMSER			
GROUND ELEVATION 659.03	DATUM NAVD 88		

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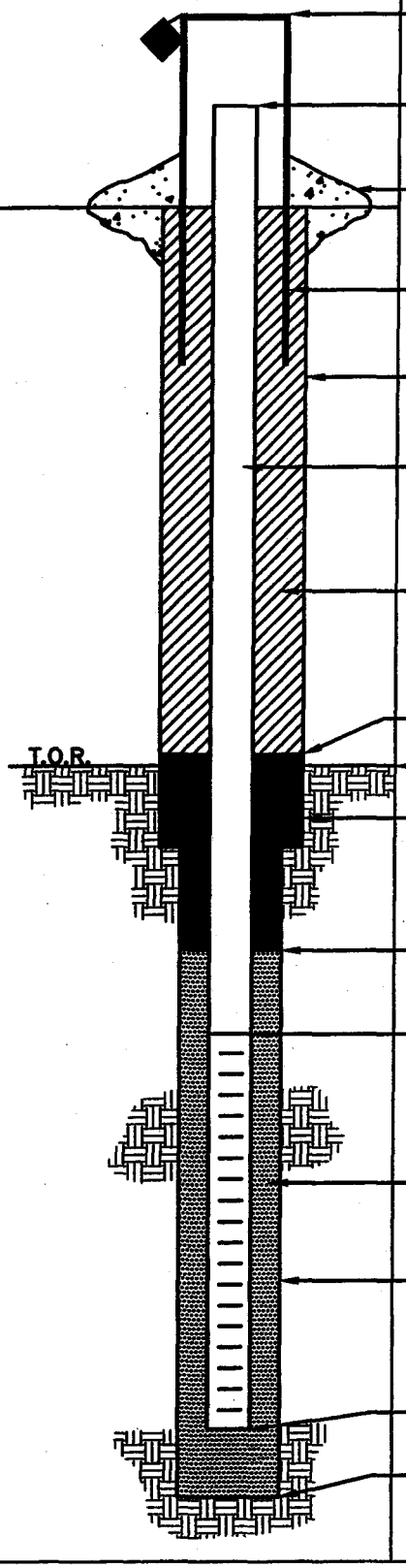

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 661.03 / ~3.0'

ELEVATION/HEIGHT TOP OF RISER: 661.04 / ~2.5'

TYPE OF SURFACE SEAL: 4' x 4' x 6" SQ CONCRETE PAD

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 11" DOWN TO 39'

ISOLATION CASING 6" DIA, DEPTH 39'

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: 2" PVC SCH. 40

TYPE OF BACKFILL: BENTONITE PURE GOLD CHIPS GEL CETCO

CEMENT/BENTONITE OUTSIDE OF ISO. CASING

ELEVATION/DEPTH TOP OF SEAL: 611.03 / 48'

ELEVATION/DEPTH TOP OF BEDROCK: 649.03 / 10'

TYPE OF SEAL: BENTONITE PURE GOLD CHIPS GEL CETCO

ELEVATION/DEPTH TOP OF SAND: 607.03 / 52

ELEVATION/DEPTH TOP OF SCREEN: 604.03 / 55

TYPE OF SCREEN: PVC SCH. 40

SLOT SIZE x LENGTH: .020 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP 18/B

DIAMETER OF HOLE IN BEDROCK: 5" (BELOW ISO. CASING)

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 594.03 / 65

ELEVATION/DEPTH BOTTOM OF SAND: 591.03 / 68

ELEVATION/DEPTH BOTTOM OF HOLE: 579.03 / 80

BACKFILL MATERIAL BELOW SAND: BENTONITE PURE GOLD CHIPS GEL CETCO

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT38
DATE: 11-4-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1		0%			SOFT	DK GREY/BLK	CLAY STONE	V.BR					
							LAM. TO THINLY LAM.			10			0
	50		10/10										
						BLK	CLAYSTONE - LAM. TO THINLY LAM.	V.BR		12			
S-4	55	0%			MED HARD	LT GREY	SANDSTONE - F grain - THIN BEDDED TO THINLY LAM.	BR		13			0
	60		7/10		MED HARD	LT GREY	SANDSTONE - F GRAIN COARSENING DOWN WARD TO M. GRAIN ~63'	BR	OCC VUGS SCREEN 55'-65'	10			
S-5	65	90					- THIN BEDDED TO LAM. - OCC PLANT FOSSIL		52-68 49				0
					MED HARD	DK GREY	SILTSTONE - V.THIN BEDDED TO LAM.	V.BR	68'				
	70		5/10										

When rock coring, enter rock brokeness.
Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT38

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT38
DATE: 11-4-03
GEOLOGIST: FRED W RAMSEY
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
					MED	DK	MUDSTONE	V.BR					
					SOFT	GRY	-THIN BEDDED						
						TO	TO V.THIN LAM.			10			
						BLK	-FINING DOWNWARD						
S/6	75	0%											0
						↓	↓	↓					
	80		10/10		HARD	GRY	SILTSTONE	BR	CALCITE FILLED FUGS OCC FUGS/VOIDS				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT38

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT39
DATE: 11-4-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						YEL	BRN SILT + CLAY W/ SAND							
				TOP OF BDRK									
	5												
S-1 1305		10 90			MED SOFT	YEL	BRN SANDSTONE	V.BR					
							ABUN. Fe STONE LAM.						
							CROSS BEDDING LAM.						0
	10		4/5				OCC. VUG/VOIDS	BR		10			
							MED & FRAC (RARE)						
													0
S-2 1315	15	11 90						V.BR					
					SOFT	DK	GREY SILTSTONE MUDSTONE	V.BR		12			0
	20		6/10				SILTSTONE -ALT. BLK + GREY LAM.		SCREEN 14-24 SAND 11-25 BENTONITE				
S-3 1355		09			SOFT	BLK	COAL BRITTLE						
	25		4/5.0							13			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: 13MWT39

15" 1.1/10

WELL NO.: 13MWT39

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER	
PROJECT NO. 9060	BORING 13MWT39	DRILLING METHOD ROTO SONIC	
DATE BEGUN 11-4-03	DATE COMPLETED 11-4-03		
FIELD GEOLOGIST FRED W RAMSER		DEVELOPMENT METHOD BAILER/PUMP/SURGE	
GROUND ELEVATION 652.42	DATUM NAVD 88		

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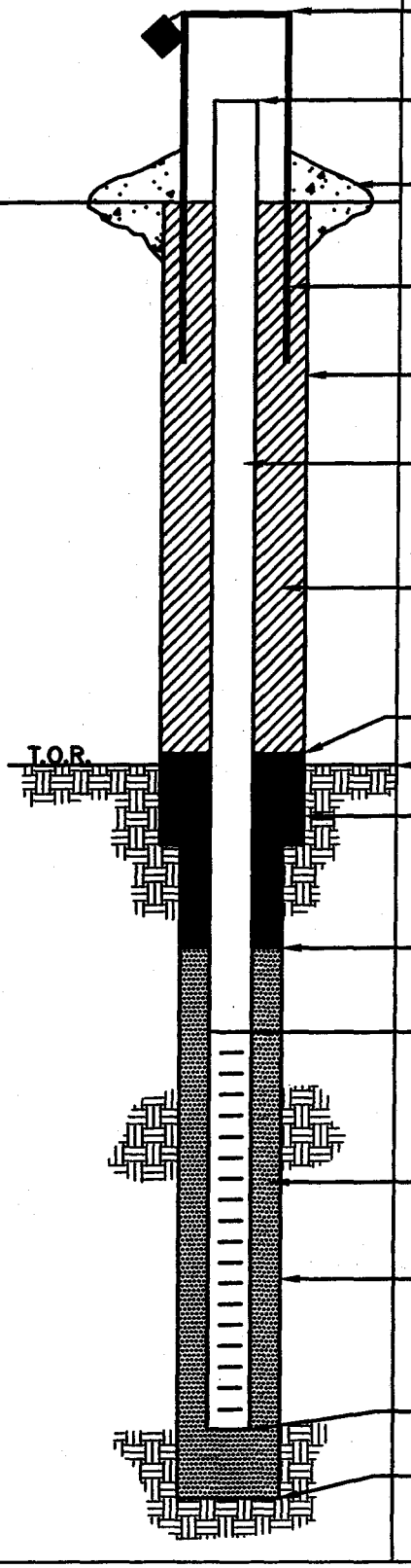


ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 654.39/ ~3'

ELEVATION/HEIGHT TOP OF RISER: 654.44/ ~2.5'

TYPE OF SURFACE SEAL: 4' x 4' x 6" SQ CONCRETE PAD

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCH. 40

TYPE OF BACKFILL: BENTONITE CHIPS PUREGOLD CETCO GEL

ELEVATION/DEPTH TOP OF SEAL: 644.42/ 8

ELEVATION/DEPTH TOP OF BEDROCK: 649.42/ 3'

TYPE OF SEAL: BENTONITE CHIPS PUREGOLD CETCO GEL

ELEVATION/DEPTH TOP OF SAND: 641.42/ 11

ELEVATION/DEPTH TOP OF SCREEN: 638.42/ 14
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.020 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30, SEP 18/B

DIAMETER OF HOLE IN BEDROCK: 5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 628.42/ 24
ELEVATION/DEPTH BOTTOM OF SAND: 627.42/ 25
ELEVATION/DEPTH BOTTOM OF HOLE: 627.42/ 25
BACKFILL MATERIAL BELOW SAND: NONE

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT40
DATE: 10-22-03 / 10-23-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1645			2.0/3.0			MED BRN	SILT + SAND	SM	TOPSOIL				
						YEL BRN	WEATHERED SANDSTONE @ 2.5	SM					
S-2 1650	5	0%	2.0/2.0	BORE"	SOFT		REDDISH BRN						
						LT	YEL BRN WEATHERED SANDSTONE		SOME IRON STAINING	15			
					MED SOFT	VERY LT BRNISH GREY	SANDSTONE	BR	MOTTLED				
		10%					IRON STAINING		CLAY LAYER 6" @ 6.5'				0
S-3 0830													
	10		3.5/5.0		MED SOFT	LT GREY	SILTY SANDSTONE	V.BR	CLAY LAYER @ 9.5-10'	20			
							- MED GREY LAYERING		VERY SOFT				
							- CLAY PARTINGS + SILT						0
					MED SOFT	VERY LT BRNISH GREY		BR	CLAY LAYER				
S-4	15	10%					IRON STAINING		W/GRA.	15			
0836					MED		MOTTLED SAND STONE						
					HARD		ABUNDANT HOR. FRAC, TRACE LOW ∠ FRAC - ON BEDDING PLANE						0
									H_2O @ 25' @ 0855 HRS				
	20		8.5/10						BELOW DRILL	3			
					MED HARD		REDDISH ORANGE SAND STONE	BR	PLATFORM (PLATFORM IS 3.5' AGS				
S-5 0845		0%							@ 0900 23.5'				0
	25		3.5/5						@ 0906 23'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: BEGIN W/ 4" CORE PIPE (DRY), INSTALLED 6" CASING (TEMP) TO 5' BGS

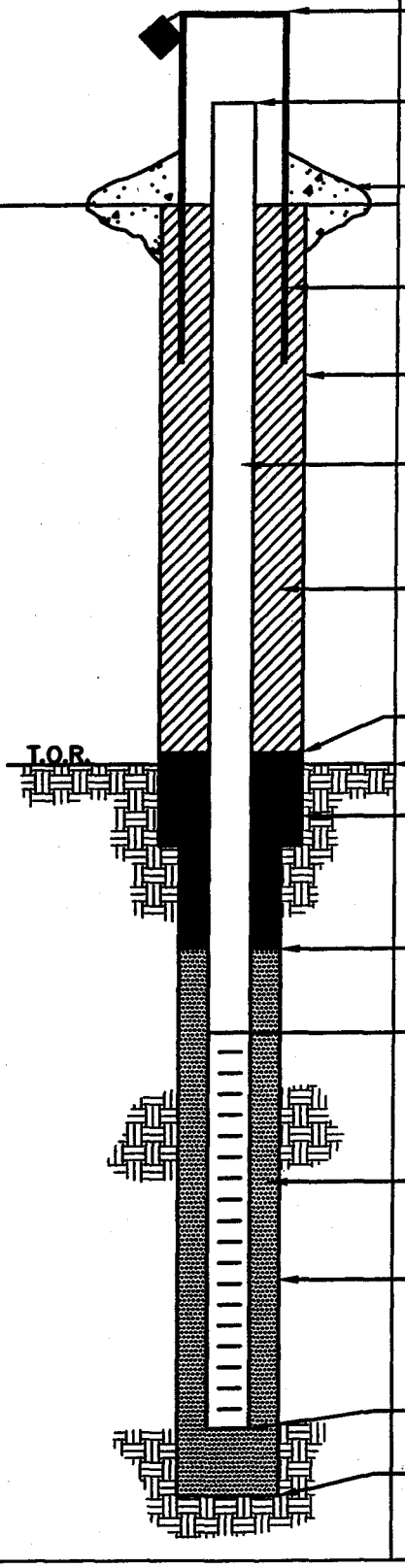
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT40

WELL NO.: 13MWT40

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KELFER
PROJECT NO. 9060	BORING 13MWT40	DRILLING METHOD ROTO-SONIC
DATE BEGUN 10-22-03	DATE COMPLETED 10-23-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/PUMP/SURGE
GROUND ELEVATION 664.93	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 667.27/+3.0

ELEVATION/HEIGHT TOP OF RISER: 667.18/2.5

TYPE OF SURFACE SEAL: 4' x 4' x 6" CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC 2" ø

TYPE OF BACKFILL: CEMENT/BENTONITE GROUT

ELEVATION/DEPTH TOP OF SEAL: 655.93/9'

ELEVATION/DEPTH TOP OF BEDROCK: 659.93/5'

TYPE OF SEAL: BENTONITE CHIPS CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SAND: 652.93/12'

ELEVATION/DEPTH TOP OF SCREEN: 649.93/15'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: ~~~4~~ 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 639.93/25

ELEVATION/DEPTH BOTTOM OF SAND: 639.43/25.5

ELEVATION/DEPTH BOTTOM OF HOLE: 639.43/25.5

BACKFILL MATERIAL BELOW SAND: NONE

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC / CME 550

BORING No.: 13MWT41
DATE: 10-23-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		50/6			MED HARD	YEL BRN	SANDSTONE	BR	SEE LOG	10			
							LOW Δ FRACS IRON STAINING LAYERING		FOR 13MWT40				
S-1 1345									FOR LITHO.	9.8			
		0%			MED SOFT	VERY LITH GREY	SILTY SANDSTONE	V.BR	DESCRIPTION				
	30		4.5/5						0' TO 25'	12.5			
					SOFT		LIGHT GREY SILT + SAND	V.BR	BGS.				
							GRADING TO CLAY + SILT @ ~32'			5			
									COHESIVE,				
						DARK GREY	CLAY + SILT	V.BR	PLASTIC				
S-2 1435	35						DECOMPOSED		W/TR SHALE				
		0%					MUD STONE?		PARTINGS	9.2			
									INSTALLED				
			6.0/10						6" CASING TO				
									38'				
C1		8%	9.0/		SOFT	DK GREY	SHALE,		BROKEN, DAMP,	0	0	0	0
			10.0						DRILL RATE 1'-				
									@ 8 MIN.				
									HOR BED				
									PLANE FRACS				
	50								THRU CORE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: DRILL TO 25' WITH 8" DRILL PIPE, SET UP TO CORE @ 38' W ATV ON 11-4-04, REAMED OUT PLUG IN LOWER 10' OF HOLE PRIOR TO CORING, START CORING @ 40'

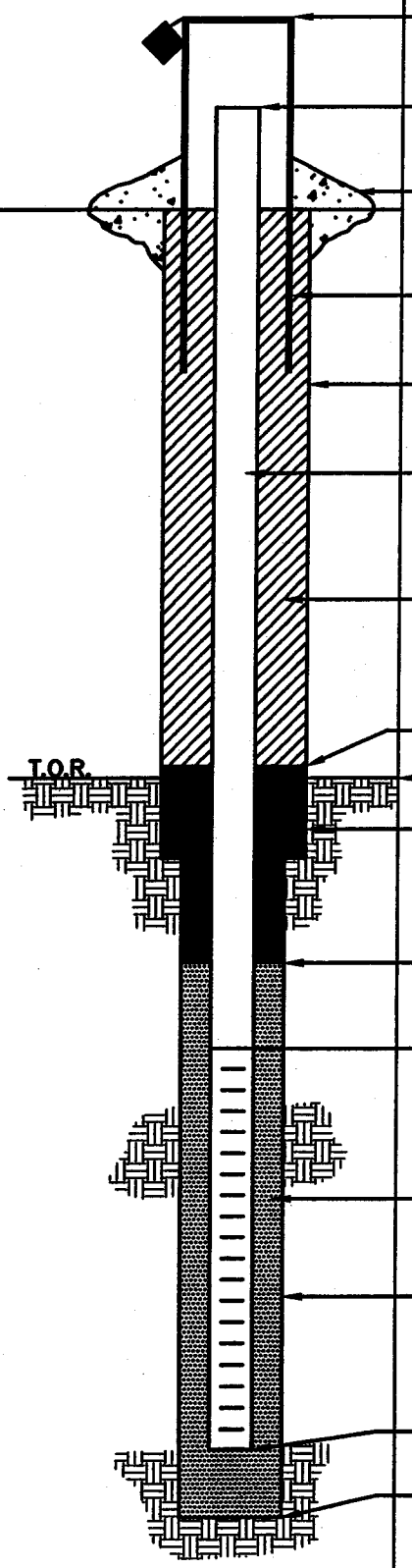
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MW T41

WELL NO.: 13MWT41

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT41	DRILLING METHOD ROTO SONIC
DATE BEGUN 10-23-03	DATE COMPLETED 11-10-03	
FIELD GEOLOGIST FRED W RHMSER		DEVELOPMENT METHOD BAILER / PUMP / SURGE
GROUND ELEVATION 663.65	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 665.81 / 3.0

ELEVATION/HEIGHT TOP OF RISER: 665.67 / 2.5

TYPE OF SURFACE SEAL: CONCRETE 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CHIPS CETCO. 6" ISOLATION CASING INSTALLED USING CEMENT/BENTONITE GROUT TO 39.5'

ELEVATION/DEPTH TOP OF SEAL: 658.65 / 5'

ELEVATION/DEPTH TOP OF BEDROCK: 658.65 / 5'

TYPE OF SEAL: BENTONITE "PURE GOLD" CHIPS CETCO

ELEVATION/DEPTH TOP OF SAND: 611.65 / 52'

ELEVATION/DEPTH TOP OF SCREEN: 608.65 / 55'

TYPE OF SCREEN: PVC SCH. 40

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP / 18 B

DIAMETER OF HOLE IN BEDROCK: 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 598.65 / 65'

ELEVATION/DEPTH BOTTOM OF SAND: 597.65 / 66'

ELEVATION/DEPTH BOTTOM OF HOLE: 597.65 / 66'

BACKFILL MATERIAL BELOW SAND: NONE

ACAD: FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: RONSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13 MWT 41
DATE: 11-4-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	50				SOFT	DK GREY	SHALE		DAMP, THIN LAMINATED, DRILL RATE 5 MIN/FT, BROKEN				
C2		94%	10'/10'	55.1	M. HARD	LT GREY	SANDSTONE		LOW ϕ FRACS @ 1' INTERVALS, MOIST ALONG FRACS & IN PORES, FE STAINED IN FRACS, GREY LAMINATIONS @ LOWϕS IN CORE ~5MM THICK	0	0	0	0
	60				M. HARD	LT. GREY	SANDSTONE	BR					
S-3		39%					PLANT FOSSILS, BLK LAMINATIONS, V. FINE BEDDING, LOϕ FRACS		IRREGULAR BEDDING				
	65				M. SOFT	LT GRY	SILTY SANDSTONE	V. BR					
A	66		2.5/6.0										
							PLACE SCREEN @ 55 TO 65						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: STOPPED @ 60' ON 11-4-03. RESUMED DRILLING ON 11-5-03. LOST BIT @ 60', WILL OVERDRILL W/ ROTASONIC RETRIEVED BIT W/ 4" SOIL BIT USING ROTO SONIC RIG

Converted to Well: Yes ✓ No _____ Well I.D. #: 13 MWT41

WELL NO.: 13MWT42

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER	
PROJECT NO. 9060	BORING 13MWT42	DRILLING METHOD ROTO-SONIC	
DATE BEGUN 10-22-03	DATE COMPLETED 10-22-03		
FIELD GEOLOGIST FRED W RAMSER		DEVELOPMENT METHOD BAILER/PUMP SURGE	
GROUND ELEVATION 668.05	DATUM NAVD 88		

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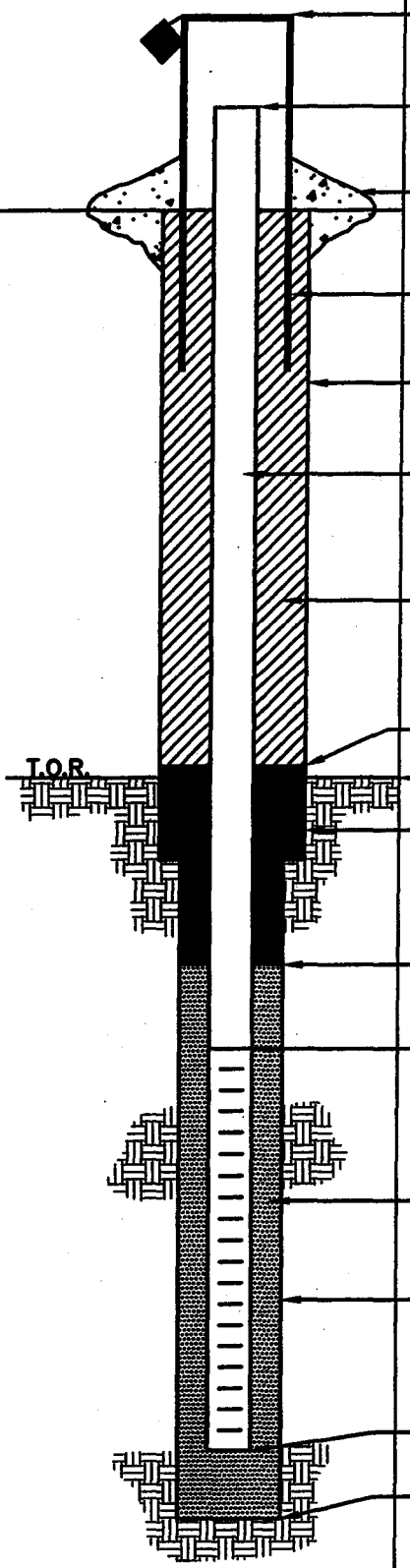


ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 670.35/ 2.3

ELEVATION/HEIGHT TOP OF RISER: 670.31/2.26

TYPE OF SURFACE SEAL: CONCRETE 4'x4'x6"

I.D. OF SURFACE CASING: 4" x 4"

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC 2" Ø

TYPE OF BACKFILL: CEMENT/BENTONITE GROUT

ELEVATION/DEPTH TOP OF SEAL: 662.05/ 6'

ELEVATION/DEPTH TOP OF BEDROCK: 658.05/10'

TYPE OF SEAL: BENTONITE CHIPS CETCO PURE GOLD

ELEVATION/DEPTH TOP OF SAND: 659.05/ 9'

ELEVATION/DEPTH TOP OF SCREEN: 657.05/ 11'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: ~~4~~ 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 647.05/21'

ELEVATION/DEPTH BOTTOM OF SAND: 643.05/25

ELEVATION/DEPTH BOTTOM OF HOLE: 643.05/25

BACKFILL MATERIAL BELOW SAND: NONE

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT42
DATE: 10-22-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
					MED		MED BRN	SC					
	2				DENSE		SILT + F gSAND	SC/SM	Fe STAINING				
1S							TR CLAY	SM	MOIST	2.6			
1015 HR	4				SOFT	YEL	WEATHERED						
	5		5.0/5.0			BRN	S.S.		MOTTLED GREY	7.5			
					SOFT	YEL	WEATHERED S.S		RQD NOT	10			
		0%				BRN	W/GRAY LAYERING		RELIABLE				
2S							LESS WEATHERING		DRILLING W/				
1025		0	4.0/4.0		MED SOFT		TO 10'		ROTOSONIC	21			
1035	10	0%	2.0/10				V.BR 5'-10'	V.BR	DESTROYS SAMPLE				
						LT			CORE. MOIST @				
					MED	YEL	SAND STONE Br	BR	10' NO H_2O	2.1			
					HARD	BRN	IRON STAINING/		IN HOLE @ 1045 HRS				
						+ GREY	LAYERING		MOTTLING				
	15								HOR FRACTURES	3.0			
3S									* H_2O @ 22' 9"				
1443									@ 1508				
									* H_2O @ 22' 4" @ 1516				
		20%							* H_2O @ 22' 3"	3.0			
	20		8.5/10						@ 1524				
					MED	DK	GREY SILT STONE	V.BR	BLK MOTTLED	0.0			
5-4 1500		0%			SOFT		V.BR		SAND 25'-9'				
									SCREEN 21'-11'				
	25		3.5/5				TD @ 25'		BENT 6'-9'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: USE-4' CASING TO ADVANCE HOLE FOR 2" PVC WELL
INSTALLED TEMP 6" CASING 0-10' BGS
STARTED TO USE H_2O TO DRILL @ 10' @ 1430 HRS

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT42

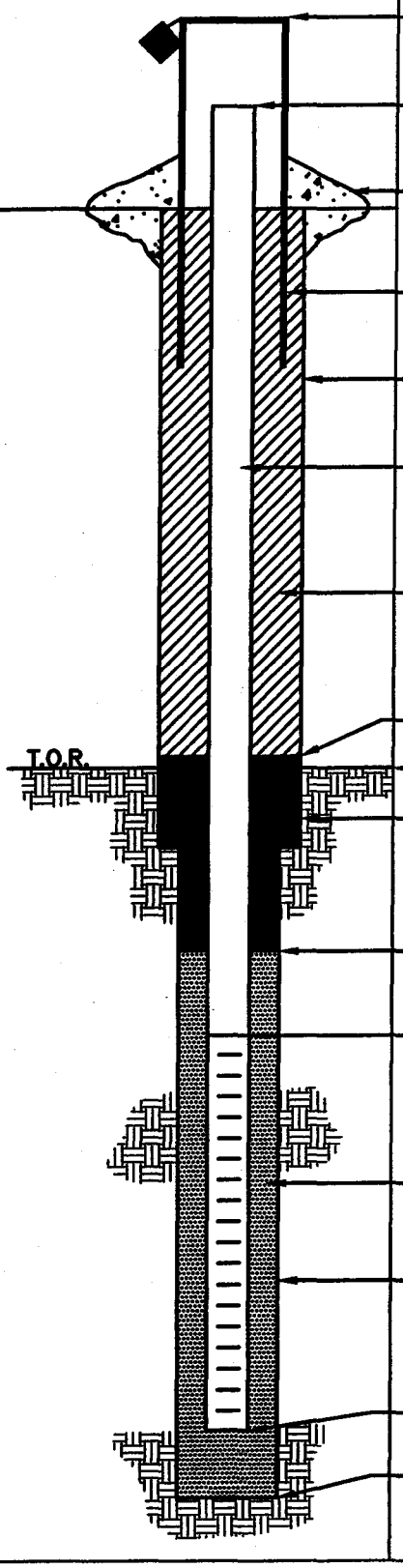
* MEASURED FROM TOP OF RIG PLATFORM (3' ABOVE GROUND SURFACE).
4" CORE PIPE ⇒ 5" HOLE 10' TO 25' 6" CASING ⇒ 7½ HOLE 0'-10'

WELL NO.: 13MWT43

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT43	DRILLING METHOD ROTO-SONIC
DATE BEGUN 11-6-03	DATE COMPLETED 11-6-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/ PUMP/ SURGE
GROUND ELEVATION 688.88	DATUM NAVD 88	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 690.96/~3'

ELEVATION/HEIGHT TOP OF RISER: 690.90/~2.5'

TYPE OF SURFACE SEAL: 4'x4'x6" CONCRETE PAD

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 8"

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: SCH.40 PVC

TYPE OF BACKFILL: BENTONITE PURE GOLD CETCO GEL

ELEVATION/DEPTH TOP OF SEAL: 683.88/ 5'

ELEVATION/DEPTH TOP OF BEDROCK: 678.88/ 10'

TYPE OF SEAL: BENTONITE. PURE GOLD GEL CETCO

ELEVATION/DEPTH TOP OF SAND: 681.88/ 7'

ELEVATION/DEPTH TOP OF SCREEN: 678.88/ 10'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.02 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: ~5"
CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 668.88/ 20'
ELEVATION/DEPTH BOTTOM OF SAND: 667.88/ 21'
ELEVATION/DEPTH BOTTOM OF HOLE: 667.88/ 21'
BACKFILL MATERIAL BELOW SAND: NONE

ACAD: FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT43
DATE: 11-06-03
GEOLOGIST: FRED WRAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						DK BRN	SILT + CLAY		TOP SOIL				
							YEL BRN						
							CLAY + SILT		LOG CUTTINGS				
							f-g SAND						
	5						MOTTLED			30			
							GREY						
							SILTY f-g SAND						0
							RELIC LAM.		DEC. BRK				
							LIGHT YEL BRN			8			
	10						GREY						
					MED SOFT	YEL	SAND STONE		WL=22' BIC				
					SOFT	BRN	DK GREY MUD		@ 1435 HRS				
							STONE		WL=21' 8" @				0
					SOFT	DK GREY	SILT STONE	BR	1445				
20%	15						- LAM. LGT GREY BLK		WL=21' 6" @				
							- IRREGULAR LAM.		1448				
							-		WL=21' 4" @	10			
									1452				
									1500, WL=21' 0"				
	20		8.5/10						MAKING H2O				
									OBCIDIAN				
							SCREEN 10-20		INSTALL WELL				
							SAND 7-21		10'-20'				
							BENT. 2-7						
	25												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: _____

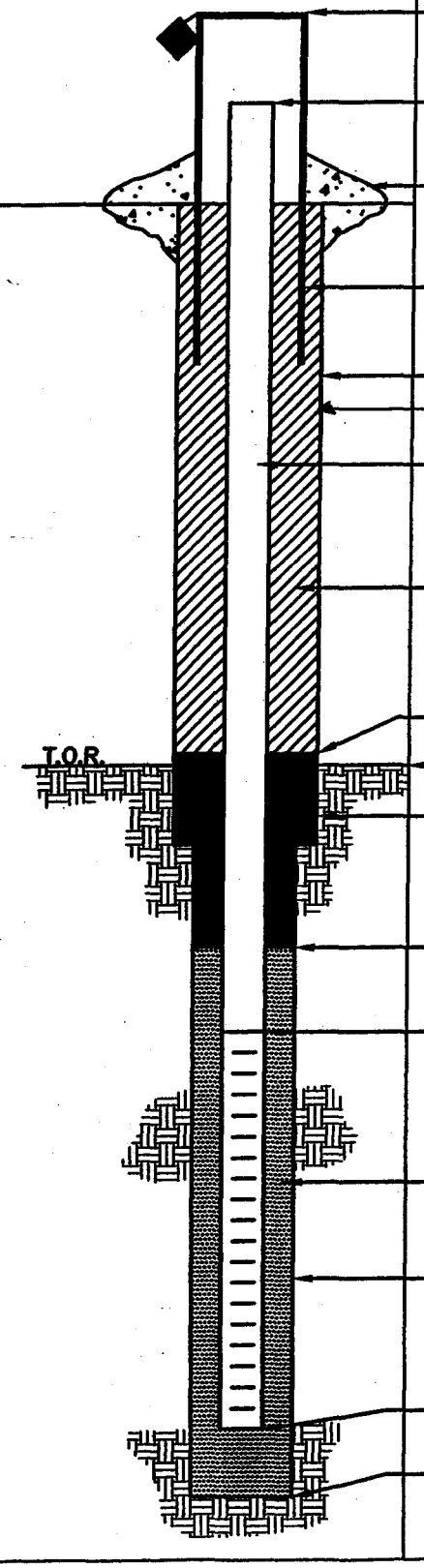
Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT43

WELL NO.: 13MWT44

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION CRANE IN	DRILLER J WALSH	
PROJECT NO. 9060	BORING 13MWT44	DRILLING METHOD A.R.	
DATE BEGUN 11-6-03	DATE COMPLETED 11-10-03		
FIELD GEOLOGIST M.G.COCHRAN		DEVELOPMENT METHOD BAILER/PUMP SURGE	
GROUND ELEVATION 682.11	DATUM NAVD 88		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 684.06/1.95

ELEVATION/HEIGHT TOP OF RISER: 683.82/1.71

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" x 4" SQ STEEL

DIAMETER OF HOLE: 11" TO 40', 5 7/8" TO TD,
6" DIA ISOLATION CASING TO 40'

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCHEDULE 40

TYPE OF BACKFILL: PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 679.11 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 670.11 / 12'

TYPE OF SEAL: PURE GOLD MEDIUM BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 612.11 / 70

ELEVATION/DEPTH TOP OF SCREEN: 609.11 / 73
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 5 7/8"
CORE/REAM: 3" / 5 7/8"

ELEVATION/DEPTH BOTTOM SCREEN: 599.11 / 83
ELEVATION/DEPTH BOTTOM OF SAND: 599.11 / 83
ELEVATION/DEPTH BOTTOM OF HOLE: 594.11 / 88'
BACKFILL MATERIAL BELOW SAND: PURE GOLD MEDIUM BENTONITE CHIPS

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Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT44
DATE: 11-6-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
					STIFF	MED BRN	SILT + CLAY	CL	MOIST				
							SILT CONTENT INC. DOWNWARD						
							- MOTTLED						
S-1	5				↓		↓ BRN	↓	MOIST			0	
0900					MED DENSE	YEL	SILT + CLAY +	SM/SC	DEC. BDRK				
						BRN	f - g SAND		MOTTLED	10			
									YEL BRN + GREY				
						LT.	YEL BRN + GREY		LAM. STRONGLY				
	10		10/10				f - g SAND W/SOME SILT	SM	WEATHERED				
							MUD STONE		BDRK				
							- STRONGLY WEATHERED		VERY SOFT UNCONSOLIDATED				
				TOP OF BDRK	SOFT	YEL	SAND STONE	BR					
						BRN	- ABUNDANT Fe STAIN - THINLY BEDDED						
	15		15%			+ GREY	- INTERLAYERED			8		0	
S-2							W/STRONGLY WEATH.						
							SILT + CLAY STONE						
							-S.S. MOD						
			8/10				WEATHERED						
	20						SAND STONE LESS WEATHERED						
					MED HARD		@20°						
					SOFT		INTERLAYERED MUDSTONE	YBR					
							AND SAND STONE		MUDSTONE = DK GREY	10			
S-3			20%				V. THINLY BEDDED + LAM.		SANDSTONE = LT GREY				
	25				↓		↓	↓				0	

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: INSTALLED 8" ISOLATION CASING TO 40' BGS USING 11" DRILLPIPE.

Converted to Well: Yes ✓ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT44
DATE: 11-6-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample: BZ	Borehole**	Driller BZ**
						MOD GREY	SANDSTONE	BR					
							ABUNDANT FE STAIN						
					SOFT	DK GREY	INTERLAYERED	V.FM	M. STONE DK GREY S. STONE LT GRAY				
							MUD STONE AND SAND STONE						
	30		9/10										
												0	
					MED HARD	MOD GREY	SANDSTONE	BR					
							THINLY BEDDED			10			
							W/ BLK LAM.						
	35	5/10					OCC VUGS						
										5		0	
	40		6/10		V		V						
					SOFT	DK GREY	SHALE		FISSILE SMALL H2O ON TOP OTHERWISE DRY				
									CORE RATE 3 MIN/FOOT. BLOCKY				
C-1		95%	10/							0	0	0	0
9.5/			10	46									
10					M. HARD	LT GREY	SILTSTONE		V.F. LAMS. STRONG IN WHITE. DRY				
									CORE RATE 5 MIN/FOOT. BLOCKY				
	50												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: SET UP ON HOLE ON 11-10-03 TO DRILL THROUGH CASING W ATV RIG STARTING @ 40'

Converted to Well: Yes ✓ No _____ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT44
DATE: 11-10-03
GEOLOGIST: M. G COCHRAN
DRILLER: T. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	50				M HARD	LT GREY	SILTSTONE		CORE 3 MIN/FT V.F. LAMS. STREAKS IN WHITE DRY, HOR BEDDING BECOMING SHALY BLOCKY	0	0	0	0
C2													
9.5/		95%	10/	57					LOOKS MOIST @ 57'				
10.0			10		SOFT	LT GREY	SHALE		DRY, V.F LAMS WHITE STREAK, HOR BEDDING BLOCKY				
	60												
				61									
				62	M HARD	LT GREY	SANDSTONE		1 LOW ANGLE FRAC @ 61.5.				
					SOFT	BL	SHALE		DRY				
C3			8/						CORE SLIPPED OUT OF BARREL PER DRILLER				
7.4		74%	10							0	0	0	0
				65.5					BLOCKY				
10.0					M HARD	LT GREY	SILTSTONE						
									DRY, GRADES INTO SS AT BTM.				
	70			70.									
					SOFT	GREY	SHALY SILTSTONE		V. BROKEN, FRACS THRU OUT, SLIGHT MOISTURE				
C4									THRU OUT, MOST FRACS ARE				
10/		0%	8/						HOR, FEW VERT FOSSILIFEROUS	0	0	0	0
10			8										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: WAITED AFTER 70' FOR H2O. NO H2O IN HOLE AFTER 1 HR. H2O LEVEL @ 64' BGS. INSTALLED WELL ON 11-11-03

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT44

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 90660
DRILLING COMPANY: BONSER-MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT44
DATE: 11-10-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1				SOFT	GREY	SHALY SILTSTONE		V. BROKEN, FRACS THRU OUT, HOR. FRAC FREQUENT VERT FRACS FEW, MOIST THRU RUN TO 82.5'				
	78												
C5			10/.							0	0	0	0
4.0/		40%	10										
10.0					MHARD	GREY	SHALY SILTSTONE		DRY, + BLOCKY AT 82.5				
				86									
	88				MHARD	LT GREY	SANDSTONE		V. F. LAMS ALONG HOR. BEDDING, DK GREY LAMS				
							TD 88'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: CHECKED FOR H2O AFTER 88', 1' OF H2O IN HOLE AFTER 1 HR.

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT44

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT45
DATE: 10-27-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
									0-6' YEL BRN OCC MOTTLING				
									GRAY SILT+SAND CUTTINGS YEL				
									BRN C' TO ~ 15' BGS TURNING DK GREY				
									TO BLK DOWN TO 19' BGS				
	20				SOFT	BLK	COAL		BRITTLE				
					MED HARD	LT GREY	SILTSTONE	BR					
					VERY SOFT	LT GREY	CLAY W/ROCK FRAG.	↓	UNCONSOLIDATED				
		0%			HARD		SANDSTONE	BR		10			
							GRADING DOWN	↓					
S-1	25						WARD TO	N.BR					
1555						MED	A LAMINATED						
						GREY	SILTSTONE	↓					
					SOFT		CLAY+SILT+SAND W/OCC ROCK FRAG		UNCONSOLIDATED	12			
			8/10				DK GREY						
	30				MED HARD	LT.	SILTSTONE						
					HARD	GREY	SANDSTONE	BR	IRREGULAR LAMINATION				
							POORLY BEDDED			13			
S-2 1620		10%						↓					
	35				MED SOFT	DK	SILTSTONE	V.BR					
						GREY	ALT. BLK + GREY						
							LAMINATIONS		SANDSTONE	5			
					SOFT	DK	SILT + CLAY +		CLASTS. UNCONSOLIDATED				
			6/10		↓	GREY	fg SAND	↓					
	40												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: STARTED @ 0' USING AIR, SWITCHED TO WATER @ ~10' USING 8" DRILL PIPE NO SAMPLING. INSTALLED ISOLATION CASING 10-28-03 TO 39'

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT45

WELL NO.: 13MWT45

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT45	DRILLING METHOD ROTA-SONIC
DATE BEGUN 10-27-03	DATE COMPLETED 11-10-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER/WATER/SURGED
GROUND ELEVATION 688.76	DATUM NAVD 88	

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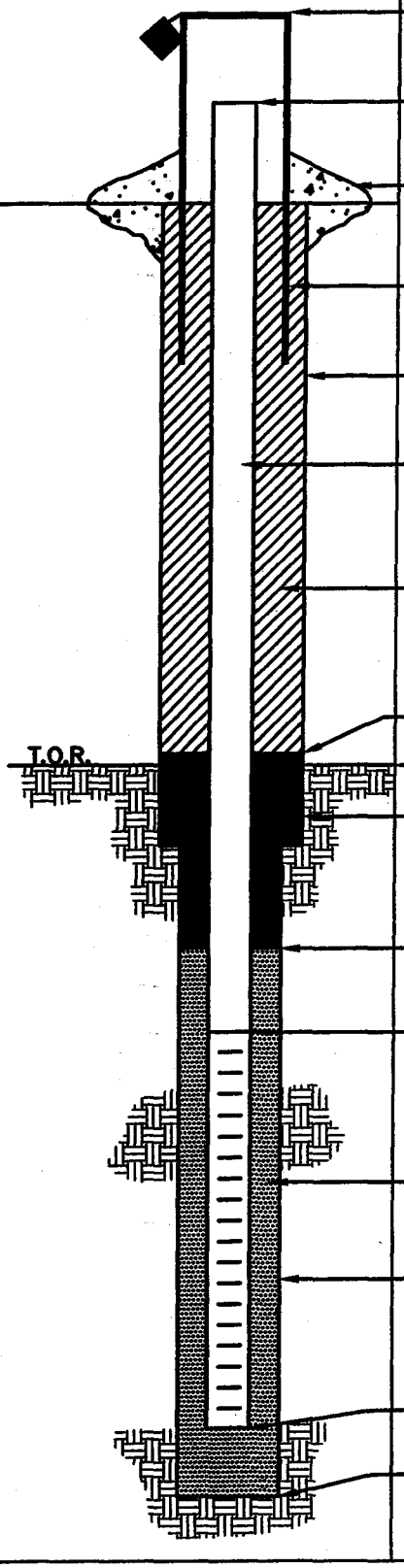

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 690.54 / 1.78

ELEVATION/HEIGHT TOP OF RISER: 690.59 / 1.83

TYPE OF SURFACE SEAL: CONCRETE 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CETCO. 6" ISOLATION CASING INSTALLED USING CEMENT/BENTONITE GROUT TO 39'

ELEVATION/DEPTH TOP OF SEAL: 683.76 / 5'

ELEVATION/DEPTH TOP OF BEDROCK: 678.76 / 10'

TYPE OF SEAL: BENTONITE "PURE GOLD" CHIPS CETCO

ELEVATION/DEPTH TOP OF SAND: 621.76 / 67

ELEVATION/DEPTH TOP OF SCREEN: 618.76 / 70

TYPE OF SCREEN: PVC SCH. 40

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP / 188

DIAMETER OF HOLE IN BEDROCK: 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 608.76 / 80

ELEVATION/DEPTH BOTTOM OF SAND: 604.76 / 84

ELEVATION/DEPTH BOTTOM OF HOLE: 604.76 / 84

BACKFILL MATERIAL BELOW SAND: NONE

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT45
DATE: 11-10-03
GEOLOGIST: FRED W. RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	40						DK GREY						
							(SILTSTONE)					2	0
	45												
												0	
							CUTTINGS TURN						
							YEL BRN SILT +						
	50						SAND						
							(SANDSTONE)						
												0	
	55												
							CUTTINGS DK GREY						
							SILT + CLAY						
					SOFT	DK GRAY	SILTSTONE	V.BR					
							LAM. VTHIN		FISSIL TO				
	60						BEDDING.		66'	11			
							CLAYEY 59'-61'						
S-B							SILTSTONE					0	
		10											
	65									12			

* When rock coring, enter rock brokeness.
** Include monitor reading in 6-foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: LOG CUTTINGS FROM 39' TO 57, BEGIN TO CORE @57 W/ 4" TO CORE PIPE.

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT45

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13MWT45
DATE: 11-10-03
GEOLOGIST: FRED W RAMSER
DRILLER: JON KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	65						SILT STONE						
			8 / 11			DK GREY	MUD STONE ↓ POORLY BEDDED	B1				0	
					VERY SOFT		NO RECOVERY		AS PER				
	70				BASED ON		CUTTINGS		DRY CORE				
					DRILL RATE		AND DRILL		RUNS FROM				
							RATE INDICATE		WELL 13MWT44				
S-4							(SHALE) TO		WILL INSTALL				
							78' BGS		WELL FROM				
	75								70' TO 80'				
									SAND: 67 - 84			0	
			0 / 10				↓						
							SILT STONE	V.BR					
	80						↓						
S-5		54 / 60								11			
						GREY	SANDSTONE	B1				0	
							↓						
	85			TD-84									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: INSTALLED WELL 70'-80'
SAND 67 - 84'

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT45

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13 MWT 46
DATE: 11/21/03
GEOLOGIST: S. GRIER
DRILLER: T. REIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25				VERY SOFT TO MED SOFT	GR	CLAYSTONE + SILTSTONE LAYERS 40% clay	BR/VBR	CLAY IS VERY SOFT WEATHERED SILT IS MORE COH.				
C1													
	28	25/6	3/3						ROCK FRAGS ARE LARGE				0.8
					MED TO MED. SOFT	GR/BLK	SILTSTONE W/ LAYERS OF SHALE	BR	THIN LAMS OF SHALE + ROCK FRAGS				
	30												
					VERY SOFT	GR	CLAYSTONE W/ POCKETS OF SILTSTONE	VBR	HIGHLY WEATHERED				
	35						SILTSTONE W/ Very thin lams of F.SAND + SHALE	BR	V. THIN LAMS OF FINE SAND				
C2						GR	CLAYSTONE W/ LAYERS OF SHALE	VBR	LENSES OF SHALE				
	38	25/12	10/10			GR	SILTSTONE W/ LAMS OF F.SAND + SHALE		ROCK CHIPS			15.9	
									LOW RECOVERY PROBABLY SILTSTONE				
	40												
	45												
					VERY SOFT	GR/BLUE	SILTSTONE		HIGHLY WEATHERED				
C3		14/0											
	48		2.5/10						LOW RECOVERY				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.6

Remarks: VERY LOW RECOVERY BETWEEN 40' → 68'
HIGHLY FRACTURED ROCK
6" ISOLATION CASING SET TO 39' BGS.

Converted to Well: Yes ✓ No _____ Well I.D. #: 13 MWT 46

WELL NO.: 13MWT46

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: NSWC CRANE	LOCATION: SWMU 13	DRILLER: J. KEIFER
PROJECT NO.: 9060	BORING: 13MWT46	DRILLING METHOD: ROTO-SONIC
DATE BEGUN: 11/21/03	DATE COMPLETED: 11/22/03	
FIELD GEOLOGIST: S. GRIER		DEVELOPMENT METHOD: BAILER/ WATERRA/SURGE
GROUND ELEVATION: 651.64	DATUM: NAVD 88	

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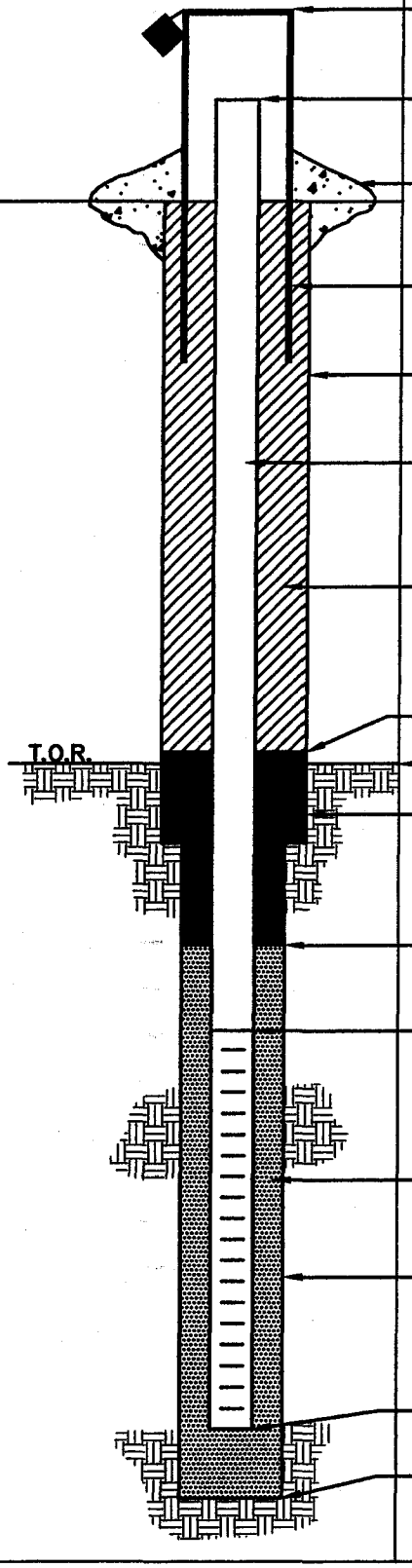


ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 653.68/2.04

ELEVATION/HEIGHT TOP OF RISER: 653.61/1.97

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" steel

DIAMETER OF HOLE: 11" down to 39'
ISOLATION CASING 6" DIA. SET TO 39' BGS.

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: 2.5" PVC

TYPE OF BACKFILL: BENTONITE PURE GOLD ISOLATION CASING GROUTED W/ CEMENT/BENTONITE SLURRY.

ELEVATION/DEPTH TOP OF SEAL: 648.64 / 3'

ELEVATION/DEPTH TOP OF BEDROCK: 648.64 / 3'

TYPE OF SEAL: BENTONITE PURE GOLD GEL CHIPS

ELEVATION/DEPTH TOP OF SAND: 599.64/ 52'

ELEVATION/DEPTH TOP OF SCREEN: 596.64/ 55'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 20 x 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: GLOBAL MED. QTZ SAND

DIAMETER OF HOLE IN BEDROCK: 4"/5"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 586.64/ 65'
ELEVATION/DEPTH BOTTOM OF SAND: 583.64/ 68'
ELEVATION/DEPTH BOTTOM OF HOLE: /
BACKFILL MATERIAL BELOW SAND: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: VERSA-SONIC

BORING No.: 13 MWT 46
DATE: 11/22/03
GEOLOGIST: S. GRIER
DRILLER: J. KEIFER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	50	5					SILTSTONE	VBR	LOW RECOVERY				
	55												10.9
				HARD	VERY HARD	YELLOW BR	SANDSTONE		FINE GRAINED				
C4									LOW RECOVERY				
		0%	15/10										
	60												
	65				VERY SIFT	GREY BLUE	SILTSTONE		Screen set				1
									@ 65'-55'				
C5					VERY HARD	YELLOW BLUE	SANDSTONE						
	68	0%											

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HIGHLY FRACTURED BETWEEN 40'-68'

Drilling Area Background (ppm): 0.6

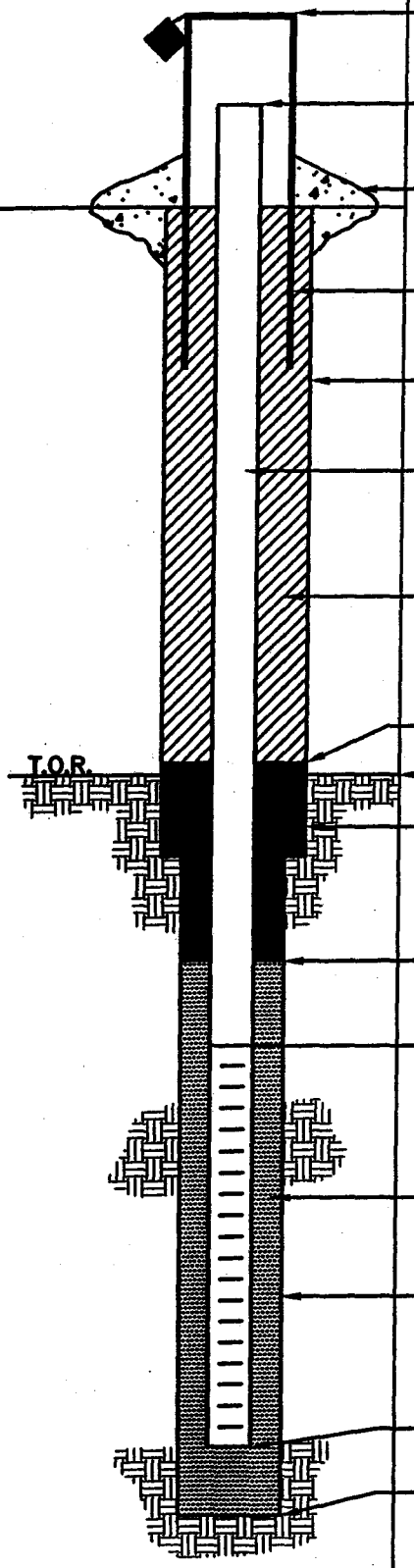
Converted to Well: Yes ✓ No _____ Well I.D. #: 13 MWT 46

WELL NO.: 13MWT47

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NWSC CRANE	LOCATION CRANE, IN	DRILLER BOWSER MORNER	
PROJECT NO. 9060	BORING 13MWT47	DRILLING METHOD HSA/AR	
DATE BEGUN 11-19-03	DATE COMPLETED 11-20-03		
FIELD GEOLOGIST M. G. COCHRAN		DEVELOPMENT METHOD BAILER/PUMP/SURGE	
GROUND ELEVATION 675.41	DATUM NAVD 88		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 677.32/1.91

ELEVATION/HEIGHT TOP OF RISER: 677.23/1.82

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4"x4" SQ.

DIAMETER OF HOLE: 8 1/2 TO 4', 4" TO TD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC SCH. 40

TYPE OF BACKFILL: CETCO VOLCLAY BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 672.41/3'

ELEVATION/DEPTH TOP OF BEDROCK: 671.41/4'

TYPE OF SEAL: CETCO VOLCLAY BENTONITE CHIPS

ELEVATION/DEPTH TOP OF SAND: 669.41/6

ELEVATION/DEPTH TOP OF SCREEN: 667.41/8

TYPE OF SCREEN: PVC SLOTTED

SLOT SIZE x LENGTH: .020 X 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: BEST MEDIUM SAND

DIAMETER OF HOLE IN BEDROCK: 4"

CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 657.41/18

ELEVATION/DEPTH BOTTOM OF SAND: 654.41/21

ELEVATION/DEPTH BOTTOM OF HOLE: 654.41/21

BACKFILL MATERIAL BELOW SAND: N/A

ACAD:FORM_MWINBR.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT47
DATE: 11-19-03
GEOLOGIST: M. G. COCHRAN
DRILLER: J. WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
						LT BRN	CLAYEY SILT		LOOKS NTL	0	0	0	0
	4			4.0									
S1		50/4"	.2/		SOFT	LT BRN	SANDSTONE,						
	6		.3										
									HIT H2O @ 6', BLOCKY, HOR. FRACS @ 1-4' INTERVALS				
C1										0	0	0	0
7.3/		91%	.8/						FE STAINED ZONES ~.4'				
8'			8						THICK THRU CORE AT .5' INTERVALS				
					1 HR.								
	12				M. HARD	LT BRN							
					M. HARD	LT GREY	SANDSTONE		LAMINATED W V.F LMS. DK GRAY. ENTIRE CORE IS DAMP, LITTLE H2O BLOCKY				
C2										0	0	0	0
B.B/		97%	9/										
9			9										
	21						TD 21'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: H2O @ 3.7' BGS ON 11-20-03

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT47

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13SB16
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					BLK	SILTY LOAM		SLIGHTLY MOIST				
0002						LT BR.	SILTY CLAY		MOIST + COHESIVE				
0204	4												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: WATER IN HOLE AT 2.0' ✗

Drilling Area Background (ppm): [ ]

Converted to Well: Yes [ ] No [✓] Well I.D. #: [ ]

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13SB17
DATE: 12/8/03
GEOLOGIST: S. BRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					Br.	SILTY LOAM		SLIGHTLY MOIST				
0002						Lt. Br./ Gr.	SILTY CLAY		MOIST + COHESIVE				
0204	4					Gr.	INCREASING CLAY % + FINE SAND						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: NO WATER IN HOLE

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB 18
DATE: 12/8/03
GEOLOGIST: S. GRIEL
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					BLK.	SILTY LOAM		SLIGHTLY MOIST				
0002						LT. BR.	SILTY CLAY		MOIST & COHESIVE				
0204	4					ORG.	CLAYEY FINE SAND 80% SAND		MOIST & SLIGHTLY COHESIVE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: WATER IN HOLE AT 3.0'

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB 19
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	0												
	1					Blk. Br.	SILTY LOAM SILTY CLAY		SLIGHTLY MOIST MOIST + COHESIVE				
0002	2					Br.	SILTY LOAM W/ GRAVEL + FILL		SLIGHTLY MOIST				
0203	3					Br.	SILTY CLAY		MOIST + COHESIVE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: REFUSAL AT 3.0'

Drilling Area Background (ppm): [ ]

Converted to Well: Yes [ ] No [✓] Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB 20
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
0001	1						SILTY LOAM W/ORGANIC MTRL CLAYEY SAND W/GRAVEL + ROCKS		SLIGHTLY MOIST				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks: REFUSAL AT 1.0'

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13SB21
DATE: 12/8/03
GEOLOGIST: S. BRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	0					Blk.	SILTY LOAM		SLIGHTLY MOIST				
0002						lt. Br.	SILTY CLAY W/ SOME FINE SAND		MOIST + COHESIVE				
						Org.	CLAYEY SAND		MOIST + SEMI COHESIVE				
0204	4					lt. Br.	SILTY CLAY W/ SAND (FINE)		MOIST + COHESIVE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB 22
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	0				BRK.	BRK	SILTY LOAM / GRAVEL		SLIGHTLY MOIST				
					Br.	Br.	SILTY CLAY		MOIST + COHESIVE				
0002							CLAYEY SAND W/ GRAVEL		↓				
							INCREASING GRAVEL						
0264	3.5					org.	SANDY CLAY W/ GRAVEL		↓				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area

Remarks: REFUSAL AT 3.5'

Background (ppm):

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13SB23
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					Blk.	SILTY LOAM W/ GRAVEL		SLIGHTLY MOIST				
0202						Org/Blk	SANDY CLAY W/ PATCHES OF ORGANIC MAT'RL		MOIST + SLIGHTLY COHESIVE				
						Org.	CLAYEY SAND		↓				
0204	4												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: _____

Drilling Area Background (ppm): _____

Converted to Well: Yes _____ No ✓ Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB24
DATE: 12/8/03
GEOLOGIST: S. BRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample BZ	Borehole**	Driller BZ**
	0					Blk. Org.	SILTY LOAM CLAYEY SAND		MOIST + SEMI COHESIVE				
0002						Br.	SANDY CLAY 70% clay		MOIST + COHESIVE				
0203	3					Org.	SILTY SAND W/GRAVEL		MOIST + SEMI COHESIVE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: REFUSAL AT 3.0'

Drilling Area Background (ppm):

Converted to Well: Yes ____ No / Well I.D. #: N/A

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Crane NSWC
PROJECT NUMBER: 9060
DRILLING COMPANY: NA
DRILLING RIG: HAND AUGER

BORING No.: 13 SB 25
DATE: 12/8/03
GEOLOGIST: S. GRIER
DRILLER: NA

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0					BLK	SILTY LOAM W/GRAVEL		SLIGHTLY MOIST				
0002						Org.	SILTY SAND W/CLAY (FINE)		MOIST T SEMI COHESIVE				
0204	4												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: _____

Converted to Well: Yes ____ No ✓ Well I.D. #: N/A

APPENDIX B.1.3
SWMU 13
BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
ROUND 3

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-13
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT48
DATE: 7-27-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 @ 1710	0	6/4	1.7/2		M DENSE	BRN	CLAYEY SANDY SILT	ML	MOIST	0			
	2	5/5					TR ROOTS AND ROCK	/SM		0			
S-2 @ 1715	4	6/5	1.4/2			BRN	CLAYEY SAND - SOME ROCK FRAG	SM /SC	MOIST / CLAYEY SILT	0			
S-3 @ 1720	6	2/3	1.3/2	5'	M DENSE	BRN	SANDY SILT - TR CLAY TR ROCK FRAG	SM	MOIST	0			
S-4 @ 1718	8	5/6	1.7/2		LOOSE	BRN	SANDY SILT - TR TO SOME ROCK FRAG	ML SM	MOIST → WET	0			
S-5 @ 1723	10	4/3	1.8/2	9.5 10 BOTM @ 10.5	M SOFT	GRAY	SHALE	VBR	WET ≈ 8.5 → 10	0			
		1/30								0			
									1750 - Decide to Auger to 10' Clean out & Check WL in AM				
							HSA TO ≈ 10.5 ON 7/28/04 Will Set well @ 10'± W ≈ .5' SAND ON BOTM						
									7-28-04 - WL was 5' from GS Decide to put well at 10'±				
							Screen 5-10						
							Sand 3.5-10.5						
							Chips to 1.5						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

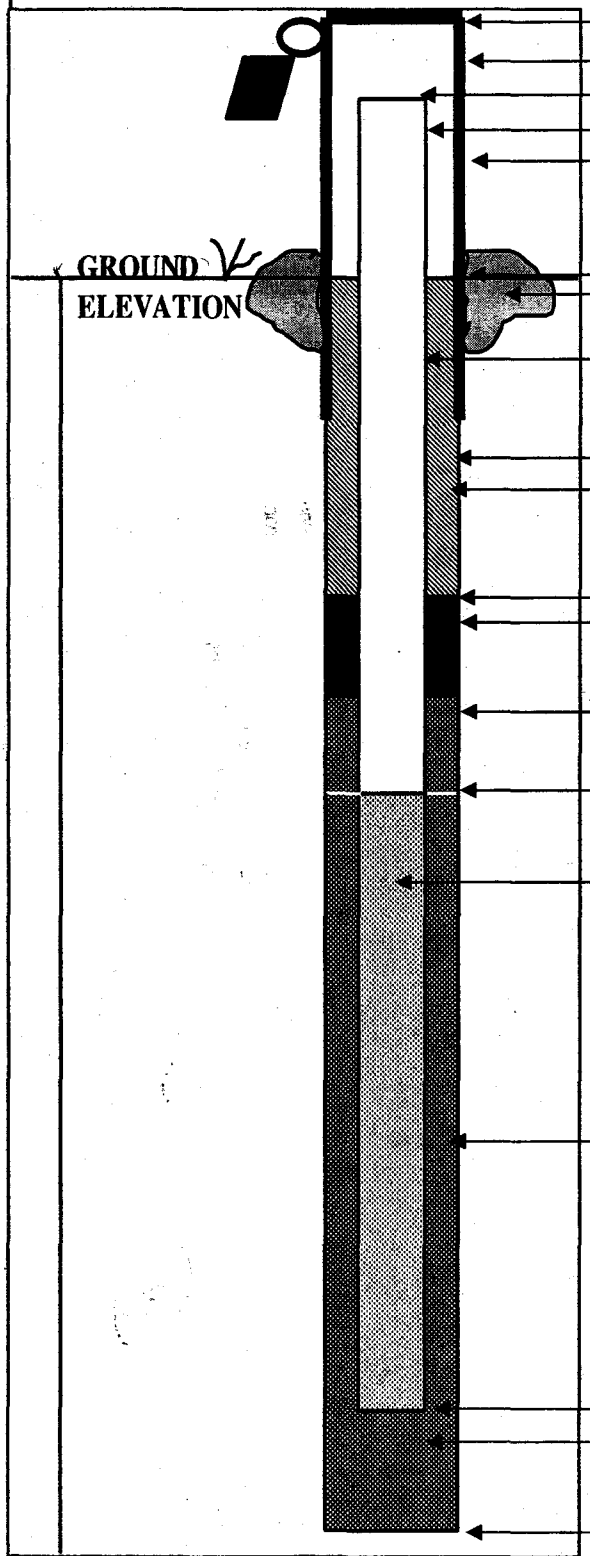
Remarks: HSA 4¼" ID AUTO HAMMER

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT48

BORING NO.: 13MWT48

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MWT48
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7-28-04
SITE:	13	DRILLING METHOD:	HSA	NORTHING:	1309618.82
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	302 1409.02



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 548.67

RISER STICK-UP ABOVE GROUND SURFACE: NA

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

GROUND ELEVATION: 546.20

TYPE OF SURFACE SEAL: CONCRETE PAD

RISER PIPE I.D.: 2

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8 1/2

TYPE OF SEAL: CONCRETE PAN

ELEVATION / DEPTH OF SEAL: 544.7/1.5

TYPE OF SEAL: BENTONITE CHIPS

ELEVATION / DEPTH TOP OF FILTER PACK: 542.7/3.5

ELEVATION / DEPTH TOP OF SCREEN: 541.2/5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 20SL X 5'

I.D. OF SCREEN: 2"

TYPE OF FILTER PACK: GLOBAL # 5 FILTER PACK

ELEVATION / DEPTH BOTTOM OF SCREEN: 536.2/10

ELEVATION / DEPTH BOTTOM OF FILTER PACK: 535.7/10.5

TYPE OF BACKFILL BELOW WELL: QUARTZ SAND

ELEVATION / DEPTH OF BOREHOLE: 535.7/10.5

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-13
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT49
DATE: 7-27-09
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 e	0	3/5	1/2		M DENSE	YELLOW BRN	SANDY SILT - TR	ML	MOIST	0			
1550	2	8/8	2			TAN	ROCK - TR ROOTS	SM		0			
S-2 e		5/3	.3/2		LOOSE	ORANG BRN	SILTY SAND - SOME ROCK FRAGS	SM	MOIST	0			
1552	4	3/2							POOR REC DUE TO FRAGMENT IN SHOE	0			
S-3 e		2/2	1.3/2	4	LOOSE	BRN	CLAYEY SAND - SOME ROCK	SC	MOIST → WET	0			
1555	6	2/3				MOTTLED			BOTTOM 1' HAS WET APPEARANCE	0			
S-4 e		6/8	1.5/2		M DENSE	ORANG BRN	CLAYEY SAND - SOME ROCK FRAGS	SC	± 5' → 6 WET MOIST → WET	0			
1600	8	12/12							SPOON WAS WET	0			
S-5 e		2/11	1.5/2	8.5	M SOFT	GRAY	SHALE	WR		0			
1605	10	28/30		9 10.0'						0			
				BOTM									
							AUGER TO 9.5		WLE 4' BGS @ 1625				
							SET WELL 4-9						
							SAND 3 TO 9.5						
							CHIPS TO 1'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

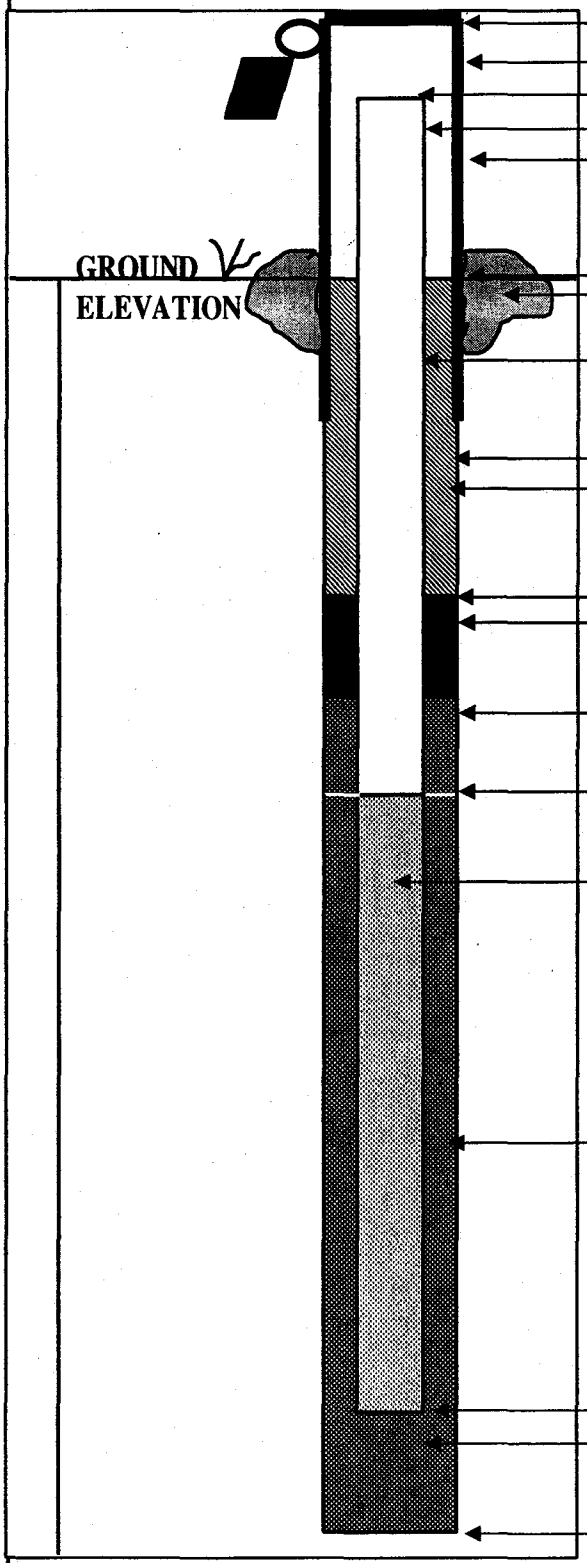
Remarks: START ≈ 1545 HSA/ATV 4¼" ID W/ AUTO HAMMER

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT49

BORING NO.: 13MWT99

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER-MORNER	BORING No.:	13MWT99
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7/27/04
SITE:	13	DRILLING METHOD:	HSA	NORTHING:	1309795.96
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	302171 3.21



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 553.90

RISER STICK-UP ABOVE GROUND SURFACE: NA

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: steel

GROUND ELEVATION: 551.05

TYPE OF SURFACE SEAL: CONCRETE PAD

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8½"

TYPE OF SEAL: CONCRETE PAD

ELEVATION / DEPTH OF SEAL: 550.05 / 1

TYPE OF SEAL: BENTONITE CHIPS

ELEVATION / DEPTH TOP OF FILTER PACK: 548.05 / 3

ELEVATION / DEPTH TOP OF SCREEN: 547.05 / 4

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 20 SL X 5'

I.D. OF SCREEN: 2"

TYPE OF FILTER PACK: #5 GLOBAL FILTER PACK

ELEVATION / DEPTH BOTTOM OF SCREEN: 542.05 / 9

ELEVATION / DEPTH BOTTOM OF FILTER PACK: 541.55 / 9.5

TYPE OF BACKFILL BELOW WELL: QUARTZ SAND

ELEVATION / DEPTH OF BOREHOLE: 541.55 / 9.5

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-13
PROJECT NUMBER: N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550 ATV

BORING No.: 13MWT50
DATE: 7-27-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 e	0	5/4	1/2		LOOSE	TAN BRN	SILTY SAND-TR	SM	MOIST - FILL	0			
1000	2	4/2					ROCK-TR ROOTS		NEAR SEWER ?	0			
S-2 e		5/4	1.5/2		LOOSE	BRN	(SAME) TR GRAVEL	SM	MOIST → WET	0			
1005	4	3/4							FILL ? TO 5' NOT SURE	0			
S-3 e		4/10	1.8/2	5'	M DENSE	YELLOW BRN	SILTY SAND- SOME	SM	MOIST	0			
1010	6	8/9				TAN	ROCK FRAG TR GRAVEL			0			
S-4 e		15/12	1.5/2		V DENSE	ORANG BRN	SILTY SAND-SOME	SM	MOIST	0			
1013	8	43/21		8'			ROCK FRAGS		PC OF SHALE	0			
S-5 e		20/34	1.5/		M SOFT	GRAY	SHALE	VBR	IN SHOE	0			
1015	9.5	50/5"	1.5						REF @ 9.5	0			
1110					M SOFT	GRAY	SHALE		1015→1045 WAIT - NO	0			
									WATER IN HOLE WILL COMMENCE CORING	0			
0/5.5	①	10	1/5							0			
									DRY	0			
1125	15								SHOE HAD PC OF MORE SANDY	0			
1130				15		LT							
					M SOFT	GRAY	SHALY SILTSTONE	BR	MATL V. WEATHERED	0			
								TO	(POOR REC)	0			
0-5/5	②	10%	1/5						DRY	0			
								VBR	CRUMBLES WHEN BROKEN	0			
1150	20								1315 HOLE MUD	0			
1325									3' WATER @ 20' DEPTH.	0			
										0			
0/5	③	0	1/5						AGAIN POOR REC DRILLS DRY	0			
										0			
1340	25			25						0			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: MOVE ≈ 6' EAST OF GREEN (SEWER) PIN FLAG
4¼" HSA / AUTO HAMMER / 2" SPOONS. SET TEMP CASING AT 9.5

Converted to Well: Yes ✓ No _____ Well I.D. #: 13MWT50

Tetra Tech NUS, Inc.

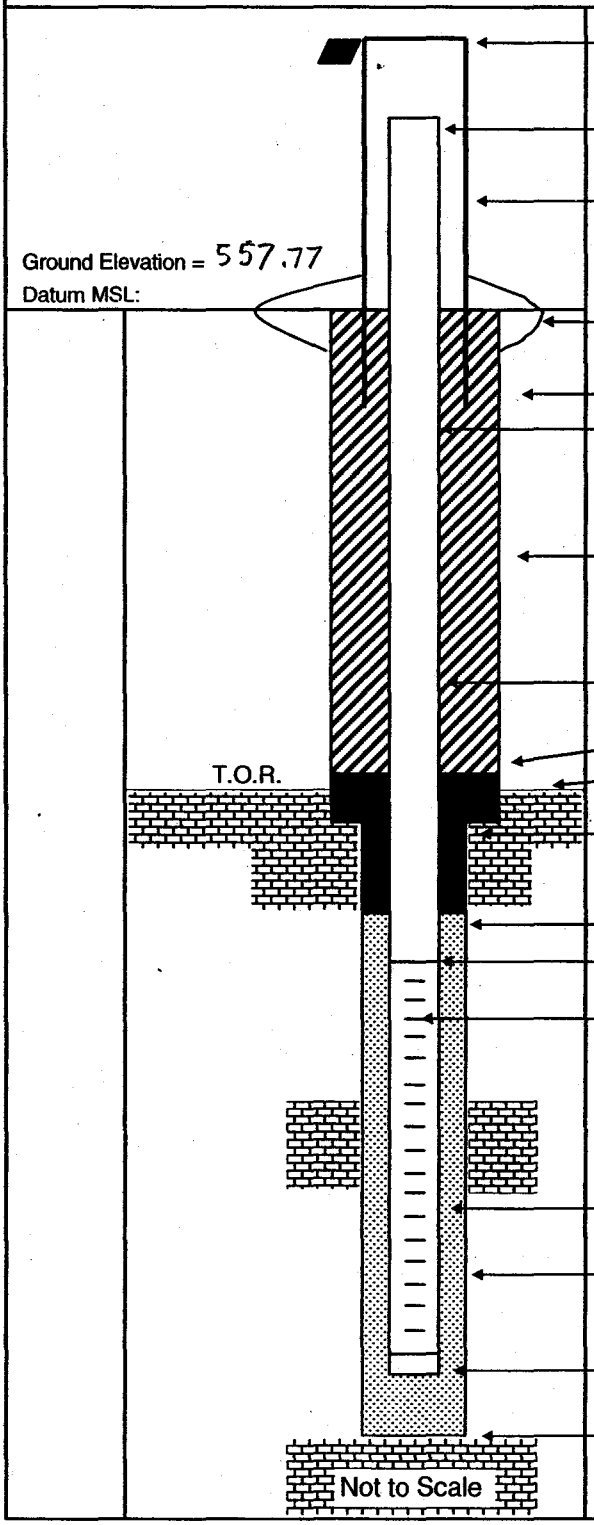
BEDROCK

MONITORING WELL SHEET

WELL No.: 13MWT50

PERMIT No:

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER-MORNER	BORING No.:	13MWT50
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7-27-04
SITE:	SWMU-13	DRILLING METHOD:	HSA/ROT	NORTHING:	131000 2.40
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	3022085.22



Elevation of Top of Casing: NA

Stick Up of Casing Above Ground Surface: NA

Elevation of Top of Riser: 560.49

I.D. of Surface Casing: ____

Type of Surface Casing: Steel

Type of Surface Seal: STEEL V TEMP CAS TO 9.5

I.D. and Depth of Permanent Casing: (if applicable)

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 8½ TO 9.5'

Type of Backfill: CEMENT GROUT

Elevation / Depth Top of Seal: 553.77 / 4'

Elevation / Depth Top of Bedrock: 548.27 / ≈ 9.5

Type of Seal: BENTONITE CHIPS

Elevation / Depth of Top of Fine Sand: NA / NA

Elevation / Depth of Top of Filter Pack: 545.77 / 12

Elevation / Depth of Top of Screen: 542.77 / 15

Type of Screen: PVC

Slot Size x Length: 20SLx 10'

I.D. of Screen: 2"

Type of Filter Pack: # 5 GLOBAL FILTER PACK

Diameter of Hole in Bedrock: Core / Ream: 5½"

Elevation / Depth of Bottom of Screen: 532.77 / 25

Elevation / Total Depth of Borehole: 531.77 / 26

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE-SWMU-~~12~~ 13
PROJECT NUMBER: ~~N6070~~ N7448
DRILLING COMPANY: BOWSER MORNER
DRILLING RIG: CME 550

BORING No.: 13MWT51
DATE: 7-26-04
GEOLOGIST: CONTI
DRILLER: WALSH

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 e	0	2/3	1.5/2		LOOSE	YELLO BRN	CLAYEY SAND - TR	SC	MOIST → WET	0			
08/2	2	4/4					ROCK - TR ROOTS TR SANDY CLAY			0			
S-2 e		1/3	.7/2		V LOOSE	BRN	CLAYEY SAND - SOME		wet @ 2' SMALL AMT OF	0			
08/5	4	2/1		4			ROCK FR.		H_2O (Perched)	0			
S-3 e		1/1	1.5/2		SOFT	BRN	SANDY CLAY TR	SC	WET → MOIST	0			
08/20	6	2/2		5 6		MOTTLD	ROCK FRAG			0			
S-4 e		4/4	2/2		M STIFF	GRAY BRN	SILTY CLAY - TR	CL	MOIST	0			
08/24	8	5/6		8		MOTTLD	ROCK			0			
S-5 e		12/8	1.5/2		STIFF M	GRAY YELLO	SANDY CLAY -	SC	MOIST	0			
08/28	10	10/9			DENSE	BRN	CLAYEY SAND SOME ROCK FR TR GRAVEL		SPOON IS WET	0			
S-6 e		4/8	1.6/2		M DENSE		Same as above	SC	MOIST → WET	0			
08/34	12	10/13					SOME ROCK TR GRAVEL			0			
S-7 e		11/17	1.5/2			BRN	CLAYEY SAND AND	SC	MOIST → WET	0			
08/40	14	15/15					ROCK FRAGS (weath rock) ?			0			
S-8 e		4/17	1.0/2.	15			Tr Gravel.			0			
08/48	16	48/50		15.5	M SOFT	GRAY	SHALE	VBR		0			
				16' TD									
							AUGER TO 16						
							WELL 5 TO 15						
							SAND 4 TO 16						
							CHIPS 1 TO 4						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

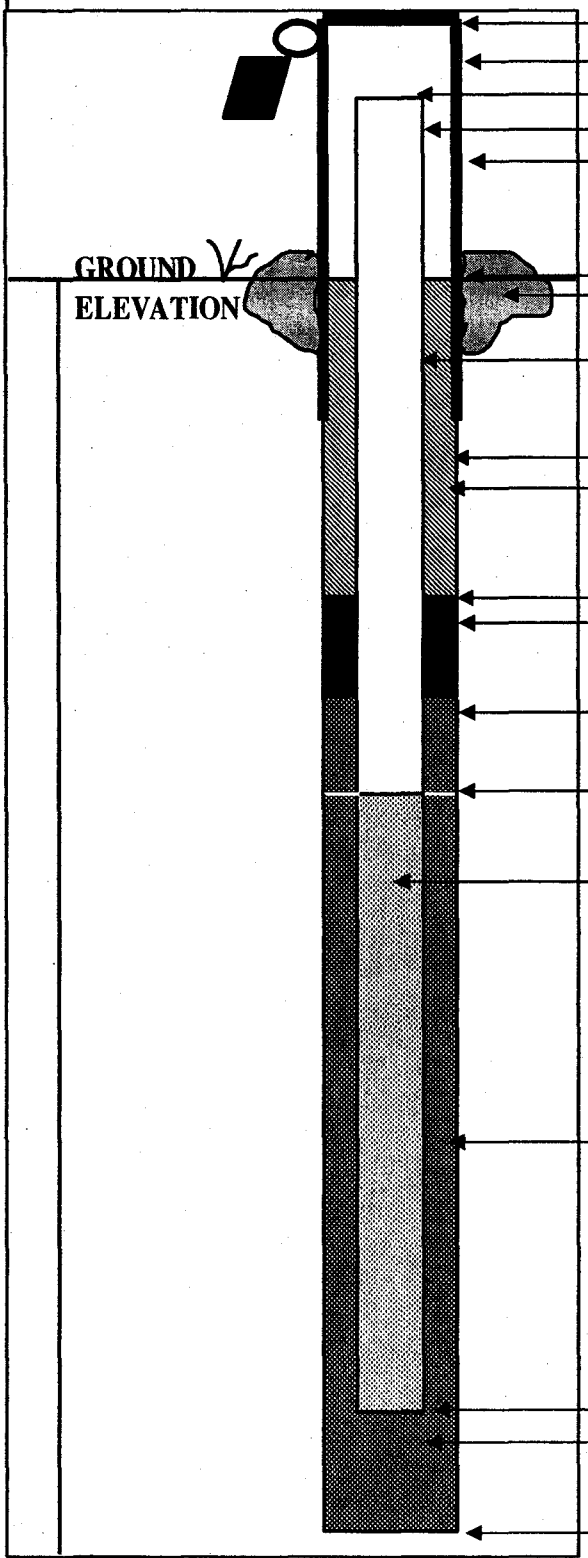
Remarks: HSA TO 16 - NO CASING HERE
O.B. WELL HERE

Converted to Well: Yes ✓ No _____ Well I.D. #: 12MWT08

BORING NO.: 13MWTS1

Tetra Tech NUS, Inc. **OVERBURDEN MONITORING WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	BOWSER MORNER	BORING No.:	13MWTS1
PROJECT No.:	N7448	DRILLER:	WALSH	DATE COMPLETED:	7/27/04
SITE:	13	DRILLING METHOD:	HSA	NORTHING:	1310206.30
GEOLOGIST:	CONTI	DEV. METHOD:		EASTING:	3022381.30



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 571.36

RISER STICK-UP ABOVE GROUND SURFACE: NA

I.D. OF SURFACE CASING:

TYPE OF SURFACE CASING: STEEL

GROUND ELEVATION: 569.28

TYPE OF SURFACE SEAL: CONC PAD

RISER PIPE I.D.: 2

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8 1/2

TYPE OF SEAL: CEMENT / CONCRETE PAD

ELEVATION / DEPTH OF SEAL: 568.28 / 1

TYPE OF SEAL: BENTONITE CHIPS

ELEVATION / DEPTH TOP OF FILTER PACK: 565.28 / 4

ELEVATION / DEPTH TOP OF SCREEN: 564.28 / 5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 20 X 10'

I.D. OF SCREEN: 2"

TYPE OF FILTER PACK: QUARTZ SAND #5 GLOBAL FILTER PAC

ELEVATION / DEPTH BOTTOM OF SCREEN: 554.28 / 15

ELEVATION / DEPTH BOTTOM OF FILTER PACK: 553.28 / 16

TYPE OF BACKFILL BELOW WELL: QUARTZ SAND

ELEVATION / DEPTH OF BOREHOLE: 553.28 / 16

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB26
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			ORG. BRN	0-2" Topsoil, 2"-6" Clayey SAND, 6"-8" Small Gravels, 8"-1' Clayey SAND	SC		-	-	-	-
	2					ORG. BRN. GRAY	Mot. Clayey SAND	SC		-			
	3					MOD. BRN	Fine SAND/SILT		} SM-SC	-			
	4					ORG BRN.	Mot. Clayey SAND, STIFF	SC		-			
			←				Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): -

Remarks: 0-2' Collected @ 0940
2-4' Collected @ 0943

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13 SB 27
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Soft	Dark Brown	Topsoil (0-2") 2"-6" Sand. Dark Gray soft clay,	CL		-	-	-	-
	2				"	Dark Gray	Wet w/ Petro. odor. (6" → 8')	CL		-			
	3				"	"	" "	CL		-			
	4				"	Dark Brown	Silty Clay, soft, moist.	CL		-			
	↓						Boring Terminated			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' Sample collected @ 1818
2-4' sample collected @ 1821
PID NOT WORKING.

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: GeoProbe

BORING No.: 13 SB 28
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Putton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			ORG. BRN.	0-2' Topsoil, Clayey Sand w/some Gravels	SC		-	-	-	-
	2					"	Clayey SAND	SC		-			
	3					"	" "	SC		-			
	4					ORG. BRN.	Fine SAND, SILT, MOIST	SM		-			
2	5		4'			"	Fine SAND, SILT, MOIST	SM		-	-	-	-
	6					"	" "	SM		-			
	7					ORG. BRN. Mottled Gry	" "	SM		-			
	8					"	" "	SM		-			
			←				Boring Terminated			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: ~~0-2' Sample @ 0955 (TK)~~
2-4' Sample @ 0957
4-6' Sample @ 1005 6-8' Sample @ N/A

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB29
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			DARK GRAY	0-2' Topsoil. Clayey SAND, Trace Gravels.	SC	No odors	—	—	—	—
	2					"	" "	SC		—			
	3					DARK GRAY	Silty SAND, wet.	SM		—			
	4					"	Clayey SAND, wet.	SC		—			
							Boring Terminated.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' Sample collected @ 1036
2-4' Sample collected @ 1040

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448, CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13S830
DATE: 8/11/04
GEOLOGIST: Charles C. Lowery FH
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Loose	ORG. BRN.	Topsoil (0-2") Clayey SAND, DRY	SC		0	0	0	0
	2				"	"	Clayey SAND, some Gravels, DRY.	SC		0			
	3				"	LT. OLIVE BRN	Clayey SAND, DRY Shale, Fractured	SC	-RX	0			
	4				"	LT. GRAY	Shale, Fractured	RX		0			
		←					Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: 0-2 Sample collected @ 0840 along w/MS/MSD
2-4 Sample collected @ 0846 along with DUP: 13FD081104-01

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO #343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB31
DATE: 8/16/04
GEOLOGIST: Charles C. Lavey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Loose	Lt Brown	0-6" Topsoil, Clayey SAND	SC		-	-	-	-
	2				Soft	Org Brn	Clayey SAND	SC		-			
	3				Stiff	Org-Brn mottled Grey	" "	SC		-			
	4				STIFF	"	" "	SC		-			
2	5		4'		Loose	Org Brn	Fine SAND, SILT, DRY	SM		-	-	-	-
	6				"	Gray	" " "	SM		-			
	7				"	Org Brn	" " "	SM		-			
	8				"	Gray	" " "	SM		-			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): -

Remarks: Sample 4-6' collected @ 1050 along w/ Dup 13FD081004-01
Sample 6-8' collected @ 1052

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: GeoProbe

BORING No.: 13SB32
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			BRN.	0-2" Topsoil)						
						ORG. BRN.	Clayey Sand		SC	–	–	–	–
	2					"	Clayey SAND w/ compacted	SC		–			
	3					"	SAND Lenses	SC		–			
	4					"	Clayey SAND, WET.	SC		–			
			←				Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' collected @ 1106
2-4' collected @ 1109

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 135833
DATE: 8/10/04
GEOLOGIST: Charles C. Lavey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		STIFF	ORG. BRN	Topsoil (0-2"). Clayey SAND	SC		—	—	—	—
	2				Loose	"	Fine SAND, SILT, very Micaceous.	SM		—			
	3				"	"	" "	SM		—			
	4				"	dark brn Mottled w/ Orange	" "	SM		—			
			←				Boring Terminated.			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' Sample collected @ 1121
2-4' Sample collected @ 1124

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB34
DATE: 8/10/04
GEOLOGIST: Charles C. Lavey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Loose	BRN	Medium SAND, trace Gravel	SM		—	—	—	—
	2				Stiff	DRK. GRN.	Sandy CLAY, DRY	SC		—			
	3				"	DRK. BRN. MOT. GRAY	" "	SC		—			
	4				"		" "	SC		—			
			4				Boring Terminated.			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' Sample collected @ 1139
2-4' Sample collected @ 1143

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 013SB35
DATE: 8/10/04
GEOLOGIST: Charles C. Lawley III
DRILLER: Josh Duttow

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Gravel Cover						
1	1		4'			Lt. Gray / Org. Brn	SANDY CLAY, W/ Gravels	SC		—	—	—	—
	2					Org. Brn Mottled Gray	SANDY CLAY	SC		—			
	3					"	FINE SAND, SILT, very Micaceous.	SM		—			
	4					Lt. Brn Mottled Gray	" "	SM		—			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Sample 0-2' collected @ 1207
Sample 2-4' Collected @ 1210

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB36
DATE: 8/10/04
GEOLOGIST: Charles C. Lewis III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Covered						
1	1		4'			LT. GRAY ORG. BRN	STIFF CLAY	CL		—	—	—	—
	2					ORG. BRN MOTTLED LT. GRAY	" "	CL		—			
	3					ORG. BRN	FINE SAND, SILT, VERY MICACEOUS	SM		—			
	4					ORG. BRN LT. GRAY	" "	SM		—			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Sample 0-2' collected @ 1155
Sample 2-4' collected @ 1159

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 013 SB 37
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			ORG. BRN	Topsoil (0-2") Clayey SAND, STIFF.	SC		-	-	-	-
	2					ORG. BRN; MOTTLED GRY	Clayey SAND, STIFF.	SC		-			
	3					"	" "	SC		-			
	4					ORG. BRN TO LT. BRN	FINE SAND, SILT, VERY MICACEOUS.	SM		-			
			4'				Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): -

Remarks: 0-2' Sample Collected @ 1222
2-4' Sample Collected @ 1225

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO #343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13 SB 38
DATE: 8/10/04
GEOLOGIST: Charles C. Lavey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Stiff	Lt. Gray	0-2" Topsoil 2"-1' clayey SAND	SC		-	-	-	-
	2				Loose	Lt. Brn/Gray	Sandy, CLAY	CL		-			
	3				Stiff	ORG-BRN	Silty, micaceous CLAY	CL		-			
	4				Stiff	"	" "	CL		-			
		←					Boring Terminated			→			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: MS/MSD collected on 0-2' Sample collected @ 1440
2-4' Sample collected @ 1443

Drilling Area Background (ppm): -

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13 SB 39
DATE: 8/16/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample: BZ	Borehole**	Driller: BZ**
	0						Grass Cover						
1	1		41		Soft	Lt. Gray	CLAY w/ Roots.	CL		—	—	—	—
	2				Stiff	Org. Brn	Silty CLAY; Moist.	CL		—			
•	3				Loose	"	Very Fine SAND, some SILT, Micas.	SM		—			
	4				Loose	Org. Brn Mot. Gray	" "	SM	Distinct Banding	—			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 0-2' Sample collected @ 1455
2-4' Sample collected @ 1459

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB40
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Bare Soil						
1	1		4'		Stiff	Lt. BRN TO ORG-BRN	CLAY w/ some SAND	CL		–	–	–	–
	2				"	ORG-BRN	Clayey SAND w/ Some Micas	SC		–			
	3				Loose	"	Very Fine SAND, SILT, Micaceous.	SM		–			
	4				Loose	"	" "	SM		–			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): –

Remarks: 0-2' Sample Collected @ 1429
2-4' Sample Collected @ 1431

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB41
DATE: 8/18/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						GRASS COVER						
1	1		3'		SOFT	DARK BROWN	CLAY w/ some Gravels	CL		-	-	-	-
	2				LOOSE	ORG BRN	SILTY CLAY, some MICAS, MOIST	CL		-			
	3				LOOSE	LT. ORG. BRN	VERY FINE SAND, SILT, MICACEOUS, MOIST.	SM		-			
	4				←		NO RECOVERY →						
2	5		4'		LOOSE	LT. ORG. BRN	VERY FINE SAND, SILT, MICACEOUS	SM		-	-	-	-
	6				"	LT. ORG BRN MOT. GRAY	" "	SM		-			
	7				"	"	VERY FINE SAND, SILT, MICACEOUS, DISTINCT Boundary	SM		-			
	8				"	"	" "	SM		-			
		←					BORING TERMINATED →						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 4-6' Sample Collected @ 1417
6-8' Sample Collected @ 1420
PID NOT WORKING

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO #343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB42
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	/					Grass Cover						
1	1	/	4'		Firm	Brn	0-2" Topsoil 2"-2' Clayey SAND	SC		-	-	-	-
	2	/			Firm	Org. Brn.	Clayey SAND	SC		-			
	3	/			Loose	"	Silty CLAY, moist	CL		-			
	4	/			Loose, Soft	"	" "	CL		-			
2	5	/	4'		Stiff	Org. Brn	Clayey SAND	SC		-	-	-	-
	6	/			"	"	" "	SC		-			
	7	/			Org. Brn Mottled Lt-Gray	"	Fine SAND & SILT, micaceous, Loose	SM		-			
	8	/			Lt-Gray	"	" " , Loose	SM		-			
		/	←				Boring Terminated		→				
		/											
		/											
		/											
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		/											
		/											

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 4-6' Sample Collected @ 1357
6-8' Sample Collected @ 1400
PID NOT WORKING

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SUMMER
PROJECT NUMBER: N7448 CTO #343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe

BORING No.: 13SB43
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Stiff	ORG Brn	Clayey SAND	SC		—	—	—	—
	2				"	"	" "	SC		—			
	3				"	"	V. Fine SAND, SILT, micas.	SM		—			
	4				"	"	" "	SM		—			
2	5		0		←		Resistance →						
	6												
	7												
	8												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 2 Attempts made to set post 4'. No Success
4' Sample Collected @ 1530.

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB44
DATE: 8/10/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Stiff	Gray / Org-Brn	Gravelly SAND / V. Fine SAND, SILT, MOIST.	GP-SM		—	—	—	—
	2				Loose	Org-Brn Mot. Gray	V. Fine SAND, SILT, MOIST.	SM		—			
	3				Loose	Lt. Org. Brn	" " "	SM		—			
	4				Stiff	Org-Brn	V. Fine SAND SILT, [redacted]. Micas.	SM		—			
2	5		0		← Resistance →								
	6												
	7												
	8												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: 4 Attempts made to get past 4'. All not Successful, 4' Sample Collected @ 1505

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE - SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB45
DATE: 8/10/04; 8/11/04
GEOLOGIST: Charles C. Lowey III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Surface						
1	1		2'		Soft	Brn	Clay, with some Gravels, wet	CL		-	-	-	-
	2				" Stiff	" Occ. Brn. Mot. Gray	" Clayey SAND, some Silt, Dry	CL-SC		-			
	3		←				No Recovery		→	-			
	4		←				No Recovery		→	-			
2	5		4'		Soft	Gray	Gravelly SAND, wet w/a lot of Concrete debris		→GP	0	0	0	0
	6					Occ. Brn Mot. Gray	Compacted SAND w/ Gravels	GP		0			
	7					Gray	Silty SAND w/ some Compacted SAND lenses.	SM		0			
	8					Gray	Silty CLAY w/a lot of Shale Fragments, wet		CL-RX	0			
			←				Boring Terminated		→				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: Boring only advanced to 6' bgs, but cannot get rods out of hole (1600) - (1730)
8/11/04 - Retrieve Rods from hole. 4-6' collected @ 0928

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU 13
PROJECT NUMBER: N7448 CTO 0343
DRILLING COMPANY: Enviro. Field Services, Inc.
DRILLING RIG: GeoProbe
BORING No.: 13 SB 46
DATE: 8/19/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'			ORG BRN	0-2" Topsoil. 2"-1' Clayey SAND, Trace Gravel	SC		—	—	—	—
	2				ORG MAT.	BRN GRAY	Clayey SAND, STIFF	SC		—			
	3					"	" "	SC		—			
	4					"	" "	SC		—			
2	5		4'			"	" "	SC		—	—	—	—
	6					"	Fine to very Fine SAND, SILT	SM		—			
	7					LT. GRAY	" "	SM		—			
	8					"	" "	SM		—			
							Boring Terminated						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4-6' Sample collected @ 0923

Drilling Area Background (ppm): —

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC CRANE, SWMU13
PROJECT NUMBER: N744B CTO 0343
DRILLING COMPANY: EFS
DRILLING RIG: Geoprobe
BORING No.: 13SB47
DATE: 8/11/04
GEOLOGIST: Charles C. Laney III
DRILLER: Josh Dutton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						Grass Cover						
1	1		4'		Soft	Brn	Topsoil (0-2"). CLAY, wet.	CL		0	0	0	0
	2				"	"	" "	CL		0			
	3				"	Org. Brn	CLAY, wet w/ lenses of Compacted SAND	CL		0			
	4				"	"	" "		} CL-RX	0			
					Hard	"	SANDSTONE						
	5		←				Refusal		→				
	6												
	7												
	8												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): —

Remarks: Sample collected @ 4' time was 0904

Converted to Well: Yes ____ No X Well I.D. #: ____

APPENDIX B.2
SWMU 13
DIGGING PERMITS
ROUND 1, ROUND 2, ROUND 3

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4062

REQUESTED BY	DATE
Tetra Tech NUS, Inc / Terry Rojahn - 412-921-8857	2/21/03
WORK REQUEST OR E/S NO.	
68286	Mine Fill-B - SWMU 13
WORK WILL BE PERFORMED BY	**DATE (Start - on or about)**
Tetra Tech NUS, Inc.	2/28/03

WORK DESCRIPTION

Drilling soil samples for surface & subsurface samples. Install ground water monitoring wells. All locations marked with wooden stakes & pink flagging. See Attached drawing.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 2/21/03

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR ZZ	N/A			PN 2-26-03
HIGH VOLTAGE ELECTRICAL	YES	red FLAGS		2-24-03 PT HT
FIRE ALARM ZZ	NA			3/6/03 WQM
GROUNDING ZZ	Present	call it Cat		SH 2-28-03
NATURAL GAS Exp 4/13 0393055	✓	✓		3 25 03 MWM
SECURITY ALARM ZZ J. HASELMAN	N/A			3/3/03 JH
SEWER	YES	MARKED		AM 3-24-03
STEAM	NA			BCW 2-25-03
TELEPHONE Faxed 2/21/03	NA			DL 3-3-03
WATER	YES	MARKED		AM 3-24-03
SECOND ELECTRICAL ZZ	N/A			SH 2-28-03
Faxed 2/21/03 GENERAL DYNAMICS/NMCI	Not Marked	Not Marked		M.S. 3-7-03

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Terry Rojahn	3/25/03
DIGGING PERMIT APPROVED BY	**DATE**
Warren L. Zellman	3/25/03

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4344

REQUESTED BY	DATE
Tetra Tech NUS, Inc / Ralph Basinski 412-921-8308	10/17/03
WORK REQUEST ON E/S NO.	Wooded Area Behind Mine Fill B
108250	
WORK WILL BE PERFORMED BY	**DATE (Start - on or about)**
Tetra Tech NUS, Inc.	10/21/03

WORK DESCRIPTION SWMU 13

Soil borings to obtain surface & subsurface samples, & installation of ground water monitoring wells. Area is behind (Northwest) of Mine fill B & locations (9) are outside fence in wooded area. Marked with laths & pink ribbon.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR	N/A			10/17/03 dg
HIGH VOLTAGE ELECTRICAL	N/A	OVERHEAD		10/17/03 RNG
FIRE ALARM	N/A			10/17/03 SL
GROUNDING	N/A			10/17/03 SL
NATURAL GAS	N/A			10/17/03 dg
SECURITY ALARM 22 J. Hasenmeyer	N/A			10/20/03 JRH
SEWER	Yes	Yes		10-20-03 M. Wagoner
STEAM	N/A			10/17/03 SL
TELEPHONE Faxed 10/17/03	N/A			phone 10/20/03 per P. Eggers
WATER	Yes	Yes		10-20-03 M. Wagoner
SECOND ELECTRICAL	N/A			10/17/03 RNG
GENERAL DYNAMICS/NMCI	N/A			10/17/03 dg

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Tony Roach	10/20/03
DIGGING PERMIT APPROVED BY	**DATE**
Donna L. Zollman	10/20/03

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4345

REQUESTED BY Tetra Tech NUS, Inc/Ralph Basinski 412-921-8308	**DATE** 10/17/03
WORK REQUEST ON E/S NO. 108272	Mine Fill B
WORK WILL BE PERFORMED BY Tetra Tech NUS, Inc. (Terry Rojahn 412-337-0460	**DATE (Start - on or about)** 10/27/03

WORK DESCRIPTION
Soil borings to obtain surface & subsurface samples, & installation of ground water monitoring wells. Several locations are inside fence, 1 location outside fence on west side, & 6 outside fence in front across Hwy 45. Marked with laths & pink ribbon

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 10/17/03

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR 22	N/A			7287 10-27-03
HIGH VOLTAGE ELECTRICAL	N/A			S.P. 10/22/03
FIRE ALARM 22	N/A			10/22/03 WDH
GROUNDING 22	N/A			10/22/03 BA
NATURAL GAS Exp 11/6 03/01/2020	✓	✓		102103 JCF
SECURITY ALARM 22 S. Haseman	N/A			10/20/03 JRH
SEWER	Yes	Yes		10-27-03 M.W.
STEAM	Above Ground		*	10-22-03
TELEPHONE Faxed 10/17/03	N/A			10-24-03 RBP
WATER	Yes	Yes		10-27-03 M.W.
SECOND ELECTRICAL 22	N/A			10/22/03 BA
GENERAL DYNAMICS/NMCI Faxed 10/17/03	YES	YES		10-20-03

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	**DATE** 10-27-03
DIGGING PERMIT APPROVED BY Mary S. Hostetter	**DATE** 10-27-03

DISTRIBUTION:
ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4558

REQUESTED BY	DATE
Tetra Tech NUS, Inc./Ralph Basinski 412-921-8308	6/24/04
WORK REQUEST ON E/S NO.	Mine Fill "B"
150740	
WORK WILL BE PERFORMED BY	**DATE (Start - on or about)**
Tetra Tech NUS, Inc.	7/7/04

WORK DESCRIPTION

22 Soil samples at various site in Mine Fill "B". Locations are marked with wooden stakes & orange flags & the number on the attached drawing. SWMU-13

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed Z2 6/24/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR Z2	N/A			per phone J. Beasley 8/10/04
HIGH VOLTAGE ELECTRICAL	NA			S.P. 7-6-04
FIRE ALARM Z2	NA			7-14-04 MA
GROUNDING Z2	N/A			6-29/04 BL
NATURAL GAS	N/A			6/24/04 dg
SECURITY ALARM Z2	NA			7/2/04 MA
SEWER	Yes	Yes		7-7-04 MC
STEAM	N/A			6-28-04 RT
TELEPHONE Faxed 6/24/03	N/A			7-5-04 RP
WATER	Yes	Yes		7-8-04 RW
SECOND ELECTRICAL Z2	N/A			6-29/04 BL
Faxed 6/24/03 GENERAL DYNAMICS/NMCI	N/A	N/A		6-30-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Ralph Basinski	8/10/04
DIGGING PERMIT APPROVED BY	**DATE**
Donna L. Zollman	8/10/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

DIGGING PERMIT

NSWC CRANE 11000/3 (REV. 8/02)

4560

REQUESTED BY	DATE
Tetra Tech NUS, Inc./Ralph Basinski 412-921-8308	6/25/04

WORK REQUEST ON E/S NO.	
150962	Along H-521, N B-2311 & W Mine Fill C

WORK WILL BE PERFORMED BY	DATE (Start - on or about)
Tetra Tech NUS, Inc.	7/7/04

WORK DESCRIPTION

4 Soil Samples Along Highway 521. Locations are North East of Building 2311 & West of Mine Fill "B". Marked with wooden stakes with pink flagging. SWMU-13

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR	N/A			THW 6/25/04
HIGH VOLTAGE ELECTRICAL	N/A			THW 6/25/04
FIRE ALARM	N/A			THW 6/25/04
GROUNDING	N/A			THW 6/25/04
NATURAL GAS	N/A			6/25/04 dm
SECURITY ALARM	N/A			THW 6/25/04
SEWER	YES	YES		
STEAM	N/A			THW 6/25/04
TELEPHONE Faxed 6/25/04	N/A			7-6-04 MP
WATER	YES	YES		
SECOND ELECTRICAL	N/A			THW 6/25/04
GENERAL DYNAMICS/NMCI	N/A			THW 6/25/04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Ted Lyst	7/8/04

DIGGING PERMIT APPROVED BY	DATE
Donna L. Zollman	7/8/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

4961

REQUESTED BY: RALPH BASINSKI & TERRY ROJAHN (412) 921-8308	DATE: 01-24-06
WORK REQUEST ON E/S NO.	
WORK WILL BE PERFORMED BY: TETRA TECH NUS	DATE (Start - on or about): 02-13-06

WORK DESCRIPTION

MINE FILL B - HAS 24 DRILLING LOCATIONS (SOIL BORINGS 1BSB48 - 1BSB71) to be cleared - MARKED with WOODEN STAKES & PINK RIBBON.

EQUIPMENT TYPE

☐ HAND TOOLS ☒ CORE DRILL (DPT RIG) ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR				
HIGH VOLTAGE ELECTRICAL	NA			S.? 2-7-06
FIRE ALARM	NA			WDM 2/3/06
GROUNDING	N/A			
NATURAL GAS				
SECURITY ALARM	NA			
SEWER	NA			
STEAM	N/A			2/3
TELEPHONE	N/A			2-2-06
WATER	YES			2-2-06
SECOND ELECTRICAL				
GENERAL DYNAMICS/NMCI	YES	YES		2-9-06

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

IUPPS TICKET # 060125 1056 — REMARK 060213 1660

Start Date 1/27

EXPIRES 03/05

EXPIRES 3/14/06

PERMIT HOLDER SIGNATURE: Ted Hook	DATE: 2/14/06
DIGGING PERMIT APPROVED BY: Ted Hook	DATE:

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Supv. At work site
PINK - Permit requestor

Sec 20
Hwy 45 & Hwy 510

APPENDIX B.3.1
SWMU 13
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 1

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT01	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/30/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT02	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/29/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT03	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/30/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT04	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/30/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	ND
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT05	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/29/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT06	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/7/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	↓
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT07	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/29/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT08	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/30/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	No
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT09	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/1/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT10	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/27/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT11	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/28/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	✓
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT12	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/27/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT13	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/23/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT14	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/31/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT15	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/25/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT16	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/27/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT17	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/26/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	ND
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT18	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/26/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT19	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/31/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT20	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/1/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT21	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/28/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT22	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/28/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT23	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/1/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	ND
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT24	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	4/1/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT25	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/28/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

MONITORING WELL MATERIALS

CERTIFICATE OF CONFORMANCE

Well Designation:	13MWT26	Site Geologist:	BOB BALKOVEC
Site Name:	SWMU 13 MINE FILL B	Drilling Company:	BOWSER MORNER
Date Installed:	3/28/2003	Driller:	DAVE S.
Project Name:	NSWC CRANE	Project Number:	N9060 CTO 0279

MATERIAL	BRAND/DESCRIPTION	SOURCE/SUPPLIER	SAMPLE COLLECTED?
Well Casing	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	NO
Well Screen	2" PVC / 20 Slot / Schedule 40	Boart Longyear ASTM F480-88A	
End Cap	2" PVC / Schedule 40	Boart Longyear ASTM F480-88A	
Drilling Fluid	NA	NA	
Drilling Fluid Additives	NA	NA	
Backfill Material	Portland Cement	Home Depot	
Annular Filter Pack	#5 Global Sand	Global	
Bentonite Seal	Pure Gold Medium Chips	Global	
Annular Grout	Quik Grout Bentonite Powder	Global	
Surface Cement	Portland Cement	Home Depot	
Protective Casing	4" Steel	Global	
Paint	Safety Yellow. Rustoleum	Home Depot	
Rod Lubricant	NA	NA	
Compressor Oil	NA	NA	

To the best of my knowledge, I certify that the above described materials were used during the installation of this monitoring well.

Signature of Site Geologist: Robert Balkovec

APPENDIX B.3.2
SWMU 13
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 2

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT27
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/05/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred W Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT28
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/19/03
Project Name: NSWC CRANE

Site Geologist: SCOTT GRIER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Kaiser FOR SCOTT GRIER

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT29
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/04/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Ira Allamon FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT30
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/06/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT31
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/05/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Sara Allmann FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT32
Site Name: SWMU 13 MINE FILL B
Date Installed: 10/29/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JOHN KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT33
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/06/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Todd Wanner for MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT34
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/11/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Steve Mauser FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT35
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/19/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred W Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT36
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/05/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott Mauser FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT37
Site Name: SWMU 13 MINE FILL B
Date Installed: 10/24/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred W Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT38
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/04/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT39
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/04/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT40
Site Name: SWMU 13 MINE FILL B
Date Installed: 10/23/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT41
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/10/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred C Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT42
Site Name: SWMU 13 MINE FILL B
Date Installed: 10/22/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT43
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/06/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT44
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/10/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred Mc Cranor FOR MATT C.

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT45
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/10/03
Project Name: NSWC CRANE

Site Geologist: FRED RAMSER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred M Ramser

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT46
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/22/03
Project Name: NSWC CRANE

Site Geologist: SCOTT GRIER
Drilling Company: Bowser Morner
Driller: JON KEIFER
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Greg Ramsey FOR SCOTT GRIER

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT47
Site Name: SWMU 13 MINE FILL B
Date Installed: 11/20/03
Project Name: NSWC CRANE

Site Geologist: MATT COCHRAN
Drilling Company: Bowser Morner
Driller: J. WALSH
Project Number: 9060 CTO 279

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
Well Screen 2"X 10'	Boart Longyear ASTM F480-88A PVC	Global Well Supplies	No
End Cap	Boart Longyear	Global Well Supplies	No
Drilling Fluid	Potable water	Bldg. #3245 distribution system	Yes
Drilling Fluid Additives	Not used	NA	NA
Backfill Material			
Annular Filter Pack	Global NSF Qtz Sand SEP/18 B	Global Well Supplies	No
Bentonite Seal	CETCO, Pure Gold Med. Chips NSF	Global Well Supplies	No
Annular Grout	Portland Cement & Baroid Bentonite	Global Well Supplies	No
Surface Cement	Concrete Mix Pak Mix	Global Well Supplies	No
Protective Casing	Prepainted	Global Well Supplies	No
Paint	NA	NA	NA
Rod Lubricant	Jet Lube, Inc. – Well Guard	Global Well Supplies	No
Compressor Oil	-	-	-

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Fred W Bowser FOR MATT C.

APPENDIX B.3.3
SWMU 13
MONITORING WELL MATERIALS
CERTIFICATES OF CONFORMANCE
ROUND 3

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: 13MWT 48 THRU T51
Site Name: SWMU 13
Date Installed: JULY 2004
Project Name: NSWC CRANE

Site Geologist: CONTI
Drilling Company: BOWSER-MORNER
Driller: J. WALSH
Project Number: N7448

GLOBAL 1-800-356-6400

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	JOHNSON PVC 2"	GLOBAL WELL SUPPLIES	N
Well Screen	" PVC 10 SLOT 2"	"	N
End Cap	" PVC	"	N
Drilling Fluid	POTABLE WATER	BLDG 3245	Y
Drilling Fluid Additives	NA	—	—
Backfill Material	NA	—	—
Annular Filter Pack	GLOBAL FILTER PACK #5	GLOBAL WELL SUPPLIES	N
Bentonite Seal	CETCO PURE GOLD MED CHIPS	" " "	N
Annular Grout	PORTLAND CEMENT	" " "	N
Surface Cement	CONCRETE MIX (SAKRETE)	LOWES	N
Protective Casing	STEEL 6" SQUARE PIPE	GLOBAL	N
Paint	HIGHWAY YELLOW	LOWES	N
Rod Lubricant	NA	—	—
Compressor Oil	NA	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: SJConti

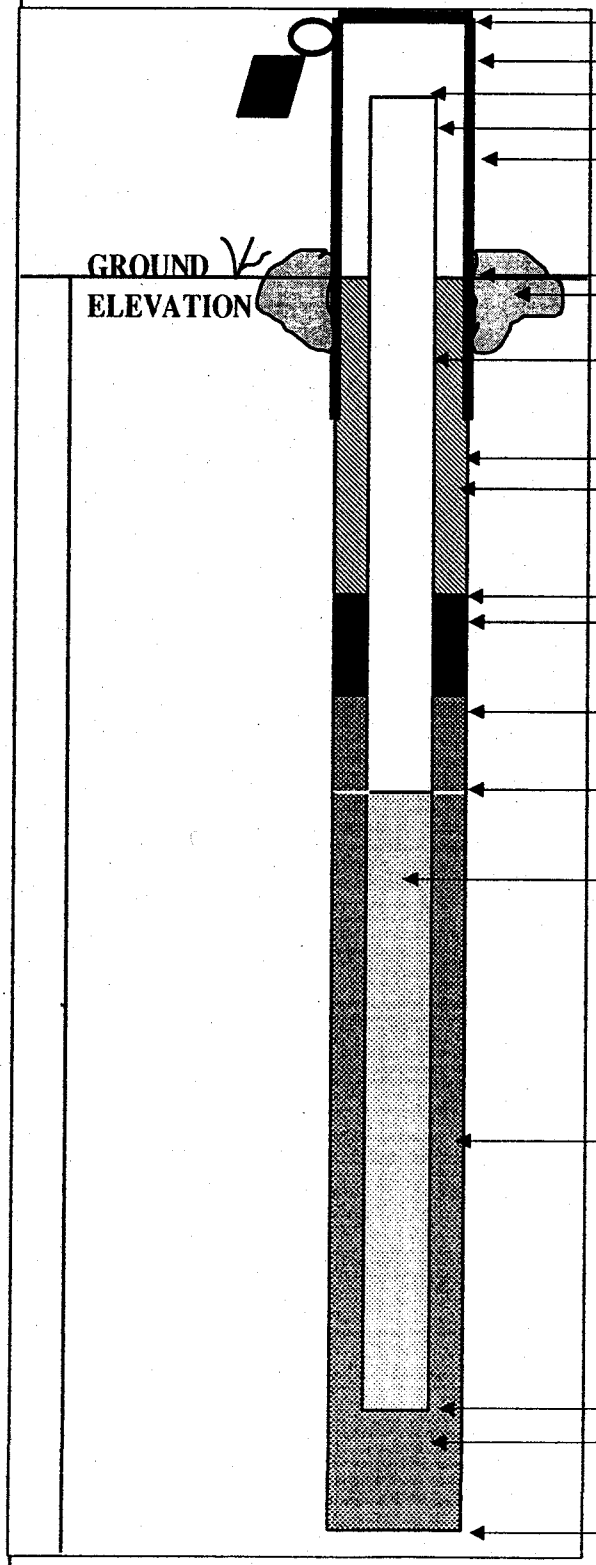
APPENDIX B.4

EXTERNAL SUMP/DRAINAGE INVESTIGATION
OVERBURDEN GROUNDWATER TEMPORARY WELLS

BORING NO.: 13SB50
13TW001

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB50
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-14-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309815.54
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3024077.90



ELEVATION OF TOP OF SURFACE CASING: NA
STICK -UP TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 705.54
RISER STICK-UP ABOVE GROUND SURFACE: ~1'
I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 704.54
TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:
TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -
TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 704.54 / 0
ELEVATION / DEPTH TOP OF SCREEN: 700.54 / 14.0'

TYPE OF SCREEN: PVC
SLOT SIZE X LENGTH: 0.010 X 5.0'
I.D. OF SCREEN: 1"

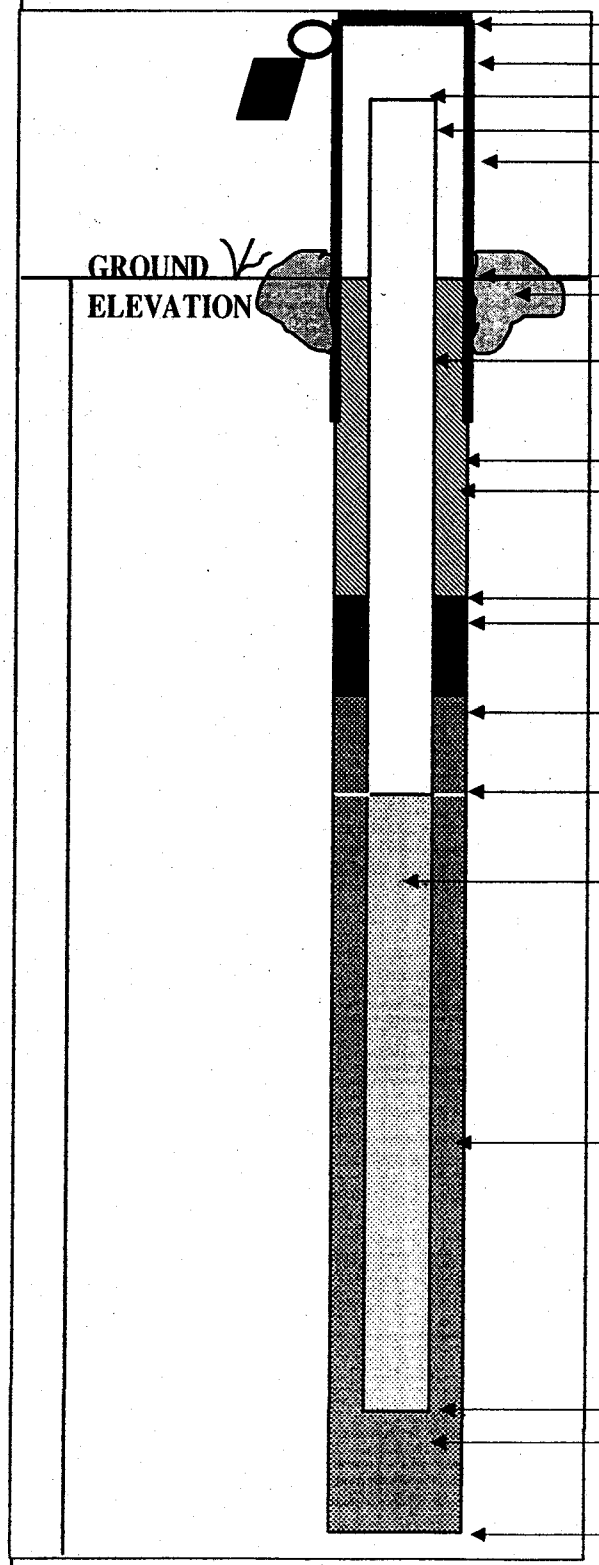
TYPE OF FILTER PACK: None

ELEVATION / DEPTH BOTTOM OF SCREEN: 695.54 / 9.0'
ELEVATION / DEPTH BOTTOM OF FILTER PACK: /
TYPE OF BACKFILL BELOW WELL:
ELEVATION / DEPTH OF BOREHOLE: 695.54 / 9.0'

BORING NO.: 13 TW00'2

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB62
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-14-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309791.85
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	302403.70



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 703.70

RISER STICK-UP ABOVE GROUND SURFACE: ~4'

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 699.70

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 699.70 / 0

ELEVATION / DEPTH TOP OF SCREEN: 698.70 / 1.0'

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: None

ELEVATION / DEPTH BOTTOM OF SCREEN: 693.7 / 6.0'

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

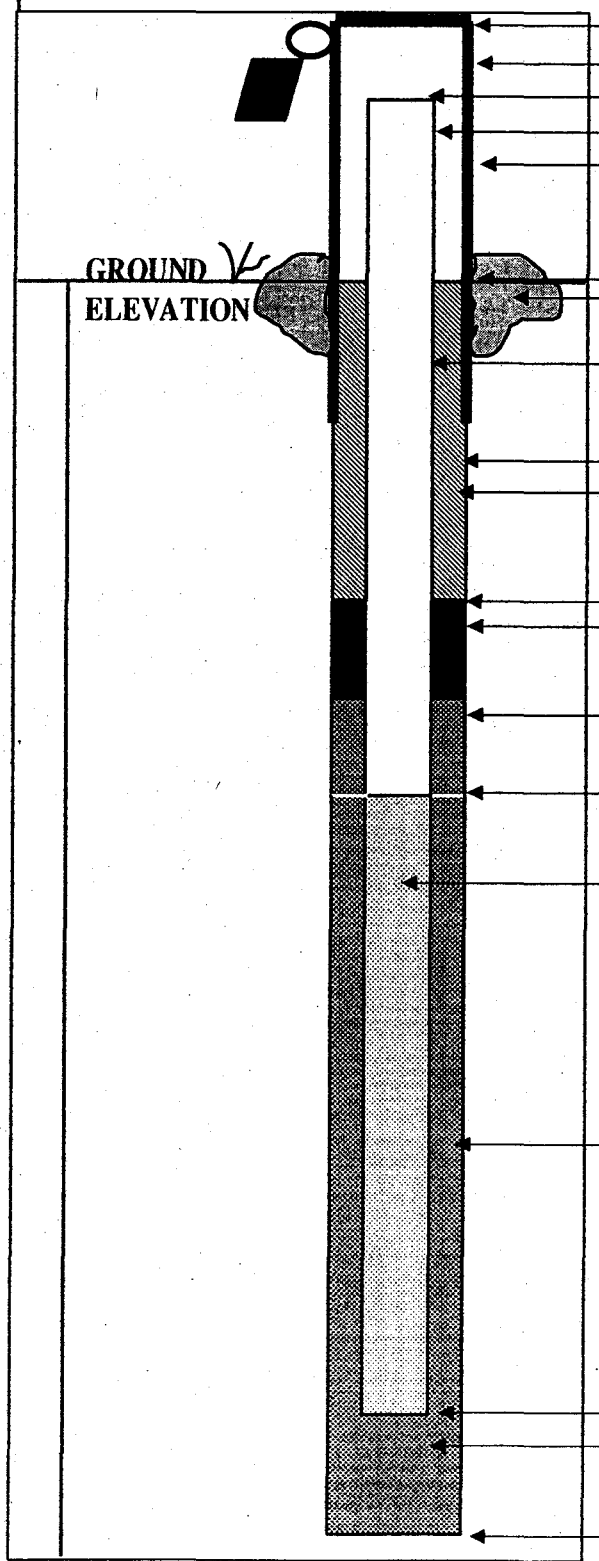
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 693.70 / 16.0'

BORING NO.: 13TW0003

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB68
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-14-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1310130.88
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023854.32



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 683.67

RISER STICK-UP ABOVE GROUND SURFACE: ~1.7

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 681.97

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 681.97 / 0

ELEVATION / DEPTH TOP OF SCREEN: 681.97 / 10.0'

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 4.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: None

678.67' / 3.3'

ELEVATION / DEPTH BOTTOM OF SCREEN: ~~677.97 / 4.0'~~ (FE)

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

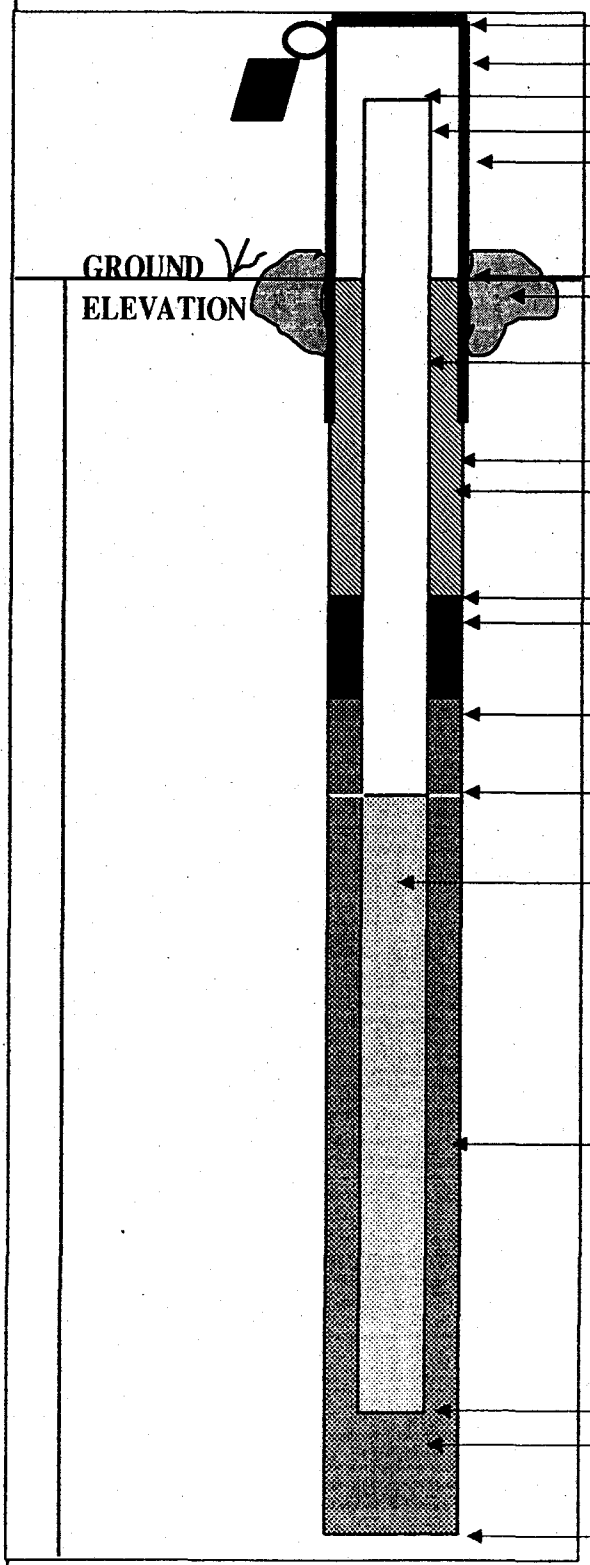
TYPE OF BACKFILL BELOW WELL: 678.67' / 3.3'

ELEVATION / DEPTH OF BOREHOLE: ~~677.97 / 4.0'~~ (FE)

BORING NO.: 13TW004

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB70
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-14-05
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309355.05
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	302311.96



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 691.40

RISER STICK-UP ABOVE GROUND SURFACE: ~0

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 691.40

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 691.40 / 0

ELEVATION / DEPTH TOP OF SCREEN: 691.40 10.0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: None

ELEVATION / DEPTH BOTTOM OF SCREEN: 686.40 / 15.0'

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

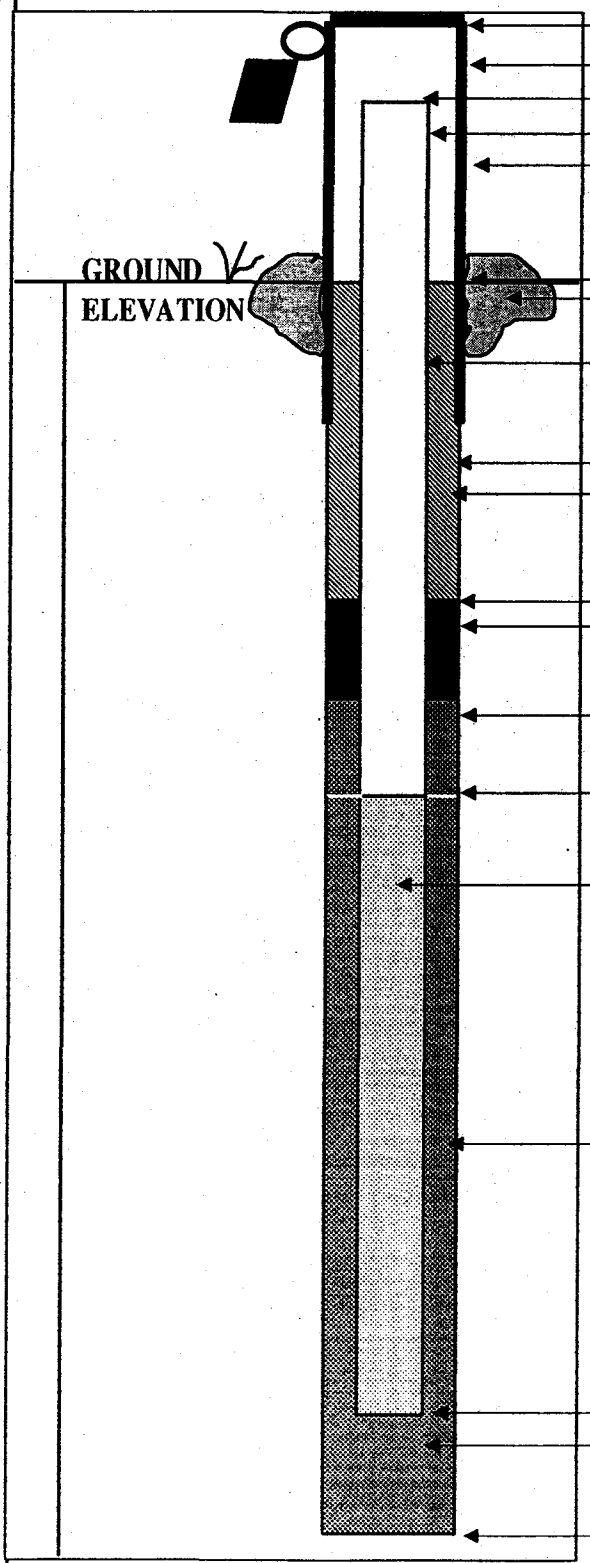
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 686.40 15.0'

BORING NO.: 13TW005

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	135659
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309094.47
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023402.28



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 697.27

RISER STICK-UP ABOVE GROUND SURFACE: 1.25'

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 696.02

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 696.02 / 0

ELEVATION / DEPTH TOP OF SCREEN: 696.02 / 0.0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 x 4.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: None

692.27' / 3.75'

ELEVATION / DEPTH BOTTOM OF SCREEN: 14.0 (TD)

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

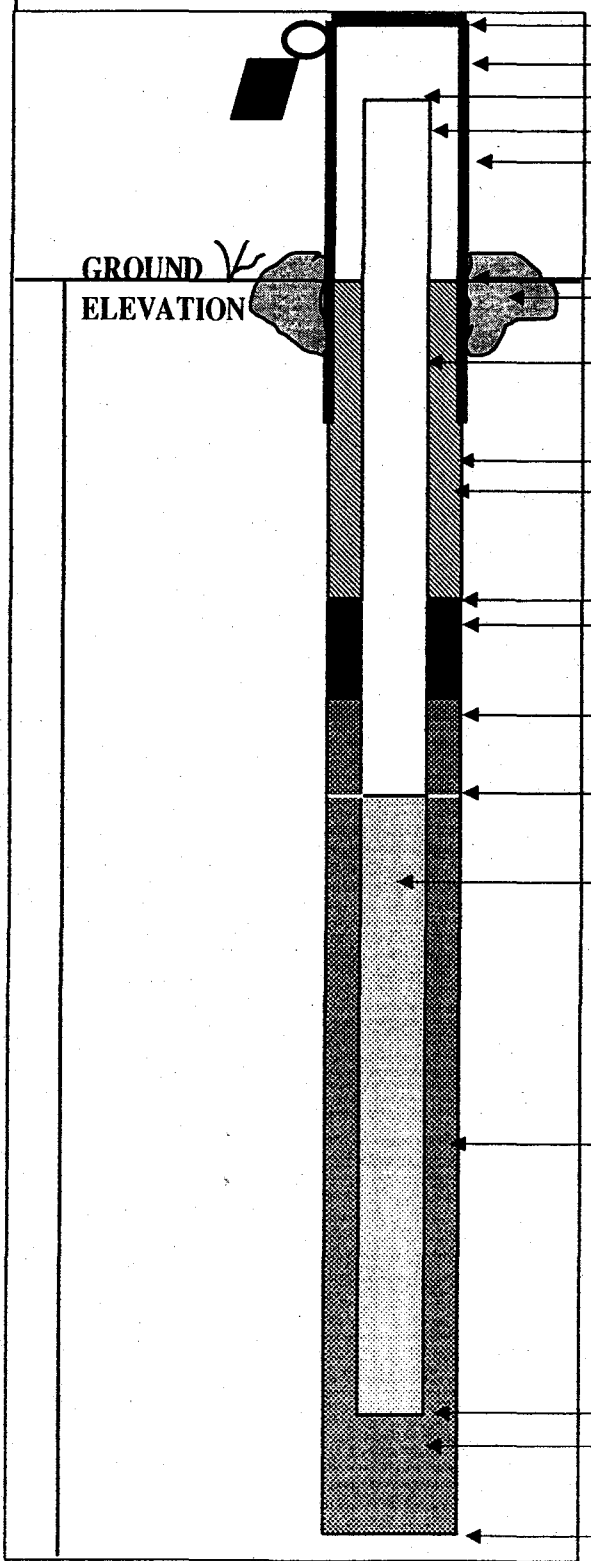
TYPE OF BACKFILL BELOW WELL: 692.27' / 3.75'

ELEVATION / DEPTH OF BOREHOLE: 14.0 (TD)

BORING NO.: 13TW006

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB587
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309051.20
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023356.77



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 697.72

RISER STICK-UP ABOVE GROUND SURFACE: 3.75

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 693.97

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 693.97 / 10.0

ELEVATION / DEPTH TOP OF SCREEN: 697.97 / 6.5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

682.72' / 11.25'

ELEVATION / DEPTH BOTTOM OF SCREEN: ~~11.5~~ T.D.

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

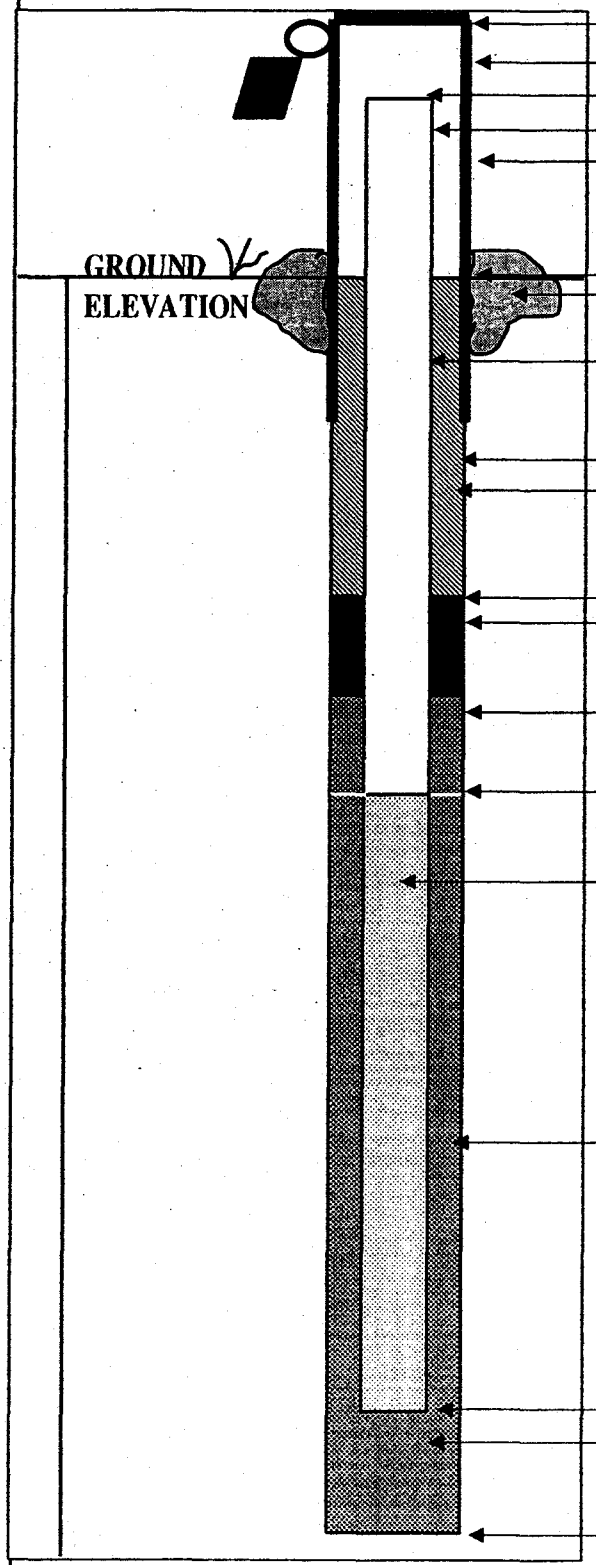
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 682.47' / 11.5

BORING NO.: 13TW007

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB56
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1308989.67
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	30233 55.47



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 690.18

RISER STICK-UP ABOVE GROUND SURFACE: ~0.5'

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 689.68

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 689.68 / 0

ELEVATION / DEPTH TOP OF SCREEN: 689.68 / 10.0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: None

ELEVATION / DEPTH BOTTOM OF SCREEN: 685.18' / 14.5'

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

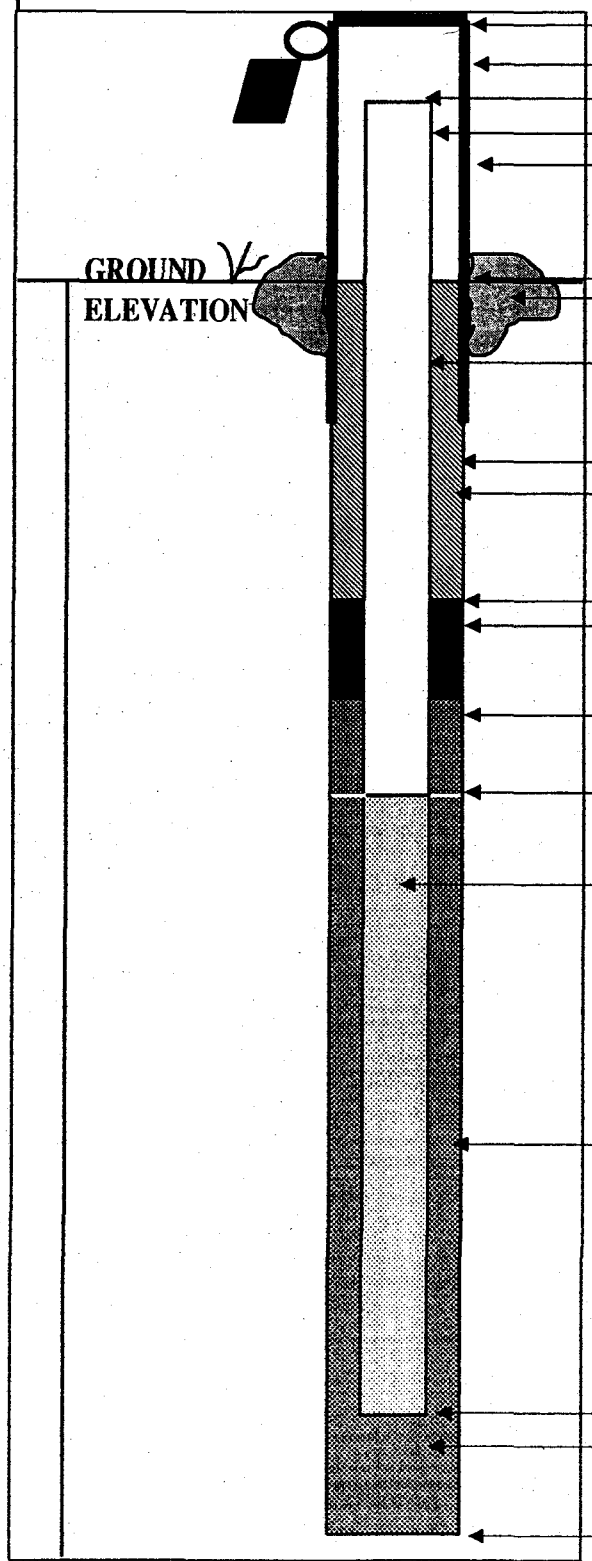
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 685.18' / 14.5'

BORING NO.: 13TW008

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB64
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1308586.09
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3022920.62



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 686.00

RISER STICK-UP ABOVE GROUND SURFACE: 3.08'

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 682.92

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 682.92 / 0

ELEVATION / DEPTH TOP OF SCREEN: 679.92 / 3.0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 676.00 / ~~8.0~~ 6.92

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

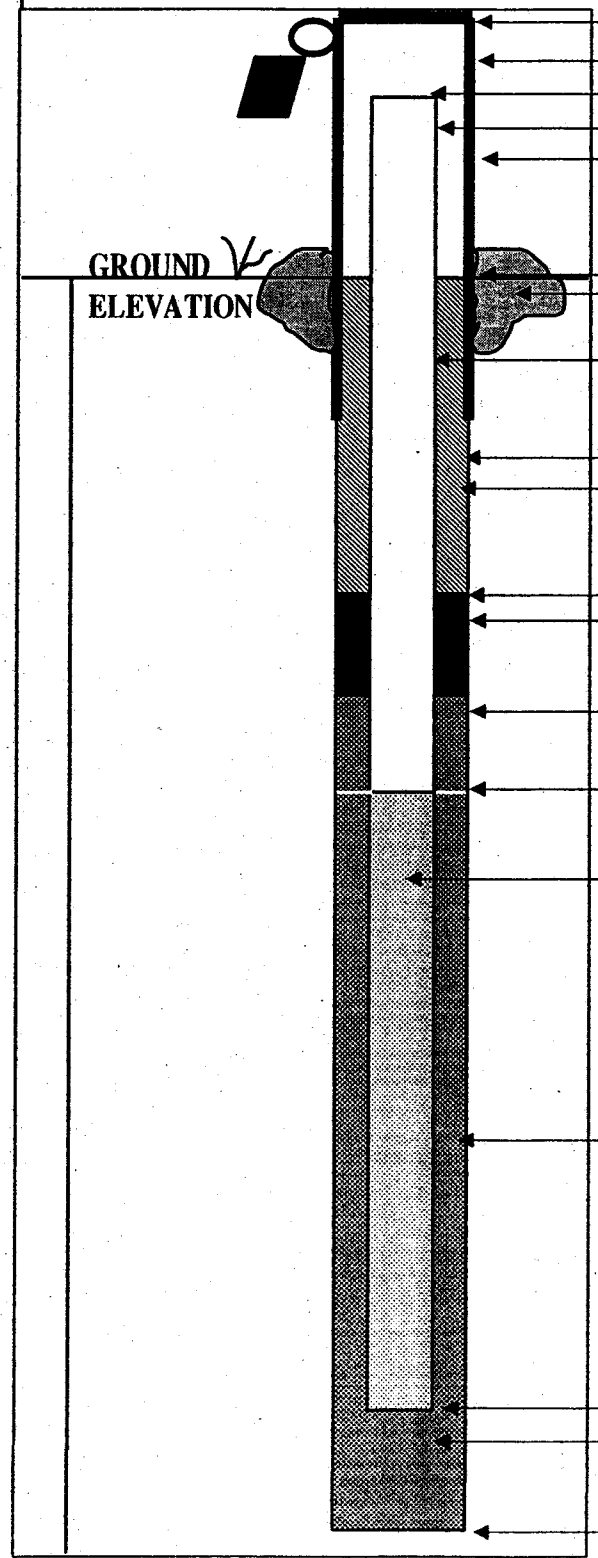
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 674.92 8.0

BORING NO.: 13TW009

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB52
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1308991.98
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023485.02



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 700.42

RISER STICK-UP ABOVE GROUND SURFACE: ~ 2.5

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 697.92

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 697.92 / 0

ELEVATION / DEPTH TOP OF SCREEN: 695.42 / 2.5

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 690.42 / 7.5

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

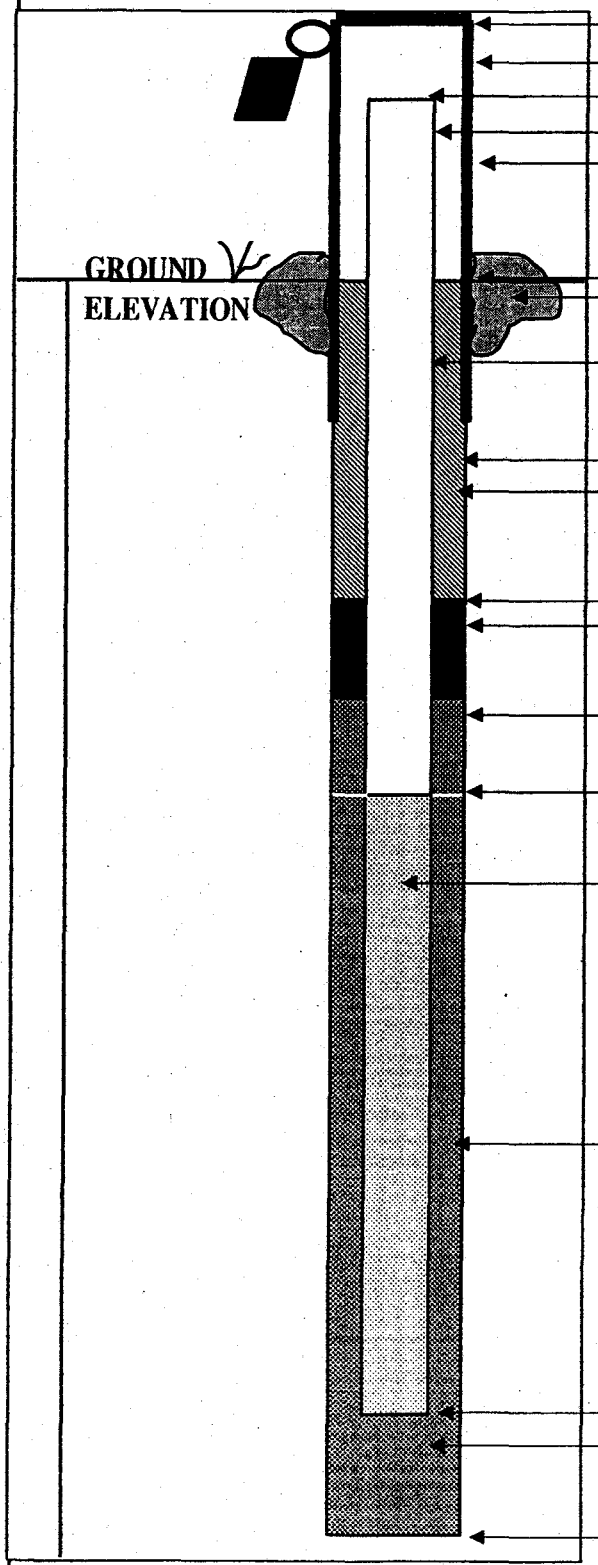
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 690.42 / 7.5

BORING NO.: 13TW010

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB54
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1309071.80
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023492.82



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 699.39

RISER STICK-UP ABOVE GROUND SURFACE: 1.85

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 697.54

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: — / —

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 697.54 0

ELEVATION / DEPTH TOP OF SCREEN: 695.54 / 2.0'

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 x 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 690.54 / 7.0

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

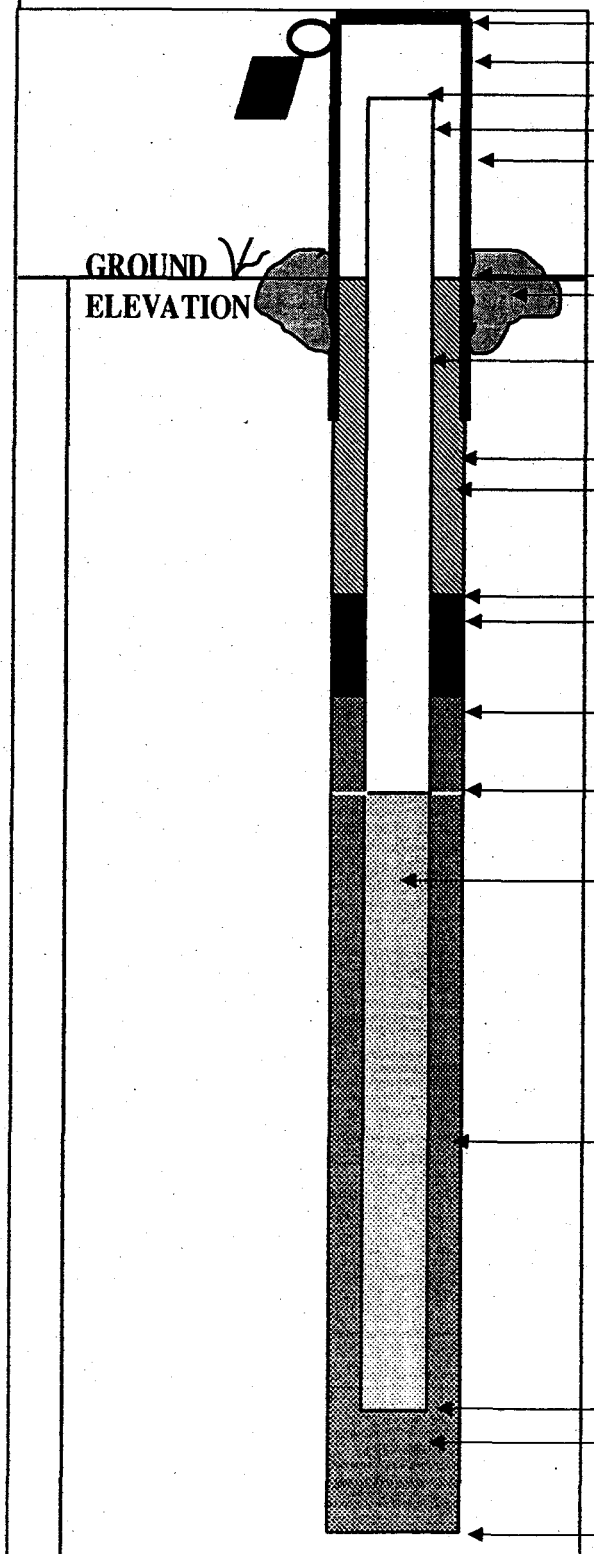
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 690.54 / 7.0

BORING NO.: 13TW01

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB60
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-15-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	130973.37
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3024174.91



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 712.04

RISER STICK-UP ABOVE GROUND SURFACE: ~3'

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 709.04

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: - / -

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 709.04 / 0

ELEVATION / DEPTH TOP OF SCREEN: 707.04 / 2

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 x 10'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 697.04 / 12

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

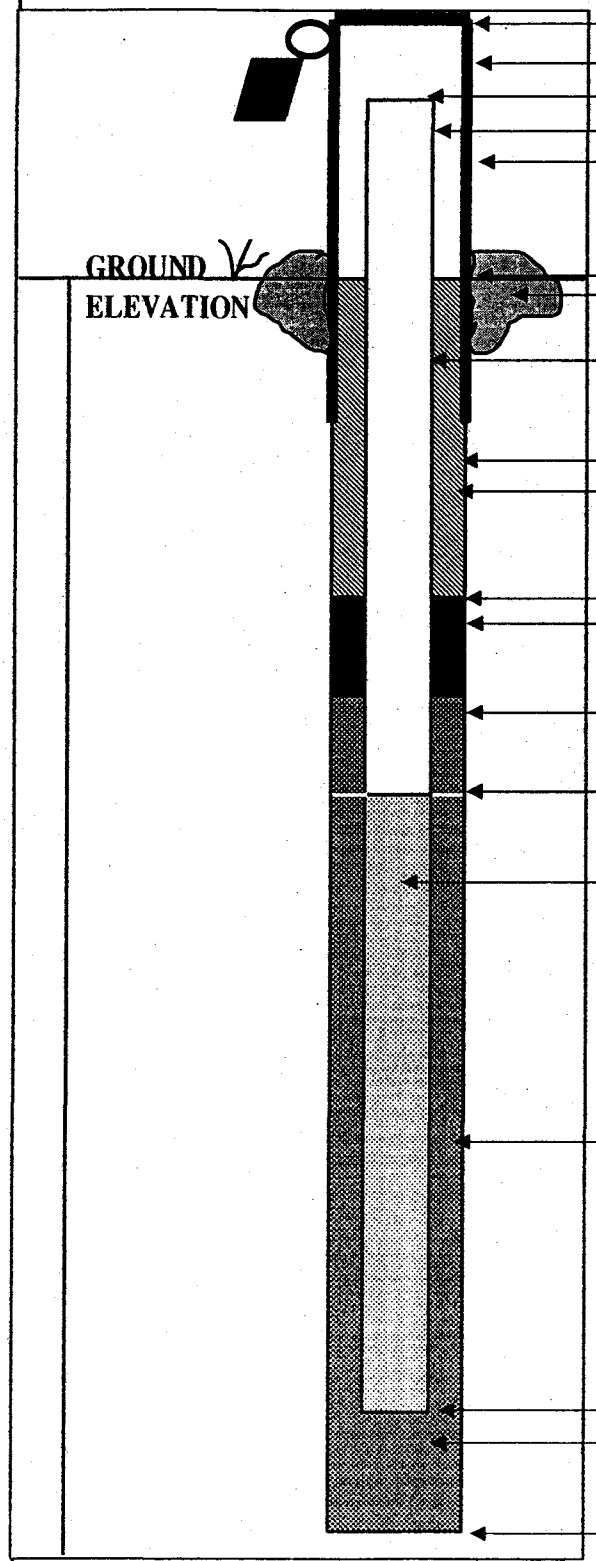
TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 697.04 / 12

BORING NO.: 13TW012

Tetra Tech NUS, Inc. **OVERBURDEN TEMPORARY WELL SHEET**

PROJECT:	NSWC CRANE	DRILLING Co.:	EFS	BORING No.:	13SB72
PROJECT No.:	6878	DRILLER:	J. McFall	DATE COMPLETED:	2-21-06
SITE:	SWMU 13	DRILLING METHOD:	DPT	NORTHING:	1308968.06
GEOLOGIST:	DAVID HICKEY	DEV. METHOD:	NA	EASTING:	3023397.43



ELEVATION OF TOP OF SURFACE CASING: NA

STICK -UP TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: 698.68

RISER STICK-UP ABOVE GROUND SURFACE: ~ 5.25

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASI: NA

GROUND ELEVATION: 693.43

TYPE OF SURFACE SEAL:

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER:

TYPE OF SEAL:

ELEVATION / DEPTH OF SEAL: — / —

TYPE OF SEAL:

ELEVATION / DEPTH TOP OF FILTER PACK: 693.43 / 0

ELEVATION / DEPTH TOP OF SCREEN: 693.43 / 0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.010 X 5.0'

I.D. OF SCREEN: 1"

TYPE OF FILTER PACK: #5 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 688.68 / 14.75

ELEVATION / DEPTH BOTTOM OF FILTER PACK: /

TYPE OF BACKFILL BELOW WELL:

ELEVATION / DEPTH OF BOREHOLE: 688.68 / 15.0'

APPENDIX C
SWMU 13
SAMPLE LOG SHEETS AND OTHER FIELD FORMS
ROUND 1, ROUND 2, ROUND 3

APPENDIX C.1.1
SWMU 13
SOIL SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 01 0002
Sample Location: 13SB 01
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1240	0 - 2'	GREY BRN	SANDY SILT, MOIST
Method: DPT			
Monitor Reading (ppm): 3.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

M L

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 010204
Sample Location: 13SB 01
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 09163 & 0965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1245	2-4'	GREY-BRN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 3.6			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: ____

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 02 0002
Sample Location: 13SB 02
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1255	0 - 2'	GREY BROWN	SANDY SILT, MOIST
Method: DPT			
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 020204
Sample Location: 13SB 02
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 20965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1300	2-4'	GREY BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 03 0002
Sample Location: 13SB 03
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 / 0965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1310	0 - 2'	GREY BROWN	SANDY SILT MOIST
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings				
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 030204
Sample Location: 13SB 03
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1315	2-4'	GREY BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 04 0002
Sample Location: 13SB 04
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1415	0 - 2'	GREY BROWN	SANDY SILT, MOIST
Method: DPT			
Monitor Reading (ppm): 2.2			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars X 3	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars X 3	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

(MS/MSD)

Duplicate ID No.: FD 0325 0301

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 040204
Sample Location: 13SB 04
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1420	2-4'	GREY BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 2.2			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 05 0002
Sample Location: 13SB 05
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1350	0 - 2'	GREY BROWN	SANDY SILT. SATURATED
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(1) ~~(2)~~ 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 050204
Sample Location: 13SB 05
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1355	2-4'	GREY BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(1) (2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

M

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS06 0002
Sample Location: 13SB06
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0963 20965

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	0 - 2'	GREY BROWN	SILTY SAND, moist
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) No	
VOCs (8015B)	(2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 060204
Sample Location: 13SB 06
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 & 0965

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-25-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1335	2-4'	GREY BROWN	SILTY SAND, DAMP
Method: DPT			
Monitor Reading (ppm): 1.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) No	
VOCs (8015B)	(2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 01 0002
Sample Location: 13SB 01
Sampled By: M.Cochran / T. Rojahn / B. Mauvee
C.O.C. No.: 0968

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/26/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1320	0 - 2'	DARK BROWN	SILTY SAND
Method: DPT			
Monitor Reading (ppm): 0.2			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/(No)	
VOCs (8015B)	(2) Encore Samplers	Yes/(No)	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes/(No)	
TOC, CEC & pH	(2) 8oz. Glass Jars	(Yes)/No	
Dioxins/Furans	(1) _oz. Glass Jars	Yes/(No)	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Belkevec

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB 07 0810
Sample Location: 13SB 07
Sampled By: M. Cochran / T. Rojahn / B Barnhouse
C.O.C. No.: 6968

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/26/03 Time: 1330 Method: DPT Monitor Reading (ppm): 0.0	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	8'-10'	RED BROWN	SILT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/(No)	
VOCs (8015B)	(2) Encore Samplers	Yes/(No)	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes/(No)	
TOC, CEC & pH	(2) 8oz. Glass Jars	(Yes)/ No	
Dioxins/Furans	(1) _oz. Glass Jars	Yes/(No)	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Bulkley

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 08 0002
Sample Location: 13SB 08
Sampled By: M.Cochran / T. Rojahn / B. Falkner
C.O.C. No.: 0979

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0745	0 - 2'	YELLOW OR	CLAYEY SILT
Method: ~~DPT~~ ROTOSONIC			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/(No)	
VOCs (8015B)	(2) Encore Samplers	Yes/(No)	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes/(No)	
TOC, CEC & pH	(4) ~~(2)~~ 8oz. Glass Jars	(Yes)/ No	
Dioxins/Furans	(1) _oz. Glass Jars	Yes/(No)	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD: —

Duplicate ID No.: FD033000304

Signature(s):

Robert Falkner

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB080608
Sample Location: 13SB08
Sampled By: M. Cochran / T. Rojahn / B. Balcome
C.O.C. No.: 0979

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0800	6-8'	YELL ORN LT. GRAY	CLAYEY SILT (MOTTLED)
Method: ~~BPT~~ RUTSONDE			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes/ No	
TOC, CEC & pH	(4) ~~(2)~~ 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Balcome

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SS 09 0002
Sample Location: 13SB 09
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 9068 ₹0946

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 945	0 - 2'	BLACK	COMPOST / MANURE MOIST
Method: DPT		BROWN	SILTY SAND DAMP
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	4 ~~(2)~~ 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	2 ~~(1)~~ oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD032603O1

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 09 0204
Sample Location: 13SB 09
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 9685 0966

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 950	2-4	BROWN	SILTY SAND
Method: DPT			
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings				
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 10 0002
Sample Location: 13SB 10
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0968 & 0966

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 930	0 - 2'	BROWN	SANDY SILT, MOIST
Method: DPT			
Monitor Reading (ppm): 1.9			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Ty Mozi

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 100204
Sample Location: 13SB 10
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 09688 0966

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 935	2-4	BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 1.9			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS | | 0002
Sample Location: 13SB | |
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0968 & 0966

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 915	0 - 2'	RD-BRN	SILTY SAND, MOIST
Method: DPT			
Monitor Reading (ppm): 1.9			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB 110204
Sample Location: 13SB 11
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0963 2096

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 920	2-4'	RD-BRN	SILTY SAND, DAMP
Method: DPT			
Monitor Reading (ppm): 1.9			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings				
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PBS-9

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SS 12 0002
Sample Location: 13SB 12
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 968 E0936

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 830	0 - 2'	BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings				
(Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes) No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle If Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 12 0204
Sample Location: 13SB 12
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 468509 6

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 835	2-4'	BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 2.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 13 0002
Sample Location: 13SB 13
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 968 50966

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 750	0 - 2'	BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes) No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SB 130204
Sample Location: 13SB 13
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 468, 50946

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3-26-03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 755	2-4'	BROWN	SANDY SILT, DAMP
Method: DPT			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	(Yes)/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	(Yes)/ No	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 14 0001
Sample Location: 13SB 14
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0985 & 0987

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/10/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1340	0 - 1'	BROWN	SANDY SILT SOME TOPSOIL
Method: ~~DPT~~ HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	Yes/ No	
VOCs (8015B)	(2) Encore Samplers	Yes/ No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes/ No	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes/ No	
Dioxins/Furans	(1) _oz. Glass Jars	Yes/ No	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

* HIT REFUSAL @ 1' 2 OFFSETS

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Robert Balkwill

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SS 15 0002
Sample Location: 13SB 15
Sampled By: M.Cochran / T. Rojahn
C.O.C. No.: 0987

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/10/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1230	0 - 2'	BROWN	TOP SOIL. HIGH ORGANIC CONTENT
Method: ~~DPT~~ HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) No	
VOCs (8015B)	(2) Encore Samplers	(Yes) No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes (No)	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes (No)	
Dioxins/Furans	(1) _oz. Glass Jars	Yes (No)	

OBSERVATIONS / NOTES:

Soil Group No. PS-3

Collected 2' From 13SB09
SEE Boring Log 13SB09

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Robert Balthrop

Tetra Tech NUS, Inc.

SOIL SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB 150204
Sample Location: 13SB 15
Sampled By: M. Cochran / T. Rojahn
C.O.C. No.: 0987

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 4/6/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1235	2'-4'	YELLOW ORANGE	SANDY SILT
Method: ~~DPT~~ HAND AUGER			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
VOCs (8260B)	(3) Encore Samplers	(Yes) / No	
VOCs (8015B)	(2) Encore Samplers	(Yes) / No	
SVOCs (8270C, SIM & 8151A) & PCBs (8082)	(2) 8oz. Glass Jars	Yes / (No)	
TOC, CEC & pH	(2) 8oz. Glass Jars	Yes / (No)	
Dioxins/Furans	(1) _oz. Glass Jars	Yes / (No)	

OBSERVATIONS / NOTES:

Soil Group No. PBL-8

Collected <1' FROM 13SB09
SEE BORING LOG 13SB09

MAP:

See Revised Figure 3-2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Robert Balkwill

APPENDIX C.1.2
SWMU 13
SOIL SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB160002
Sample Location: SWMU 13
Sampled By: SG+TR
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0848	0'0-02'	BLK/DK.BR/GREY	SILTY CLAY W/SOME FINE SAND AND ORGANIC MAT'RL
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB160204
Sample Location: SWMU 13
Sampled By: S.G+TR
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0900	02-04'	LT BR./GREY	SILTY CLAY W/SOME SAND WET + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

WATER IN HOLE @ 2.0'

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

SS (SB)

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB170002
Sample Location: SWMU 13
Sampled By: SG+TR
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0900	00'-02'	BR./LT. BR	SANDY LOAM AND SILTY CLAY
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Scott Green

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB170204
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0905	02'-04'	LT. BR/GREY/OR	SILTY CLAY W/SAND (FINE)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13 SS 180002
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0912	00'-02'	DK. BR/BR	SANDY LOAM + SILTY CLAY
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tay Logal

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB180204
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4831 & 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0930	02'-04'	DK. BR.	SILT + CLAY ALTERNATING (MOIST) WET 90
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

WATER IN HOLE AT 3.0'

MAP:

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	13FD120803O1

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13 SS SG 19 0002
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 9831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0920	00-02	BR./LT. BR	SANDY LOAM + SILTY CLAY MOIST
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Scott Green

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB190203
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0930	02-03'	DK. BR	SILTY CLAY MOIST + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s): Scott Sma

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

SS (SG)

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13582000 02
Sample Location: SWMU 13
Sampled By: TR + SG
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1005	00'-01'	BR./LT. BR/ORANGE	DARK BROWN LOAM + CLAYEY FINE SAND W/ ROCK + GRAVEL
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

REFUSAL AT 1.0'

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Scott Sm

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SS(SG)B210002
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1004	00-02'	DK. BR/LT. BR/ORANGE	BROWN LOAM + LT. BR. SILTY CLAY W/ FINE SAND
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB210204
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4831 & 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1019	02-04'	LT. BR/GREY/ORANGE	SILTY CLAY W/SOME FINE SAND MOIST + COHESIVE
Method: HAND AUGER			
Monitor Reading (ppm): ←			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: 13FD120803 02

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: SS (16) 13SB220002
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1030	00'-02'	DK. BR.	DARK BROWN LOAM + SILTY CLAY (MOIST)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s): Scott Sun

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB220204
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4831

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1045	02'-04'	BR./LTBR./ORANGE	CLAYEY FINE SAND W/GRAVEL (SLIGHTLY MOIST)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Scott Grace

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13 SS SB (SG) 23 0002
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1036	00-02'	DK. GREY / BR. / BLK	SILTY LOAM, SANDY CLAY W/GRAVEL AND PATCHES OF BLACK ORGANIC MAT'RL. (SLIGHTLY MOIST + COHESIVE)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tony Rock

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB230204
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4832

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1046	02'-04'	ORANGE	CLAYEY SAND (FINE) (SLIGHTLY MOIST + COHESIVE)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SS(SB)24 0002
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1110	00'-02'	GREY/BLK./ORANGE	SANDY LOAM + CLAYEY SAND W/GRAVEL + PATCHES OF BLACK ORGANIC MATERIAL (SLIGHTLY MOIST)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Scott Green

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB240203
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1120	02-03'	ORANGE	SILTY SAND W/ GRAVEL + SOME CLAY 70% SAND (SLIGHTLY MOIST + COHESIVE)
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

REFUSAL AT 3.0'

MAP:

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Scott Smith

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: SS SG 13SB250002
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4032

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/02	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1104	00'-02'	GREY/BLK/ORANGE	SANDY LOAM W/GRAVEL CLAYEY SAND + SANDY CLAY
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SB250204
Sample Location: SWMU 13
Sampled By: TR
C.O.C. No.: 4832

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 12/8/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1115	02-04'	ORANGE	SILTY SAND W/ CLAY 70% SAND (MOIST + COHESIVE) SC.
Method: HAND AUGER			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tey Bank

APPENDIX C.1.3
SWMU 13
SOIL SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS26ΦΦΦ2
Sample Location: 13SB26
Sampled By: CCL/JG
C.O.C. No.: 0057

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: ΦΦ94Φ	Φ-2'	Orange Brown Mottled Gray	Clayey SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID Not Working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Luke C. [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B26Φ2Φ4
Sample Location: 13SB26
Sampled By: CCL/JG
C.O.C. No.: 0057

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: Φ943	2-4'	Orange Brown Mottled Gray	Clayey SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Taylor III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S S 27 ΦΦ 2
Sample Location: 13SB 27
Sampled By: JG/CCL
C.O.C. No.: 0059

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1Φ18	Φ - 2'	Dark Gray	CLAY, soft, wet w/ petroleum odor.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT working properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Fry III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB 27 0204
Sample Location: 13SB 27
Sampled By: JG/CC
C.O.C. No.: 0059

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1021	2-4'	Dark Gray / Orange Brown	Silty Clay, Moist.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Mark C. Scott

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13S B 28 0204
Sample Location: 13SB 28
Sampled By: CCL/JG
C.O.C. No.: 0057

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0957	2-4'	Orange Brown	FINE SAND, SILT, MOIST.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Griffin III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB28Φ4Φ6
Sample Location: 13SB 28
Sampled By: CCL/JG
C.O.C. No.: 0057

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1ΦΦ5	4-6'	Orange Brown	Fine SAND, SILT, MOIST.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Griffith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS 29ΦΦΦ2
Sample Location: 13SB 29
Sampled By: CL/JG
C.O.C. No.: 0057

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1Φ36	Φ-2'	Dark Gray	Clayey SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Griffith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB29Ø2Ø4
Sample Location: 13SB29
Sampled By: CL/JG
C.O.C. No.: 0057

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1Ø4Ø	2-4'	Orange Brown	Silty, Clayey SAND, wet.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID not working properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clyde C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS30000 2
Sample Location: 13SB 30
Sampled By: CCL/JG
C.O.C. No.: 0059

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0840	0-2'	ORANGE BROWN	Clayey SAND
Method: Disposable Trowel			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date: NA	Time: NA	Depth: NA	Color: NA	Description (Sand, Silt, Clay, Moisture, etc.): NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	1x3 (3)

OBSERVATIONS / NOTES:

N/A. MS/MSD collected here.

MAP:

See Figure 3-1

Circle if Applicable:
MS/MSD

Duplicate ID No.:

Signature(s):

Chuck C. Ly III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS3ΦΦΦ24 (TT)
Sample Location: 13SB3Φ
Sampled By: CCL/JG
C.O.C. No.: 0059 & 0060

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0846 (TT)	Φ-2'	Lt. Orange Brown - Lt. Grey	Clayey SAND, SMALL DRY
Method: Disposable Trowel			
Monitor Reading (ppm): Φ			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	1X2=2

OBSERVATIONS / NOTES:

Duplicate Sample Collected Here.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.: 13FDΦ81104-Φ1

Signature(s):

Clyde C. Ivy III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB31Φ4Φ6
Sample Location: 13SB 31
Sampled By: CCL / JG
C.O.C. No.: 0057 & 0059

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1ΦSΦ	4-6'	Orange Brown To Gray	Fine SAND and SILT.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	1x2=2

OBSERVATIONS / NOTES:

Duplicate Sample Taken Here.
PID Not Working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.: 13FDΦ81ΦΦ4-Φ1

Signature(s):

Charles C. Lynch III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB31Ø648
Sample Location: 13SB 31
Sampled By: CLL/JG
C.O.C. No.: 0057

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1ØS2	6-8'	Orange Brown To Gray	Fine SAND, SILT.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly,

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ryan III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S S32ΦΦ2
Sample Location: 13SB 32
Sampled By: CCL/JG
C.O.C. No.: 0057

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11Φ6	Φ-2'	Orange Brown	Clayey SAND w/ compacted SAND lenses,
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID not working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13S B 32 Φ2Φ4
Sample Location: 13SB 32
Sampled By: CdL/JG
C.O.C. No.: 0057

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1109	2-4'	Orange Brown	Clayey SAND, wet.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Chad C. Gayhart

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS33ΦΦ2
Sample Location: 13SB33
Sampled By: CCL/JTG
C.O.C. No.: 0058

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/16/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1121	Φ-2'	Orange Brown	Clayey SAND w/ some fine SAND, SILT & micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B334204
Sample Location: 13SB 33
Sampled By: CL/JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1124	2-4'	Orange Brown Mottled Light Gray	Fine SAND, Silt, Micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS34 0002
Sample Location: 13SB 34
Sampled By: ECL/JG
C.O.C. No.: 0058

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1139	0-2'	Orange Brown	medium SAND & Sandy CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID Not Working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Eric C. Gill III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB34-2-4
Sample Location: 13SB 34
Sampled By: CC/JG
C.O.C. No.: 0058

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1143	2-4'	Orange Brown Mottled Gray	Sandy CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Griffith III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS35ΦΦ2
Sample Location: 13SB35
Sampled By: CCL/JG
C.O.C. No.: 0058

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1207	Φ-2'	Orange Brown Mottled Gray	Sandy CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT Working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.:

Signature(s):

Charles C. Tyndall

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B 35Ø2Ø4
Sample Location: 13SB 35
Sampled By: CL/JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 121Ø	2-4'	Light Brown mottled Gray	Fine SAND, SILT, micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert C. Ivy III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S S360002
Sample Location: 13SB 36
Sampled By: CCL / JG
C.O.C. No.: 0058

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1155	0 - 2'	Orange BRN mottled GRAY	Stiff clay
Method: Dis. Trowel			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date: NA	Time: NA	Depth: NA	Color: NA	Description (Sand, Silt, Clay, Moisture, etc.): NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

NA

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB36 0204
Sample Location: 13SB 36
Sampled By: CCL / JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1159	2-4'	orange BRN mottled Gray	F. Sand, Silt
Method: D.S. Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

NA

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS37QQQ2
Sample Location: 13SB37
Sampled By: CCL/JG
C.O.C. No.: 0057

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1222	0-2'	Orange Brown Mottled Gray	Clayey SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID Not Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB37Ø2Ø4
Sample Location: 13SB 37
Sampled By: CL/JG
C.O.C. No.: 0057

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/16/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1225	2-4'	Orange Brown TO Light Brown	Fine SAND, Silt, Micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

PID NOT Working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Smith

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13S538ΦΦ02
Sample Location: 13SB 38
Sampled By: CCL/JS
C.O.C. No.: 0059

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 144Φ	Φ-2'	Light Brown/ Gray	Clayey SAND and Sandy CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	1x3=3

OBSERVATIONS / NOTES:

MS/MSD Sample Collected Here.

MAP:

See Figure 3-1

Circle if Applicable:

(MS/MSD)

Duplicate ID No.:

Signature(s):

Clyde C. Ley III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B38Ø2Ø4
Sample Location: 13SB38
Sampled By: CCL/JG
C.O.C. No.: 0059

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1443	2-4'	Orange Brown	Silty Micaceous CLAY.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clyde C. Goff III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S S39004 2
Sample Location: 13SB 39
Sampled By: CCL/JD
C.O.C. No.: 0059

[X] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1455	0-2'	Light Gray TO Orange Brown	Silty CLAY w/roots, moist,
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:
MS/MSD —
Duplicate ID No.:

Signature(s):
Charles C. Ley III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B39Ø2Ø4
Sample Location: 13SB39
Sampled By: CCL/JG
C.O.C. No.: 0059

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1459	2-4'	Orange Brown mottled Gray	Very Fine SAND, some SILT, MICAS.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Lyle III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SS40002
Sample Location: 13SB40
Sampled By: acl/JG
C.O.C. No.: 0058

[X] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1429	0-2'	Light Brown To Orange Brown	Clayey SAND w/ some micas,
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13S B40204
Sample Location: 13SB40
Sampled By: CCL/JG
C.O.C. No.: 0059

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/16/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1431	2-4'	Orange Brown	Very Fine SAND and SILT, Micaceous.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID Not Working Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

C. Tyler III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SB41Ø4Ø6
Sample Location: 13SB 41
Sampled By: CCL/JG
C.O.C. No.: 0058

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1417	4-6'	Orange Brown Mottled Gray	Very Fine SAND & SILT w/micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Robert C. [illegible] III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB41-0608
Sample Location: 13SB41
Sampled By: CCL / JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1420	6-8'	Light Orange Brown Mottled Gray	Very Fine SAND + Silt w/ Micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Mark C. Leyh III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B42 0406
Sample Location: 13SB42
Sampled By: CCL/JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04 Time: 1357 Method: Disposable Trowel Monitor Reading (ppm): —	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	4-6'	Orange Brown	Clayey SAND.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ferguson III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B42Φ6Φ8
Sample Location: 13SB42
Sampled By: CCL/JG
C.O.C. No.: 0058

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Φ/Φ4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 14ΦΦ	6-8'	Orange Brown Mottled Light Gray	Fine SAND & Silt w/ some mica's.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Ingram III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B43 0406
Sample Location: 13SB 43
Sampled By: CCL/JTG
C.O.C. No.: 0059

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1530	~~4-6~~ 2-4'	Orange Brown	Very Fine SAND, Silt + micas.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Mark C. Taylor III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13S B 44 ~~0496~~ 0496 (TS)
Sample Location: 13SB 44
Sampled By: CCL/JG
C.O.C. No.: 0059

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/10/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1505	~~4-6~~ (QD) 2-4	Orange Brown	Very Fine SAND, SILT, w/ MICAS,
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A: PID not working Properly.

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Charles C. Taylor III

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13S B45Φ406
Sample Location: 13SB 45
Sampled By: CL / JG
C.O.C. No.: 0060

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0928	4-6'	Orange Brown Mottled Gray	Compacted SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Mark C. Tyff

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB46Ø4Ø6
Sample Location: 13SB46
Sampled By: CC/JG
C.O.C. No.: 0057

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/1Ø/Ø4	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: Ø923	4-6'	Orange Brown Mottled Gray	Clayey SAND
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	(Yes)	

OBSERVATIONS / NOTES:

PID NOT WORKING Properly

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Mark C. Lynch

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SB47Φ2Φ4
Sample Location: 13SB 47
Sampled By: CLL/JG
C.O.C. No.: 0059

[] Surface Soil
[X] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 8/11/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: Φ9Φ4	2-4'	Orange Brown	CLAY with lenses of compacted SAND, WET.
Method: Disposable Trowel			
Monitor Reading (ppm): Φ			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PCBs SW-846 8082	(1) 4oz Jar	Yes	

OBSERVATIONS / NOTES:

N/A

MAP:

See Figure 3-1

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

APPENDIX C.1.4
SWMU 13
SOIL SAMPLE LOG SHEETS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS480002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB48	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:47	DPT		0-2	dark brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:47	SW-846-8330	Nitroaromatics and Nitramines	None	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB480204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB48	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:50	DPT		2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:50	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS490002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB49	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:25	DPT		0-2	dark brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:25	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB490204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB49	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:30	DPT		2-4	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB490608	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB49	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:35	DPT		6-8	light tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:35	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS500002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB50	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	09:45	DPT		0-2	black	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:05	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB500305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB50	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:10	DPT		3-5	dark brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:10	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB500709	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB50	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	13:15	DPT		7-9	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	13:15	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS510002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB51	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:25	DPT		0-2	light tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:25	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB510406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB51	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:30	DPT		4-6	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB510607	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB51	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:35	DPT		6-7	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:35	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS520002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB52	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:00	DPT		0-2	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:00	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB520406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB52	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:03	DPT		4-6	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:03	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB520608	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB52	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:05	DPT		6-8	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:05	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	Do MS/MSD	112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS530002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB53	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	14:45	DPT		0-2	brown	Appeared to be a concrete basin at this outflow at approximately 2' bgs. Sample was collected from this location

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	14:45	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB530204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB53	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	14:50	DPT		2-4	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	14:50	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS540002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB54	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:35	DPT		0-2	light brown	Original staked location had refusal at 2' bgs. This sample was collected there and then the boring was moved back 5' for remaing sample depths.

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:35	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB540305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB54	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:38	DPT		3-5	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:38	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	Do MS/MSD	112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB540507	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB54	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	15:40	DPT		5-7	light grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	15:40	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS550002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB55	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	09:28	DPT		0-2	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:28	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB550406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB55	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:30	DPT		4-6	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB550608	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB55	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:33	DPT		6-8	dark grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:33	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS560002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB56	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:42	DPT		0-2	dark grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:42	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB560305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB56	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:45	DPT		3-5	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:45	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS570002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB57	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:05	DPT		0-2	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:05	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB570406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB57	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:08	DPT		4-6	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:08	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB570911	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB57	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:11	DPT		9-11	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:11	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth amber w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB571112	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB57	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	09:15	DPT		11-12	dark grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	09:15	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS580002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB58	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	08:55	DPT		0-2	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	08:55	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB580203	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB58	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	08:58	DPT		2-3	light tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	08:58	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS590002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB59	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	08:35	DPT		0-2	dark brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	08:35	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB590204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB59	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	08:45	DPT		2-4	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	08:45	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS600002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB60	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:22	DPT		0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:22	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB600406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB60	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:25	DPT		4-6	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:25	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB600810	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB60	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:28	DPT		8-10	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:28	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB601012	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB60	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:30	DPT		10-12	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:30	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS610002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB61	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:08	DPT		0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:08	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB610204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB61	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	16:10	DPT		2-4	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	16:10	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2172006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS620002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB62	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	High concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:01	DPT		0-2	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:01	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB620305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB62	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:09	DPT		3-5	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:09	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB620506	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB62	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:15	DPT		5-6	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:15	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS630002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB63	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:45	DPT		0-2	light tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:45	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB630507	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB63	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:50	DPT		5-7	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:50	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB630709	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB63	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	11:55	DPT		7-9	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	11:55	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS640002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB64	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	11:10	DPT		0-2	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	11:10	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB640406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB64	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	11:12	DPT		4-6	dark grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	11:12	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB640608	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB64	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	11:15	DPT		6-8	dark grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	11:15	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS650002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB65	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:50	DPT		0-2	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:50	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB650305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB65	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:53	DPT		3-5	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:53	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB650709	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB65	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:55	DPT		7-9	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:55	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS660002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB66	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:35	DPT		0-2	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:35	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB660406	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB66	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:37	DPT		4-6	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:37	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Plastic	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB660608	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB66	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:40	DPT		6-8	dark tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:40	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS670002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB67	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:20	DPT		0-2	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:20	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB670305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB67	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:22	DPT		3-5	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:22	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB670709	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB67	**Created Date**	2/15/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/15/06	10:25	DPT		1	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:25	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS680002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB68	**Created Date**	2/14/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	James Goerdt	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	14:40	DPT		0-2	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	14:40	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB680204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB68	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	14:45	DPT		2-4	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	14:45	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS690002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB69	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	14:20	DPT		0-2	dark brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	14:20	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	DO MS/MSD	112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB690204	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB69	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	14:25	DPT		2-4	light brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	14:25	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS700002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB70	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	16:15	DPT		0-2	black	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	16:15	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB700305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB70	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	16:18	DPT		3-5	grey	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	16:18	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS710002	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB71	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	15:55	DPT		0-2	black	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	15:55	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB710305	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB71	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	15:58	DPT		3-5	tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	15:58	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB710507	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Sample Location ID**	13SB71	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Sampled By**	James Goerdt	**Modified By**	
WBS Code #	0000	**Concentration**	-Select-	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/14/06	16:00	DPT		5-7	light tan	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	16:00	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2152006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS720002	**Created By**	Anonymous
TtNUS Project #	112GN6878	**Sample Location ID**	13SB72	**Created Date**	2/21/06
Task/Contract #	CTO 0357	**Sampled By**	Anonymous	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/21/06	09:30	DPT		0-2	orange	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/21/06	09:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2212006-4

General Observations and Notes

No Notes

- End of Report -

APPENDIX C.1.5
SWMU 13
SOIL SAMPLE LOG SHEETS
PCB DELINEATION INVESTIGATIONS

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS730002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB73	**Created Date**	6/5/06
Task/Contract #	CTO 377			**Modified By**	
WBS Code #	TP00050125	**Sampled By**	David Hickey	**Modified Date**	
QA Sample Type	na	**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	11:30	Hand auger	NA	0.0 - 2.0'	brown	Silty clay with some fine to med sand

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	11:30	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB730204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB73	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	9/8/06
QA Sample Type	na			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	11:40	Hand auger	NA	2.0 - 4.0'	-Select-	Silty fine to med sand with some clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	11:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS740002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB74	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	16:20	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	16:20	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS750001	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB75	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	na			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	11:24	Hand auger	na	0.0 - 1.0'	dark brown	Clayey silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	11:24	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS760001	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB76	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	14:42	Trowel	NA	0-1'	light brown	Sandy silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	14:42	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Sample collected from mound of dirt on concrete floor of enclosed transport corridor. Refusal at ~1.0' below surface.	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS770002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB77	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	9/8/06
QA Sample Type	FD06060602			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	10:30	Hand auger	NA	0-2'	-Select-	Collect FD06060602

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	10:30	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB770204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB77	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	Michael Quaill
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	9/8/06
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	10:40	Hand auger	NA	2-4'	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	10:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS780002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB78	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	16:50	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	16:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB780204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB78	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	16:58	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	16:58	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS790002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB79	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	16:30	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	16:30	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB790204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB79	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	na			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	16:37	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	16:37	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS800002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB80	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:05	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB800204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB80	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:15	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:15	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS810002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB81	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	18:20	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	18:20	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB810204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB81	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	MS/MSD			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	18:30	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	18:30	SW-846 8082	PCBs	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	DO MS/MSD	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS820002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB82	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	7/24/06
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	18:05	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	18:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS830002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB83	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:35	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:35	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB830204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB83	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:45	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:45	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS840002	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB84	**Created Date**	6/5/06
Task/Contract #	CTO 377			**Modified By**	
WBS Code #	TP00050125	**Sampled By**	David Hickey	**Modified Date**	
QA Sample Type	NA	**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:50	Hand auger	NA	0-2	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB840204	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SB84	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	17:56	Hand auger	NA	2-4	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	17:56	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB850406	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB85	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	14:05	Hand auger	NA	4-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	14:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	14:05	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB850608	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB85	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	14:17	Hand auger	NA	6-8	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	14:17	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	14:17	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB860406	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB86	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	10:55	Hand auger	NA	4-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	10:55	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5
✗	8/25/06	10:55	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB860608	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB86	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	11:20	Hand auger	NA	6-8	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	11:20	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	11:20	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS870002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB87	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	14:32	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	14:32	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	14:32	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB870204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB87	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	14:38	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	14:38	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5
✗	8/25/06	14:38	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB870506	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB87	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	14:52	Hand auger	NA	5-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	14:52	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5
✗	8/25/06	14:52	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

Hit refusal at 5.8ft BGS

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS880001	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB88	**Created Date**	8/24/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	08:38	Hand auger	NA	0-1	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	08:38	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8252006-2
✗	8/24/06	08:38	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

Hit refusal at approximately 0.8ft BGS. Made several attempts at primary location and adjusted the location three time but were not able to advance beyond 1ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS890001	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB89	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	08:21	Hand auger	NA	0-1	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/24/06	08:21	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/24/06	08:21	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.08 ppm	112GN7448-8252006-2

General Observations and Notes

Hit refusal at approximately 0.8ft BGS. Made several attempts at primary location and adjusted the location three time but were not able to advance beyond 1ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS900002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB90	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	13:59	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	13:59	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/24/06	13:59	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8252006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB900203	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB90	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	14:05	Hand auger	NA	2-3	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
X	8/24/06	14:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/24/06	14:05	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.03 ppm	112GN7448-8252006-2

General Observations and Notes

Hit refusal at ~3ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS910001	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB91	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	13:45	Hand auger	NA	0-1	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	13:45	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/24/06	13:45	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.35 ppm	112GN7448-8252006-2

General Observations and Notes

Hit refusal at ~1.2ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS930002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB93	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	10:29	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	10:29	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.11 ppm	112GN7448-8252006-2
✗	8/24/06	10:29	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

Hit refusal at approximately 2ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS940002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB94	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	10:43	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/24/06	10:43	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/24/06	10:43	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.08 ppm	112GN7448-8252006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS950001	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB95	**Created Date**	8/24/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	09:37	Hand auger	NA	0-1	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	09:37	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 4.81 ppm	112GN7448-8252006-2
✓	8/24/06	09:37	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB950102	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB95	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	09:45	Hand auger	NA	1-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	09:45	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/24/06	09:45	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 10.4 ppm	112GN7448-8252006-2

General Observations and Notes

Hit refusal at ~2ft BGS.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS960002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB96	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	10:32	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	10:32	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	10:32	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 13.85 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB960204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB96	**Created Date**	8/23/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	10:39	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/23/06	10:39	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/23/06	10:39	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.1 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS970002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB97	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	10:43	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	10:43	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	10:43	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.03 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB970203	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB97	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	10:53	Hand auger	NA	2-3	brown	Hit Refusal at ~3ft BGS.

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	10:53	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	10:53	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.09 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS980002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB98	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	10:59	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	10:59	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	10:59	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.05 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB980204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB98	**Created Date**	8/23/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:04	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:04	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:04	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS990002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB99	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:13	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:13	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:13	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB990204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB99	**Created Date**	8/23/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:20	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:20	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:20	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1000002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB100	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/25/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:24	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:24	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:24	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1000204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB100	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:31	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:31	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:31	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1010002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB101	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:40	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:40	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1010204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB101	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	11:46	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	11:46	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	11:46	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

Location stakes have been removed. select sample location from site map.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1020002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB102	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	15:15	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	15:15	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/25/06	15:15	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.13 ppm	112GN7448-8272006-5

General Observations and Notes

Location added to delineate hit detected in 13SB96.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1030002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB103	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	15:42	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	15:42	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.2 ppm (Duplicate = 0.29 ppm)	112GN7448-8272006-5
✓	8/25/06	15:42	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

Location added to delineate hit detected in 13SB96.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1040002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB104	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	09:31	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	09:31	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	09:31	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1040204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB104	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/11/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	09:38	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	09:38	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	09:38	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1040406	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB104	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	09:45	Hand auger	NA	4-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	09:45	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	09:45	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1050002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB105	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	09:52	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	09:52	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 2.24 ppm (Duplicate = 1.71 ppm)	112GN7448-8262006-4
✓	8/26/06	09:52	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1050204	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB105	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	09:56	Hand auger	NA	2-4	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	09:56	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	09:56	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SB1050406	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB105	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	10:05	Hand auger	NA	4-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	10:05	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	10:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1060002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB106	**Created Date**	8/27/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/27/06	07:40	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/27/06	07:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/27/06	07:40	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.01 ppm	112GN7448-8272006-6

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SS1070002	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SB107	**Created Date**	8/27/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/27/06	07:50	Hand auger	NA	0-2	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/27/06	07:50	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.1 ppm	112GN7448-8272006-6
✗	8/27/06	07:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

APPENDIX C.2.1
SWMU 13
SEDIMENT SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD010004
Sample Location: 13SD01
Sampled By: T. Rojahn
C.O.C. No.: 0975

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1035	0 - 4"	DARK BROWN	SATURATED CLAYEY SILT + GRAVEL,
Method: Disposable Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD02 0004
Sample Location: 13SD 02
Sampled By: T. Rojahn
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1105	0 - 4"	Lt Brown	GRAVELLY SAND, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes)/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tony Nagel

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD030004
Sample Location: 13SD03
Sampled By: T. Bojahn M. Cochran
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/27/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1420	0 - 4"	LIGHT BROWN	SANDY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

T Bojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD04 0004
Sample Location: 13SD
Sampled By: ~~T. Rojahn~~ M. COCHRAN
C.O.C. No.: 0973

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1450	0 - 4"	LIGHT BROWN	SATURATED GRAVELLY SAND,
Method: Disposable Trowel			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	Yes (No)	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD05 0004
Sample Location: 13SD05
Sampled By: ~~T. Rojahn~~ M. COCHRAN
C.O.C. No.: 0975 & 0978 (DUP)

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1515	0 - 4"	LIGHT BROWN	CLAYEY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	Yes/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes)/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: FD03290301

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD06 0004
Sample Location: 13SD06
Sampled By: T. Rojahn
C.O.C. No.: 0975

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1545	0 - 4"	LIGHT BROWN	SANDY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	Yes/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD070004
Sample Location: 13SD07
Sampled By: ~~I Bojahn~~ M. Cochran
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1610	0 - 4"	LIGHT BROWN	GRAVELLY SAND, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD08 0004
Sample Location: 13SD08
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0975

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1620	0 - 4"	DARK BROWN	V. MOIST SILTY CLAY + GRAVEL
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes) No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	~~FD032903-01~~ (TC)

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD09 0004
Sample Location: 13SD 09
Sampled By: ~~I. Rojahn~~ M. Cochran
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1650	0 - 4"	LT BROWN	SANDY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Hyde

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD10 0004
Sample Location: 13SD 10
Sampled By: ~~T. Rejahn~~ M. Cochran
C.O.C. No.: 0975

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1710	0 - 4"	LIGHT BROWN	CLAYEY SILT. V. MOIST
Method: Disposable Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD 11 0004
Sample Location: 13SD 11
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0978

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0915	0 - 4"	LIGHT BROWN	SANDY SILT SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes)/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD12-0004
Sample Location: 13SD12
Sampled By: T. Rojahn M. Cochran
C.O.C. No.: 0978

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0930	0 - 4"	LIGHT BROWN	GRAVELLY SAND SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD 13 0004
Sample Location: 13SD 13
Sampled By: ~~I. Rojaha~~ M. Cochran
C.O.C. No.: 0978

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1000	0 - 4"	LIGHT BROWN	GRAVELLY SAND SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD14 0004
Sample Location: 13SD14
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0978

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1030	0 - 4"	LIGHT BROWN	GRAVELLY SAND, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes) No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD15 0004
Sample Location: 13SD 15
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0978

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1045	0 - 4"	LIGHT BROWN	GRAVELLY SILT. SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD16 0004
Sample Location: 13SD 16
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0178

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1100	0 - 4"	LIGHT BROWN	SILTY SAND + GRAVEL
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

T Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD 170004
Sample Location: 13SD 17
Sampled By: ~~I. Rojahn~~ M. Cochran
C.O.C. No.: 0975 & 0978

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1630	0 - 4"	LIGHT BROWN	GRAVELLY SAND, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes)/No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: FD032903 02 Except Geotech

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD18 0004
Sample Location: 13SD18
Sampled By: ~~T. Rojahn~~ M Cochran
C.O.C. No.: 0978

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1745	0 - 4"	LIGHT BROWN	SANDY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Taylor

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD19 0004
Sample Location: 13SD19
Sampled By: ~~T. Rojahn~~ M. Cochran
C.O.C. No.: 0975

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1315	0 - 4"	LIGHT BROWN	SILTY SAND SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD20 0004
Sample Location: 13SD 20
Sampled By: ~~T. Bojahn~~ M. CUGNAN
C.O.C. No.: 0928

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1255	0 - 4"	LIGHT BROWN	SANDY SILT, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	(Yes) No	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Bojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD 21 0004
Sample Location: 13SD 21
Sampled By: ~~T Rojahn~~ M Cochran
C.O.C. No.: 0978

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/30/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1120	0 - 4"	LIGHT BROWN	SILTY SAND, SATURATED
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle If Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD22 0004
Sample Location: 13SD22
Sampled By: ~~T. Rojahn~~ M. CACHRAN
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1035	0 - 4"	LT BROWN	SATURATED CLAYEY SILT & GRAVEL,
Method: Disposable Trowel			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes)/No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes/(No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes)/No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes/(No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SD 23 0004
Sample Location: 13SD 23
Sampled By: ~~T. Rojahn~~ M. Cuchran
C.O.C. No.: 0975

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 3/29/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1135	0 - 4"	DARK BROWN	TOPSOIL, V. MOIST CLAYEY SILT + SAND.
Method: Disposable Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives (8330)	(1) 8oz. Glass Jar	(Yes) No	
Explosives (8330) & SVOCs (8270C, SIM & 8151A)	(1) 8oz. Glass Jar	Yes (No)	
Metals (6020) & Hg (7471A)	(1) 8oz. Glass Jar	(Yes) No	
Metals (6020), Hg (7471A), TOC, CEC, pH & AVS/SEM	(1) 8oz. Glass Jar	Yes (No)	

OBSERVATIONS / NOTES:

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

T. Rojahn

APPENDIX C.2.2
SWMU 13
SEDIMENT SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135024000a
Sample Location: 135024
Sampled By: FW/TR
C.O.C. No.: 1805

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/23/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1332	4"	BLK	FINE-COARSE SAND & GRAVEL w/ROOTMAT (V. MOIST)
Method: Dis. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	—	

OBSERVATIONS / NOTES:

PHOTO # (0324)

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

FW/Signature

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135D250004
Sample Location: 135D25
Sampled By: EW/TK
C.O.C. No.: 4305

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA

Date: 10/23/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1650	4"	BRN	FINE - COARSE SAND & GRAVEL (MOIST)
Method: DISP. TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	YES	

OBSERVATIONS / NOTES:

PHOTO (3021)

MAP:

Circle if Applicable:

MS/MSD /

Duplicate ID No.: —

Signature(s):

Tony Boyle

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 1350260004
Sample Location: 135026
Sampled By: MC/TC
C.O.C. No.: 4805

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/23/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1425	4"	BRN	Coarse Sand Fine Gravel (Damp)
Method: Dis Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	—	

OBSERVATIONS / NOTES:

PHOTO # (0326)

MAP:

Circle If Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135027004
Sample Location: 135027
Sampled By: MC/FW
C.O.C. No.: 4805

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
10/23/03	4"	BRN	FINE - COARSE SAND & GRAVEL (SATURATED)
Time: 1420			
Method: Dis. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	—	

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135D280004
Sample Location: 1350 28
Sampled By: MC
C.O.C. No.: 4803

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 10/22/03 1555	4"	BRN	Fine - Coarse Sand & Gravel (V. Moist)
Method: Dig Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar		

OBSERVATIONS / NOTES:

DLY Stream
PHOTO 0316

MAP:

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135D290004
Sample Location: 135029
Sampled By: EW
C.O.C. No.: 4803

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

Date: 10/22/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1240	4"	BRN	FINE SAND & GRAVEL (Dry)
Method: Dis Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	2 x (1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	2 x (1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	—	

OBSERVATIONS / NOTES:

PHOTO # 10 (0311)

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	13FD102203 02

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SD300004
Sample Location: 135030
Sampled By: FW
C.O.C. No.: 4803

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/22/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1542		BROWN	COURSE SAND + GRAVEL
Method: PETROWEL			WET
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 135D310004
Sample Location: 135031
Sampled By: FW
C.O.C. No.: 4803

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA

Date: 10/22/03	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1310	4"	Brn	Fine to Coarse Sand & Gravel
Method: Dis Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	-	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:
MS/MSD -

Duplicate ID No.: -

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060, CTO 0279

Sample ID No.: 13SD32 0004
Sample Location: 13SD032
Sampled By: MC
C.O.C. No.: #807

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 10-24-03 0850	4"	BROWN	CLAY, SAND, + GRAVEL WET
Method: DISPOSABLE TROWEL			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Explosives & Miscellaneous Explosives SW-846 8330	(1) oz Jar	Yes	
Metals SW-846 6020 & Mercury SW-846 7471A	(1) oz Jar	Yes	
Selected Ion Monitoring - PAHs	(1) oz Jar	YES	

OBSERVATIONS / NOTES:

~~PHOTO # 0326~~ CAMERA MALFUNCTION COPIED OVER (TT)

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

13FD102403-01

APPENDIX C.2.3
SWMU 13
SEDIMENT SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD0102
Sample Location: 13SW/SD01
Sampled By: SJC/JG
C.O.C. No.: 0105

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/7/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0900	0 - 4	BRN	SANDY CLAY, TR F GRAVEL
Method: DIS TROWEL			WET → SATURATED
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method:				
NA				
Monitor Readings				
(Range in ppm):				
NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	Yes	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	1350 01 02 E 13SW0102	**Date:**	10/7/04	**Time:** 0855 **Sampler:** SJC/JG
Photograph Number/Direction:	____Upstream	✓ Downstream NE	____East ____West	____North ____South
Predominant Surrounding Land Use:	(Wooded) NORTH	(Open Field) TO SOUTH	Other	
Canopy Cover:	(Open)	Partly Open	Shaded	
Dicharge Pipe Present:	(Yes)	No		
Aquatic Vegetation Present:	Yes	(No) Grass	**Stream channelized:** MANMADE CHANNEL Yes	(No)
Water flowing:	Yes	(No)	Not present	
Organisms Present:	Fish (in) SNAIL	Other (insects, frogs, etc.): NO		
Water Width (ft): .6	**Water Depth (ft):** .2	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 3'	**Channel Depth (ft):** 2'			
Signs of flooding (circle all that apply)	Yes	(No)	Water marks on trees	Water-borne debris piles Other:
Deep Pools Present (>2 feet):	Yes	(No)	If yes (approximate size)	

Sediment Substrate:	Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply)	(Sand)	(Silt) Grass	Clay	Muck	
	Debris	Detritus	Concrete	Iron deposits	
Sediment Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	(Absent)	Slight	Moderate	Profuse	
Water Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	(None)	Droplets	Sheen		
Turbidity:	(Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: Manmade Culvert and channel
≈ 1'Φ Conc culvert

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SD2202
Sample Location: 13SW/SD22
Sampled By: SJC/JG
C.O.C. No.: 0105

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/7/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0935	0-4	BRN	SAND SILT DRY-DAMP
Method: DIS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	Yes	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SD2202	**Date:** 10/7/04	**Time:** 0935	**Sampler:** SJC/JG	
Photograph Number/Direction: ✓ Upstream 128° SE	Downstream	East	West	North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	Partly Open	(Shaded)		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	(No)	(Not present)		
Organisms Present: Fish (in) NA	Other (insects, frogs, etc.): NA			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 14'	**Channel Depth (ft):** 2 TO 3' ±			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	(Water-borne debris piles)	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	(Boulder (>10 in)	(Cobble (2.5-10 in)	(Gravel (0.10-2.5 in)	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: FOUND RIBBON ON TREE, BUT NO STAKE
SP04 WAS DRY ALSO

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SD2802
Sample Location: 13SW/SD28
Sampled By: SJC/JG
C.O.C. No.: 0104

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1010	0-4"	BRN	SAND (F/C) TR GRAVEL
Method: DLS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	Yes	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

SJ Conta.

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SD2802	**Date:** 10/6/04	**Time:** 1010	**Sampler:** SJC/JG	
Photograph Number/Direction: V SE Upstream	Downstream	East	West	North / South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	(No)	(Not present)	ANOTHER TRIB 190°S	
Organisms Present: Fish (in) NA	Other (insects, frogs, etc.): NA			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 5'	**Channel Depth (ft):** 2'	135° SE		
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: (Bedrock)	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: SAND / F-C TR GRAVEL

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD3002
Sample Location: 13SW/SD30
Sampled By: SJC/JG
C.O.C. No.: 0104

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0930	0-4"	BRN	SAND - SOME GRAVEL
Method: DIS TROWEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	(Yes)	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SD3002	**Date:** 10/6/04	**Time:** 0930	**Sampler:** SJC/JC	
Photograph Number/Direction: ✓ Upstream NE	Downstream	East	West	North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	No	(Not present)		
Organisms Present: Fish (in) NA	Other (insects, frogs, etc.):			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 25'	**Channel Depth (ft):**	5' (N) 3' (S)		
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: SAND - SOME GRAVEL - MOIST

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SD3102
Sample Location: 13SW/SD31
Sampled By: SJC/JG
C.O.C. No.: 0104

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1520	0-4"	BRN	SANDY CLAY - TR GRAVEL WET
Method: DIS TROWEL			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date: NA	Time: NA	Depth: NA	Color: NA	Description (Sand, Silt, Clay, Moisture, etc.): NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	Yes	
	(3) TOTAL		

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle If Applicable:
MS/MSD

Duplicate ID No.: 13FD10060402

Signature(s):
SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SW3102	**Date:** 10/6/04	**Time:** 1515	**Sampler:** SJC/JG	
Photograph Number/Direction: ✓ N Upstream	Downstream	East	West	North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	(No)	Not present		
Organisms Present: Fish (in) NO	Other (insects, frogs, etc.): WATER BUGS			
Water Width (ft): 3'	**Water Depth (ft):** 0.5	**Estimated Flow/Velocity:** NOT FLOWING (POOLED)		
Channel Width (ft): 27'	**Channel Depth (ft):** →	7' WEST SIDE 4' EAST		
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	(Clay)	(Muck)	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: Clear	(Slightly Turbid)	Turbid	Opaque	

Other Comments/Observations: COULD NOT FIND ORIG STAKE - MEASURED (PACED) OFF FROM 13SW29 ≈ 250' AND TOOK SW FROM A POOLED AREA AT ≈ THIS DISTANCE.

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13SD3301
Sample Location: 13SW/SD33
Sampled By: SJC/JG
C.O.C. No.: 0104

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0900	0-4"	BRN	SAND - F/C TR GRAVEL
Method: DS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time: NA	Depth: NA	Color: NA	Description (Sand, Silt, Clay, Moisture, etc.): NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	(Yes)	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJConti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	13SD3301	**Date:**	10-6-04	**Time:**	0900	**Sampler:** SJC / JG
Photograph Number/Direction:	✓ Upstream NE	Downstream	East	West	North	South
Predominant Surrounding Land Use:	(Wooded)	Open Field	Other			
Canopy Cover:	Open	(Partly Open)	Shaded			
Dicharge Pipe Present:	Yes	(No)				
Aquatic Vegetation Present:	Yes	(No)	**Stream channelized:**	(Yes)	No	
Water flowing:	Yes	No	(Not present)			
Organisms Present:	Fish (in) NA	Other (insects, frogs, etc.):				
Water Width (ft):	NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA			
Channel Width (ft):	28	**Channel Depth (ft):** ~~NA~~	N = 10' S = 6'			
Signs of flooding (circle all that apply)	Yes	(No)	Water marks on trees	Water-borne debris piles	Other:	
Deep Pools Present (>2 feet):	Yes	(No)	If yes (approximate size)			
Sediment Substrate:	Bedrock	(Boulder (>10 in)	(Cobble (2) 5-10 in)	(Gravel (0) 10-2.5 in)		
(Circle all that apply)	(Sand)	(Silt)	Clay	Muck		
	Debris	Detritus	Concrete	Iron deposits		
Sediment Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic	
Sediment Oils:	(Absent)	Slight	Moderate	Profuse		
Water Odors:	(Normal) NA	Sewage	Petroleum	Chemical	Anaerobic	
Water Surface Oils:	(None)	Droplets	Sheen			
Turbidity:	Clear NA	Slightly Turbid	Turbid	Opaque		

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SD03401
Sample Location: 13SW/SD 34
Sampled By: SJC / JG
C.O.C. No.: 0104

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1100	0-4"	BRN	SAND (M/C) SOME GRAVEL
Method: DIS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	(Yes)	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

SJConte

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13503201 / 13SW3401	**Date:** 10/6/04	**Time:** 1045	**Sampler:** SJC/JG	
Photograph Number/Direction: ____Upstream	✓ WEST Downstream	____East	____West	____North ____South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes) No		
Water flowing: Yes	(No)	Not present	NO FLOW (PONDED ON SOUTH SIDE)	
Organisms Present: Fish (in)	Other (insects, frogs, etc.): Frog / Water Bugs			
Water Width (ft): 3'	**Water Depth (ft):** 0.3	**Estimated Flow/Velocity:** NONE		
Channel Width (ft): 23'	**Channel Depth (ft):**	N = 2' S = 6'		
Signs of flooding (circle all that apply) (Yes)	No	(Water marks on trees)	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: (TRACE Bedrock)	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: - PONDED POOL OF WATER - SOUTH SIDE OF CHANNEL

SD - NEAR POOL OF WATER @ 1100 HRS m/c SAND & GRAVEL

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SD3501
Sample Location: 13SW/SD35
Sampled By: SSC/JG
C.O.C. No.: 0104

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10/6/04	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1410	0-4"	BRN	SAND F/C-TR GRAVEL MOIST → WET
Method: DIS TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
NA	NA	NA	NA	NA
Method: NA				
Monitor Readings (Range in ppm): NA				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Metals SW-846 6020 & Mercury SW-846 7471A	(1) 4 oz Jar	Yes	

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET

MAP:

See Figure 3-3

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

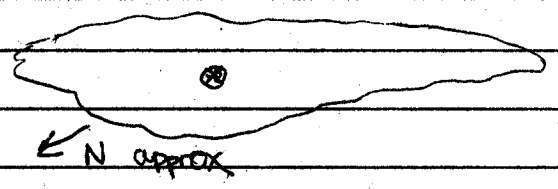
SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

2 of 2

Sample Number: 13SW3501 (13SD3501E)	**Date:** 10/6/04	**Time:** 1345	**Sampler:** SJC/JG	
Photograph Number/Direction: 1 NE	Upstream	Downstream	East	West	North	South
Predominant Surrounding Land Use:	(Wooded)	Open Field	Other	
Canopy Cover:	Open	(Partly Open)	Shaded	
Dicharge Pipe Present:	Yes	(No)		
Aquatic Vegetation Present:	Yes	(No)	**Stream channelized:**	(Yes)	No
Water flowing:	Yes	(No)	Not present	PONDED
Organisms Present: Fish (in)	Small fish	Other (insects, frogs, etc.):	WATER BUGS	
Water Width (ft):	8' max	**Water Depth (ft):**	0.5	**Estimated Flow/Velocity:**	NA
Channel Width (ft):	23'	**Channel Depth (ft):**	≈ 7'	7' E 6' W SIDE
Signs of flooding (circle all that apply)	Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	(No)	If yes (approximate size)	
Sediment Substrate:	(Bedrock)	Boulder (>10 in)	(Cobble (2.5-10 in)	(Gravel (0.10-2.5 in)
(Circle all that apply)	(Sand)	(Silt)	Clay	Muck
	Debris	Detritus	Concrete	Iron deposits
Sediment Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	(Absent)	Slight	Moderate	Profuse
Water Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	(None)	Droplets	Sheen
Turbidity:	(Clear)	Slightly Turbid	Turbid	Opaque

Other Comments/Observations: WATER IS PONDED ≈ 8'



APPENDIX C.2.4
SWMU 13
SEDIMENT SAMPLE LOG SHEETS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL001010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL001	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey & T. Rojahn	**Modified By**	
WBS Code #	0000			**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:37	Trowel	NA	0-4"	-Select-	Catch Basin - Grayish brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:37	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL002010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL002	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey &T. Rojahn	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:55	Other	NA	0-3"	-Select-	Catch Basin - Dark brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:55	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL003010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL003	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey & T. Rojahn	**Modified By**	
WBS Code #	0000			**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:44	Other	NA	0-4"	-Select-	Sump - Brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:44	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL004010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL004	**Created Date**	2/20/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	D. Hickey & T. Rojahn	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:03	Other	NA	0-4"	light brown	Catch Basin - Light brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:03	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL005010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL005	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey & T. Rojahn	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:06	Trowel	NA	0-4"	-Select-	Catch Basin - Dark brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:06	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL006010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL006	**Created Date**	2/20/06
Task/Contract #	CTO 0357			**Modified By**	
WBS Code #	0000	**Sampled By**	D. Hickey & T. Rojahn	**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:15	Trowel	NA	0-4"	-Select-	Catch Basin - Brown fine to medium sandy silt with some clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:15	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL007010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL007	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey & T. Rojahn	**Modified By**	
WBS Code #	0000			**Modified Date**	
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:28	Dredge	NA	0-4"	-Select-	Catch Basin - Grayish brown clayey silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:28	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL008010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL008	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey &T. Rojahn	**Modified By**	
WBS Code #	0000	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	15:19	Trowel	NA	0-4"	-Select-	Catch Basin - Reddish brown silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	15:19	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SL009010006	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Sample Location ID**	13SU/SL009	**Created Date**	2/20/06
Task/Contract #	CTO 0357	**Sampled By**	D. Hickey & T. Rojahn	**Modified By**	
WBS Code #	0000			**Modified Date**	
QA Sample Type	13FD02190602	**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
2/19/06	14:47	Trowel	NA	0-6"	-Select-	Sump - Gray to brown silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/19/06	14:47	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	Do MS/MSD	112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

APPENDIX C.2.5
SWMU 13
ADDITIONAL SEDIMENT SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~09~~ 13
Project No.: ~~00042~~ CTO ~~376~~ 043 7448 343

Sample ID No.: 135D3601
Sample Location: 135W/SD36
Sampled By: JG/TC
C.O.C. No.: 3717

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1205	0-4"	BRN	Silt, Sand (SAT)
Method: Dis. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
Metals (Except Hg)	4°C	(1) 4oz Glass Jar	YES

OBSERVATIONS / NOTES:

Photo 1826-16

SEE S.S.

MAP:

Circle if Applicable:
MS/MSD
YES

Duplicate ID No.:
13FD051705D1

Signature(s):

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number:	13503601	**Date:** 5/17/05	**Time:** 1205	**Sampler:** JG/TL
Photograph Number/Direction:	X Upstream	Downstream	East	West	X North	South
Predominant Surrounding Land Use:	(Wooded)	Open Field	Other	
Canopy Cover:	Open	(Partly Open)	Shaded	
Dicharge Pipe Present:	Yes	(No)		
Aquatic Vegetation Present:	Yes	(No)	**Stream channelized:**	(Yes)	No
Water flowing:	(Yes)	No	Not present	
Organisms Present: Fish (in)	Likely	Other (Insects, frogs, etc.):	Likely	
Water Width (ft): 54'	**Water Depth (ft):** 0.08	**Estimated Flow/Velocity:** Stick 10' = 0.5	
Channel Width (ft): 45'	**Channel Depth (ft):** 3-6'	
Signs of flooding (circle all that apply)	(Yes)	No	Water marks on trees	Water-borne debris piles	Other: Debris in low branches
Deep Pools Present (>2 feet):	~~Yes~~ TR	(No)	If yes (approximate size)	
Sediment Substrate:	Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))
(Circle all that apply)	(Sand)	(Silt)	Clay	Muck
	(Debris)	Detritus	(Concrete)	Iron deposits
Sediment Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	(Absent)	Slight	Moderate	Profuse
Water Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils:	(None)	Droplets	Sheen	
Turbidity:	(Clear)	Slightly Turbid	Turbid	Opaque

Other Comments/Observations: PHOTO 1826 SPILLWAY @ ANGEL to stream channel.

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~05~~ 13
Project No.: ~~00042~~ CTO ~~276~~ 7448 343 (QD)

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 135D 37 01
Sample Location: 135W/SD37
Sampled By: JG / TK
C.O.C. No.: 3717

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1150	0-4"	BRN	Silty Sand (sat.)
Method: Dis. Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz Glass JAR	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD

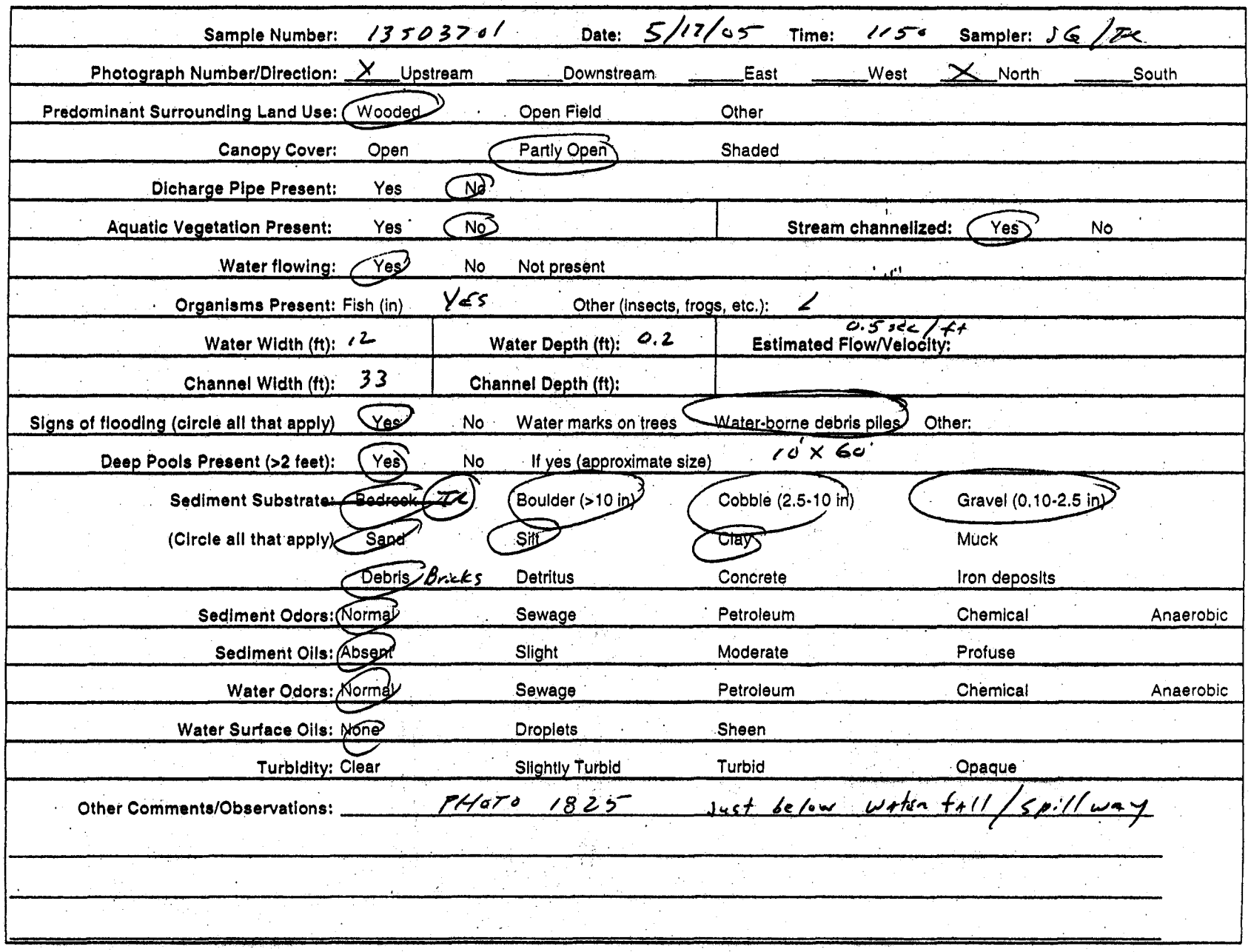
Duplicate ID No.:

Signature(s):

Tim Lapat

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13503701	**Date:** 5/17/05	**Time:** 1150	**Sampler:** JG / TK	
Photograph Number/Direction: X Upstream	Downstream	East	West	X North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) Yes	Other (insects, frogs, etc.): L			
Water Width (ft): 12	**Water Depth (ft):** 0.2	**Estimated Flow/Velocity:** 0.5 sec/ft		
Channel Width (ft): 33	**Channel Depth (ft):**			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	(Water-borne debris piles)	Other:
Deep Pools Present (>2 feet): (Yes)	No	If yes (approximate size)	10' x 60'	
Sediment Substrate: ~~Bedrock~~ TK	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	(Clay)	Muck	
(Debris / Bricks)	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	
Other Comments/Observations: PHOTO 1825 just below water fall / spillway				



Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~08~~ 13
Project No.: ~~00042~~ CTO ~~376~~ 343 (QS) 7448

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 135D38 01
Sample Location: 135W/SD38
Sampled By: JG / TL
C.O.C. No.: 3717

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1140	0-4"	BRN	F-MED SAND (WET)
Method: DIS. Trowel			
Monitor Reading (ppm): -			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz Glass JAR	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD ✓ Duplicate ID No.: —

Signature(s):

Ty Lynd

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SD3801	**Date:** 5/17/05	**Time:** 1140	**Sampler:** J G		
Photograph Number/Direction: ___X___ Upstream	____ Downstream	____ East	____ West	___X___ North	____ South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other			
Canopy Cover: Open	(Partly Open)	Shaded			
Dicharge Pipe Present: (Yes)	No				
Aquatic Vegetation Present: Yes	(No)		**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present			
Organisms Present: Fish (in) Likely	Other (insects, frogs, etc.): Likely				
Water Width (ft): 24'	**Water Depth (ft):** 0, 0.2, 0.3, 0.3, 3.0, 0.0		**Estimated Flow/Velocity:** 1 cfs/ft		
Channel Width (ft): 32'	**Channel Depth (ft):** 3-5				
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	(Water-borne debris piles)	Other:	
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)			
Sediment Substrate: Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))		
(Circle all that apply) (Sand)	(Silt)	Clay	Muck		
(Debris) Bricks	Detritus	Concrete	Iron deposits		
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic	
Sediment Oils: (Absent)	Slight	Moderate	Profuse		
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic	
Water Surface Oils: (None)	Droplets	Sheen			
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque		

Other Comments/Observations: pH 6.0 / 1823

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~08~~ 13
Project No.: ~~00042~~ CTO ~~376~~ 343 (22) 7448

Sample ID No.: 1350 3901
Sample Location: 135W/SD39
Sampled By: JGaskill/TR
C.O.C. No.: 3717

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1135	0-4"	BRN	~~Silty Clay FD~~ Silt & Fine Sand
Method: Dig, Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
Metals (EXCEPT Hg)	4°C	(1) 4oz Glass Jar	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Terry Boyd

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13503901	**Date:** 5/17/05	**Time:** 1125	**Sampler:** JG	
Photograph Number/Direction: X Upstream	Downstream	East	West	X North	South
Predominant Surrounding Land Use: Wooded	Open Field	Other		
Canopy Cover: Open	Partly Open	Shaded		
Dicharge Pipe Present: Yes	No			
Aquatic Vegetation Present: Yes	No	**Stream channelized:** Yes	No	
Water flowing: Yes	No	Not present		
Organisms Present: Fish (in) YES	Other (insects, frogs, etc.): Likely			
Water Width (ft): 24	**Water Depth (ft):** 0.43, 0.3, 0.4, 7.5, 0.4, 0	**Estimated Flow/Velocity:** 1 sec / ft		
Channel Width (ft): 40	**Channel Depth (ft):** 3 - 7			
Signs of flooding (circle all that apply) Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	No	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) Sand	Silt	Clay	Muck	
Debris: Brick	Detritus	~~Concrete~~ Tile	Iron deposits	
Sediment Odors: Normal	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: Absent	Slight	Moderate	Profuse	
Water Odors: Normal	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None	Droplets	Sheen		
Turbidity: Clear	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO # 1822

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~08~~ 13
Project No.: ~~00042~~ CTO ~~376~~ 7448 343 (23)

Sample ID No.: 13SD4001
Sample Location: 13SW/SD40
Sampled By: JG / TK
C.O.C. No.: 3717

- [] Surface Soil
- [] Subsurface Soil
- [■] Sediment
- [] Other:
- [] QA Sample Type:

Type of Sample:
- [X] Low Concentration
- [] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1105	0-4"	BRN	silt & sand (SAT)
Method: D.S. trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz GLASS JAR	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

TK Kyle

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 135D4001	**Date:** 5/17/05	**Time:** 1105	**Sampler:** JG/TK	
Photograph Number/Direction: X Upstream	Downstream	East	West	X North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: (Yes)	No	TRACE	**Stream channelized:** Yes	No
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) YES	Other (insects, frogs, etc.): likely			
Water Width (ft): 15	**Water Depth (ft):** 0, 0.1, 2.5, 3.5, 7.0, 6.5, 0	**Estimated Flow/Velocity:** 3sec FOR 10'		
Channel Width (ft): 42	**Channel Depth (ft):** 3-6			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	(Water-borne debris piles)	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	(Clay)	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO # 1821

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~08~~ 13
Project No.: ~~00042~~ CTO ~~378~~ 343 (QS) 7448

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 13504101
Sample Location: 13SW15041
Sampled By: T. ROSAN / JG
C.O.C. No.: 3717

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05 Time: 1028 Method: Dis Trunc Monitor Reading (ppm): —	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-4'	BRN	FINE & MED SAND (SAT)

COMPOSITE SAMPLE DATA:

Date: NA Method: Monitor Readings (Range in ppm):	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz GLASS JAR	YES

OBSERVATIONS / NOTES:

SES S.S.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
( )	

Signature(s):

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13504101	**Date:** 5/17/05	**Time:** 1028	**Sampler:** JG	
Photograph Number/Direction: X Upstream	Downstream	East	~~West~~ (TC)	North	South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) YES	Other (insects, frogs, etc.): likely			
Water Width (ft):	**Water Depth (ft):** 0, 0.2, 6.5, 7.5, 6.5, 0.2, 0	**Estimated Flow/Velocity:** 1sec/ft.		
Channel Width (ft): 40	**Channel Depth (ft):** 3-5			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	Water-borne debris piles	Other: Undercut banks
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) Sand	Silt	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO 1820

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~00~~ 13
Project No.: ~~00942~~ CTO ~~376~~ 7448 343

Sample ID No.: 13SD4201
Sample Location: 13SW/SD42
Sampled By: JG/TC
C.O.C. No.: 3717

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5-17-05 / Time: 0943 / Method: Dis. Trowel / Monitor Reading (ppm): —	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0 - 4"	Brn	(Sat.) Fin - Med Sand

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
Metals (Except Hg)	4°C	(1) 4oz Glass Jar	YES

OBSERVATIONS / NOTES:

SEE SUPPLEMENTAL SHEET (S.S.)

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ted Kyle

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13504201	**Date:** 5/17/05	**Time:** 0943	**Sampler:** T.ROJAHN	
Photograph Number/Direction: X Upstream	Downstream	East	X West	North South
Predominant Surrounding Land Use: Wooded	Open Field	(Other) Grassy Field 50' then Wooded		
Canopy Cover: (Open)	Partly Open	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) Likely	Other (insects, frogs, etc.): Likely			
Water Width (ft): 9'	**Water Depth (ft):** 0, 0.35, 0.65, 0.65, 0.40	**Estimated Flow/Velocity:** 0.3'		
Channel Width (ft): 40'	**Channel Depth (ft):** 3-5'			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	Water-borne debris piles	Other: UNDERCUT BANKS
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	Boulder (>10 in)	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	(Concrete) TRACE	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO # 1818

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~05~~ 13
Project No.: ~~00042~~ CTO ~~378~~ 343
7448

Sample ID No.: 1350 4301
Sample Location: 135W/SD43
Sampled By: JG/TK
C.O.C. No.: (TK) ~~3773~~ 3717

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1320	BRN →		MUCK
Method: DIS. TROWEL	0-4"		(SAT.)
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz GLASS JAR	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tim Kyle

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SD4301	**Date:** 05/17/05	**Time:** 1320	**Sampler:** JG/TK	
Photograph Number/Direction: X Upstream	Downstream	East	West	✓ North	South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) Likely	Other (Insects, frogs, etc.): Likely			
Water Width (ft): 35	**Water Depth (ft):** >2	**Estimated Flow/Velocity:** 1 sec/Ft Flow ?		
Channel Width (ft): 35	**Channel Depth (ft):** 6-10			
Signs of flooding (circle all that apply) Yes	No	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): (Yes)	No	If yes (approximate size) water depth >2		
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) (Sand)	(Silt)	(Clay)	(Muck)	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO 1828

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~09~~ 13
Project No.: ~~00042~~ CTO ~~378~~ 7448 343

Sample ID No.: 13SD4401
Sample Location: 13SW/SD44
Sampled By: JG / TK
C.O.C. No.: 3717

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05 Time: 1335 Method: Ds. Trowel Monitor Reading (ppm): -	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-4"	BRN	FINE - MED SAND (SAT)

COMPOSITE SAMPLE DATA:

Date: NA Method: Monitor Readings (Range in ppm):	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz Glass JAR	YES

OBSERVATIONS / NOTES:

SEE S.S.

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: ———

Signature(s):

Ty Kyle

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 135D4401	**Date:** 5/17/05	**Time:** 1335	**Sampler:** JG/TK	
Photograph Number/Direction: X Upstream	Downstream	East	West	X North South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) Likely	Other (insects, frogs, etc.): Likely			
Water Width (ft): ~~40~~ 30	**Water Depth (ft):** >2 feet	**Estimated Flow/Velocity:** 1 sec/ft		
Channel Width (ft): 30	**Channel Depth (ft):** 8-10			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	(Water-borne debris piles)	Other:
Deep Pools Present (>2 feet): (Yes)	No	If yes (approximate size)	stream it's self	
Sediment Substrate: Bedrock	Boulder (>10 in)	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	(Clay)	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO # 1829

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC CRANE SWMU ~~09~~ 13
Project No.: ~~00042~~ CTO ~~376~~ 7448 343 (QD)

[] Surface Soil
[] Subsurface Soil
[■] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 135D4501
Sample Location: 135W/5D45
Sampled By: JG/TK
C.O.C. No.: 3717

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 5/17/05	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1355			
Method: Dis. Trowel	0-4"	BRN	FINE - MED. SAND (SAT.)
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date: NA	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX Pesticides, PCBs, TOC, pH, and CEC	4°C	(2) 4 oz Glass Jar	Yes (No)
Appendix IX Pesticides and PCBs	4°C	(2) 4 oz Glass Jar	Yes (No)
METALS (EXCEPT Hg)	4°C	(1) 4oz Glass Jar	YES

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: ———

Signature(s):

Taylor

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 1350451	**Date:** 5/17/05	**Time:** 1355	**Sampler:** JG/TK	
Photograph Number/Direction: X Upstream	Downstream	East	West	X North	South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: (Yes)	No	Not present		
Organisms Present: Fish (in) Likely	Other (insects, frogs, etc.): Likely			
Water Width (ft): 40	**Water Depth (ft):** >Boots	**Estimated Flow/Velocity:** 1ft/sec		
Channel Width (ft): 40	**Channel Depth (ft):** ~~>Boots~~ 10-12'			
Signs of flooding (circle all that apply) (Yes)	No	Water marks on trees	Water-borne debris piles	Other: Debris low on branches
Deep Pools Present (>2 feet): (Yes)	No	If yes (approximate size)	stream its self	
Sediment Substrate: Bedrock	Boulder (>10 in)	Cobble (2.5-10 in)	Gravel (0.10-2.5 in)	
(Circle all that apply) (Sand)	(Silt)	(Clay)	(Muck)	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: (None)	Droplets	Sheen		
Turbidity: (Clear)	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: PHOTO # 1830
trib from Rifle Range mixing w/ main stream
@ this location

APPENDIX C.2.6
SWMU 13
SEDIMENT SAMPLE LOG SHEETS
PCB DELINEATION INVESTIGATIONS

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD460024	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD46	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	15:05	Other	NA	0-24"	dark tan	silty clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	15:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD470006	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD47	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	15:00	-Select-	NA		-Select-	No sample collected due to insufficient sediment present in basin

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
X	6/5/06	15:00	SW-846 8082	PCBs	4°C	0	Glass	4 oz. wide-mouth clear w/Teflon cap	No sample collected due to insufficient sediment present in basin	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD480006	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD48	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	14:55	Trowel	NA	0-6"	dark tan	Sandy silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	14:55	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD480612	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD48	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	08:30	Hand auger	NA	6-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	08:30	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 3.28 ppm (Duplicate = 2.59 ppm)	112GN7448-8272006-5
✓	8/25/06	08:30	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

First attempt refused at ~9in BGS

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD490012	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD49	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	15:25	Trowel	NA	0-12"	brown	Sandy silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	15:25	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Collected from inside large sump	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD500012	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD50	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	15:32	Hand auger	NA	0-12"	brown	Sandy silt

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	15:32	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Hit refusal at ~1.0' BGS.	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD510024	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD51	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	09:50	Hand auger	NA	0-24"	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	09:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Strong Hydrocarbon odor	112G00041-672006-14
✓	6/7/06	09:00	SW-846 8015B	TPH - Gasoline Range Organics	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Hydrocarbon odor	112G00041-672006-14
✓	6/7/06	09:00	SW-846 8015B	TPH - Gasoline Range Organics	4°C	3	EnCore	EnCore Sampler - 5 gram	Hydrocarbon odor	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD512448	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD51	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	10:05	Hand auger	NA	24-48"	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	10:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Mild Hydrocarbon odor	112G00041-672006-14
✓	6/7/06	09:05	SW-846 8015B	TPH - Gasoline Range Organics	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Hydrocarbon odor	112G00041-672006-14
✓	6/7/06	09:05	SW-846 8015B	TPH - Gasoline Range Organics	4°C	3	EnCore	EnCore Sampler - 5 gram	Hydrocarbon odor	112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD520024	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD52	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	9/8/06
QA Sample Type	FD06060601			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	09:10	Hand auger	NA	0-24"	-Select-	Collected FD06060601

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	09:10	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14
✓	6/7/06	08:30	SW-846 8015B	TPH - Gasoline Range Organics	4°C	3	EnCore	EnCore Sampler - 5 gram		112G00041-672006-14
✓	6/7/06	08:30	SW-846 8015B	TPH - Gasoline Range Organics	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD522448	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD52	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	09:20	Hand auger	NA	24-48"	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	09:20	SW-846 8082	PCBs	4°C	2	Glass	4 oz. wide-mouth clear w/Teflon cap	DO MS/MSD	112G00041-672006-14
✓	6/7/06	08:40	SW-846 8015B	TPH - Gasoline Range Organics	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14
✓	6/7/06	08:40	SW-846 8015B	TPH - Gasoline Range Organics	4°C	3	EnCore	EnCore Sampler - 5 gram		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD530024	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD53	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	08:40	Hand auger	NA	0-24"	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	08:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD532436	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD53	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/6/06	08:50	Hand auger	NA	24-36"	-Select-	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/6/06	08:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD540006	**Created By**	David Hickey
TtNUS Project #	112G00041	**Sample Location ID**	13SD54	**Created Date**	6/5/06
Task/Contract #	CTO 377	**Sampled By**	David Hickey	**Modified By**	Michael Quaill
WBS Code #	TP00050125	**Concentration**	Low concentration	**Modified Date**	9/8/06
QA Sample Type	NA			**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/1/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
6/5/06	14:28	Trowel	NA	0-6"	brown	Sandy silt with trace clay

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	6/5/06	14:28	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112G00041-672006-14

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD551224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD55	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	09:07	Hand auger	NA	12-24	mottled	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	09:07	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	09:07	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8272006-5

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD550012	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD55	**Created Date**	8/25/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	09:03	Hand auger	NA	0-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/06	09:03	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.05 ppm	112GN7448-8272006-5
✗	8/25/06	09:03	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD560012	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD56	**Created Date**	8/25/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/25/06	09:56	Hand auger	NA	0-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/25/06	09:56	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/25/06	09:56	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm (Duplicate = 0.5 ppm)	112GN7448-8272006-5

General Observations and Notes

Unable to advance boring at all at original location

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD570006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD57	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	14:45	Hand auger	NA	0-6	black	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	14:45	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/24/06	14:45	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 3.47 ppm	112GN7448-8252006-2

General Observations and Notes

Sample collected from within concrete basin. Total depth from top of concrete ~9.3ft with approximately 4ft of standing water within basin. Sample collected is saturated with an odor similar to explosives.

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD590012	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD59	**Created Date**	8/23/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	12:00	Hand auger	NA	0-12	brown	DEPTH IS IN INCHES.

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/23/06	12:00	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/23/06	12:00	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.64 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD591224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD59	**Created Date**	8/23/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	12:03	Hand auger	NA	12-24	brown	DEPTH IS IN INCHES.

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/23/06	12:03	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	12:03	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD600012	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD60	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	12:15	Hand auger	NA	0-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/23/06	12:15	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8
✓	8/23/06	12:15	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 3.95 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD601224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD60	**Created Date**	8/23/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/23/06	12:19	Hand auger	NA	12-24	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
X	8/23/06	12:19	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/23/06	12:19	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8242006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD610006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD61	**Created Date**	8/24/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	09:05	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/24/06	09:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/24/06	09:05	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8252006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD620012	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD62	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	David Hickey
WBS Code #		**Concentration**	Low concentration	**Modified Date**	10/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	08:50	Hand auger	NA	0-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	08:50	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-10112006-9
✓	8/24/06	08:50	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8252006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD621224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD62	**Created Date**	8/24/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	David Hickey
WBS Code #		**Concentration**	Low concentration	**Modified Date**	10/11/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/24/06	08:54	Hand auger	NA	12-24	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/06	08:54	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-10112006-9
✓	8/24/06	08:54	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.02 ppm	112GN7448-8252006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD630006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD63	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:00	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	11:00	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✓	8/26/06	11:00	SW-846 8082	PCBs	4°C	3	Glass	4 oz. wide-mouth clear w/Teflon cap	MS/MSD on this sample.	112GN7448-8292006-8

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD630612	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD63	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:06	Hand auger	NA	6-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	11:06	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	11:06	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD631224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD63	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:08	Hand auger	NA	12-24	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	11:08	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	11:08	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD640006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD64	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:11	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	11:11	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 3.45 ppm	112GN7448-8262006-4
✓	8/26/06	11:11	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD640612	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD64	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:21	Hand auger	NA	6-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	11:21	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	11:21	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD641224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD64	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:24	Hand auger	NA	12-24	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	11:24	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	11:24	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD650006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD65	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:38	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	11:38	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	11:38	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD650612	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD65	**Created Date**	8/26/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:40	Hand auger	NA	6-12	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/06	11:40	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4
✗	8/26/06	11:40	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD651224	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD65	**Created Date**	8/26/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/26/06	11:42	Hand auger	NA	12-24	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	8/26/06	11:42	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		
✓	8/26/06	11:42	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.5 ppm	112GN7448-8262006-4

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD660006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD66	**Created Date**	8/27/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/27/06	08:05	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/27/06	08:05	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 1.15 ppm (Duplicate = 1.27 ppm)	112GN7448-8272006-6
✓	8/27/06	08:05	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		112GN7448-8292006-8

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD670006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD67	**Created Date**	8/28/06
Task/Contract #	CTO 0343			**Modified By**	James Goerdt
WBS Code #		**Sampled By**	David Hickey	**Modified Date**	9/12/06
QA Sample Type		**Concentration**	Low concentration	**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/28/06	09:55	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/06	09:55	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.31 ppm	112GN7448-8282006-7
✗	8/28/06	09:55	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SOIL SEDIMENT SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	13SD680006	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Sample Location ID**	13SD68	**Created Date**	8/28/06
Task/Contract #	CTO 0343	**Sampled By**	David Hickey	**Modified By**	James Goerdt
WBS Code #		**Concentration**	Low concentration	**Modified Date**	9/12/06
QA Sample Type				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Sample Collection Records

Date	Time	Method	Monitor (ppm)	Depth (ft)	Color	Description
8/28/06	10:06	Hand auger	NA	0-6	brown	

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/06	10:06	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap	Rapid Assay = 0.18 ppm	112GN7448-8282006-7
✗	8/28/06	10:06	SW-846 8082	PCBs	4°C	1	Glass	4 oz. wide-mouth clear w/Teflon cap		

General Observations and Notes

No Notes

- End of Report -

APPENDIX C.3.1
SWMU 13
SURFACE WATER SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW01 01 EC
Sample Location: 13SW01
Sampled By: T. Rojahn
C.O.C. No.: 0973

[■] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other: Drainage Ditch
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1030	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Depth: 1/2" Method: Direct	CLEAR	7.49	262	9.29	11	11.7 ~~106~~	NA	95

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow 1.9gpm @ culvert

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW02 01 & F
Sample Location: 13SW02
Sampled By: T. Rojahn
C.O.C. No.: 0973

[■] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other: Drainage Ditch
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 3/29/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1100	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Depth: <1"	Slt Tan	7.24	280	9.29	59	9.28	NA	113
Method: Direct								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow 1-5 gpm @ Culvert

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ted Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW03 01 FF
Sample Location: 13SW03
Sampled By: T. Rojahn
C.O.C. No.: 0973

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1420 Depth: SURFACE Method: Direct	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
	CLEAR	7.39	.496	11	16	9.12	NA	131

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow ~1-5 gpm
IN GRASSY AREA

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 04 01 EF
Sample Location: 13SW
Sampled By: T. Rojahn
C.O.C. No.: 0973

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: Drainage Ditch
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/29/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1440	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Depth: 3"	Tan	7.75	.181	10.65	298	10.41	NA	174
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	Yes
SVOCs (SIM)	4°C	(2) 1 L Amber	Yes
SVOCs (8151A)	4°C	(2) 1 L Amber	Yes
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow 1-5 gal
@ Culvert W. side of Road

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW05 01 FF
Sample Location: 13SW05
Sampled By: T. Rojahn
C.O.C. No.: 0973

[■] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other: DRAINAGE DITCH
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1510	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Depth: 1-3" SURFACE Method: DIRECT	V.SL. TAN	7.58	0.203	10.49	36	10.8	NA	109

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	(Yes)
SVOCs (SIM)	4°C	(2) 1 L Amber	(Yes)
SVOCs (8151A)	4°C	(2) 1 L Amber	(Yes)
Explosives (8330)	4°C	(2) 1 L Amber	(Yes)
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	(Yes)
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	(Yes)
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	(Yes)

OBSERVATIONS / NOTES:

Culvert W. side of Road
Flow 1-5 gal

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW06 01 EF
Sample Location: 13SW06
Sampled By: T. Rojahn
C.O.C. No.: 0973

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Drainage Ditch
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1535	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Depth: SURFACE Method: DIRECT	Clear	7.41	0.543	10.44		9.62	NA	640

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4° C	(2) 1 L Amber	YES
SVOCs (SIM)	4° C	(2) 1 L Amber	YES
SVOCs (8151A)	4° C	(2) 1 L Amber	YES
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

FLOW: 1-2 gal/min
West side of Road @ Culvert

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Troy Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 07 01 & F
Sample Location: 13SW 07
Sampled By: T. Rojahn
C.O.C. No.: 0973 & 0980

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: Drainage Ditch
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1555 Depth: Surface ~2" Method: Direct	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
	Silt, tan	7.32	1394	9.8	352	8.13	NA	177

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4° C	(2) 1 L Amber	NO
SVOCs (SIM)	4° C	(2) 1 L Amber	↓
SVOCs (8151A)	4° C	(2) 1 L Amber	↓
Explosives (8330)	4° C	(2) 1 L Amber	(Yes)
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	(Yes)
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	(Yes)
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	(Yes)

OBSERVATIONS / NOTES:

Culvert W side of Road
Flow < 1 gpm

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW08 01 FF
Sample Location: 13SW08
Sampled By: T. Rojahn / R. BALLOCCI
C.O.C. No.: 0996

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: ORANGE DITCH
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

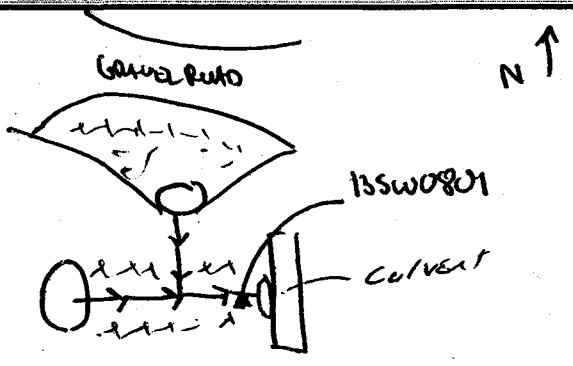
SAMPLING DATA:

Date: 5/8/03 Time: 0910 Depth: 2" Method: GRAB	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
	CLEAR	6.13	0.462	15-18	31	6.91	NA	+150.6

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4° C	(2) 1 L Amber	—
SVOCs (SIM)	4° C	(2) 1 L Amber	—
SVOCs (8151A)	4° C	(2) 1 L Amber	—
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:



FLOW COMING FROM N - W

≈ 1.5 gpm FLOW

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balloccl

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 09 01 EF
Sample Location: 13SW 09
Sampled By: T. Rojahn
C.O.C. No.: 0980

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Drainage Ditch
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/29/03 Time: 1645 Depth: Surface 1-3" Method: Direct	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
	Clear	8.48	0.138	1100	45	9.81	NA	120

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

@ Culvert inside Mine Fill B South end

Flow < 1 gpm

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 01 01 EF
Sample Location: 13SW 10
Sampled By: T. Rojahn
C.O.C. No.: 0980

[■] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Date: 3/29/03								
Time: 1700								
Depth: SURFACE 1'	V.SLTAN	7.74	.199 .283	9.3	150	9.95	NA	145
Method: Direct								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow ~10-20 gpm @ culvert

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD03290303 & F

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW11 01 E F
Sample Location: 13SW11
Sampled By: T. Rojahn / R. Bullock
C.O.C. No.: 0996

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: DRAINAGE PIPE
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

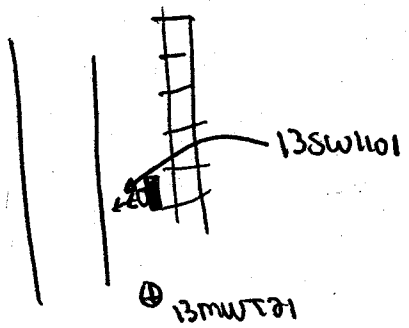
Date: 5/8/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 0935	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	mV
Depth: —	RUSTY	7.67	2.743	16.45	RS	4.35	NA	152.1
Method: GRAB	ORANGE							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

1.5 gpm
sample from Discharge Pipe



MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Bullock

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 12 01 EC
Sample Location: 13SW 12
Sampled By: T. Rojahn
C.O.C. No.: 0980

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other: Culvert
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/30/03 Time: 0930	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Depth: 1-3" Method: Direct from culvert	CLEAR	7.92	0.645	6.95	17	11.98	NA	162

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Flow 10 - 20 gpm

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD ~

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13SW 13 01 EF
Sample Location: 13SW 13
Sampled By: T. Rojahn
C.O.C. No.: 0980

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

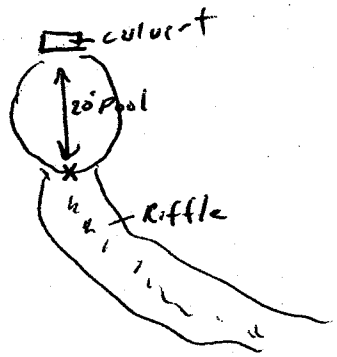
Date: 3/20/03 Time: 1000	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	ORP mV
Depth: 3" Method: Direct	CLEAR	8.07	0.260	6.52	12.6	12.32	NA	157

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
SVOCs (8270C)	4°C	(2) 1 L Amber	—
SVOCs (SIM)	4°C	(2) 1 L Amber	—
SVOCs (8151A)	4°C	(2) 1 L Amber	—
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

20' W. of culvert



FLOW ~ 20-50 gpm

MAP:

Refer to Figure 3-2 of the QAPP for CTO 0166

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Rojahn

APPENDIX C.3.2
SWMU 13
SURFACE WATER SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SP0101
Sample Location: 13 SP01
Sampled By: F.W. / TK
C.O.C. No.: 4801 & 4802

[] Stream
[] Spring
[] Pond
[] Lake
[■] Other: SEEP / PONDED WATER
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/22/03 Time: 0930 Depth: SURFACE Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	6.8	0.335	11.81	2.60	3.60	202.6	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS / NOTES

Photo #1 (0305)
PONDED NO FLOW

MAP

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tony Kyle

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135P0201
Sample Location: 135P02
Sampled By: MC/TK
C.O.C. No.: 480/E4802

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: SEEP / PONDED
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10/22/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1033	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Depth: MID	CLEAR	7.70	0.360	12.16	5.0	9.79	211.0	—
Method: DIRECT								

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

-F

8" DEEP
PHOTO #6 (0308)
PONDED NO FLOW

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tony Royal

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SP0301
Sample Location: 13SP03
Sampled By: MC / TR
C.O.C. No.: 4801 & 4802

[] Stream
[] Spring
[] Pond
[] Lake
[■] Other: SEEP / PONDED
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/22/03 Time: 1230 Depth: MID Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	TANISH	7.03	0.509	14.54	40	5.28	227.5	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS / NOTES

DEPTH ~1'
PHOTO #9 (0310)
PONDED TRENCH NO FLOW

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tay Ayala

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SP0401
Sample Location: 13SP04
Sampled By: FW
C.O.C. No.: 4801 & 4801

[] Stream
[] Spring
[] Pond
[] Lake
[■] Other: SEEP / Ponded water
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10/22/03 Time: 1330 Depth: MIP Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	6.44	0.307	14.08	0.01	6.02	283.7	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

Depth ~5"
Photo # 12 (0313)
No Flow (Ponded)

Circle if Applicable:
MS/MSD
Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW0702
Sample Location: 13SW07
Sampled By: MC
C.O.C. No.: 4814 & 4813

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: CULVERT
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-27-03 / Time: 1305 / Depth: 4" / Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.25	0.550	13.27	9.12	5.19	270	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

PHOTO # 0339

MAP

Circle if Applicable:
MS/MSD —
Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W0802 (FD)
Sample Location: 135W08
Sampled By: MC/TL
C.O.C. No.: 4804

- [x] Stream (Formerly)
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [x] Other: FORMER STREAM NOW FLOWS THROUG CULVERT
- [ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

FIELD MEASUREMENTS DATA

Date: 10/23/03 Time: 1230 Depth: MID Method: PERISTALTIC PUMP	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.09	0.460	14.71	19.3	6.03	-23.7	—

SAMPLE PRESERVATION/CONTAINER REQUIREMENTS

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

f

OBSERVATIONS/NOTES

DEPTH ~ 4"
PHOTO (0322)

MAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tim Lynch

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW0902
Sample Location: 13SW09
Sampled By: AC
C.O.C. No.: 4014 & 4813

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: CULVERT
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-27-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1015								
Depth: 6"								
Method: DIRECT FILL	CLEAR	7.80	0.436	11.80	5.13	8.55	324.4	-

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS/NOTES

PHOTO #0344

MAP

Circle if Applicable:
MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W1002
Sample Location: 135W10
Sampled By: MC/TK
C.O.C. No.: 4804

- [■] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [ ] Other: PONDED
- [ ] QA Sample Type:

Type of Sample:
- [X] Low Concentration
- [ ] High Concentration

Date: 10/23/03 Time: 0850 Depth: M10 Method:	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	6.17	0.270	12.77	1.98	3.65	178.7	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

PONDED No Flow
Depth 8"

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W1102
Sample Location: SWMU 13
Sampled By: M. COCHRAN
C.O.C. No.: 4821

[✓] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 11-18-03 / Time: 1400 / Depth: 6" - / Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	BR	6.90	1.024	15.20	242	4.99	216	

SAMPLE PRESERVATION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes ✓
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes ✓
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes ✓
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes ✓
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes ✓
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	NO

OBSERVATIONS/NOTES:

FLOW @ 15 GPM

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

FOR M. COCHRAN

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW1202
Sample Location: 13SW12
Sampled By: MC/TR
C.O.C. No.: 4901 & 4902

[■] Stream Ponded H2O No Flow
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

Date: 10/22/03 Time: 1450 Depth: MID Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	7.51	0.427	12.25	6.0	9.5	233.6	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

Depth ~1'
115' FROM ORIGINAL location
Downstream
PHOTO #14 (0315)

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW1302
Sample Location: 13SW13
Sampled By: MC / TK
C.O.C. No.: 4801 & 4802

[■] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/22/03 Time: 1400 Depth: MID Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.42	0.531	13.33	3.0	2.19	255.6	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS/NOTES

Flow < 1gal/min
Sample at EDGE OF pool

MAP

Circle if Applicable:
MS/MSD YES
Duplicate ID No.: 13FD10220303

Signature(s):
Tk

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW1401
Sample Location: 13SW14
Sampled By: MC / TK
C.O.C. No.: 4801 & 4802

[ ] Stream
[ ] Spring
[ ] Pond
[ ] Lake
[ ] Other: POND ED
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

Date: 10/22/03 Time: 1045 Depth: MID Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.33	0.365	12.14	4.4	5.93	224.7	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

Depth 12"
PHOTO #8 (0309)
POND ED No Flow

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	13FD1022030T

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

(TT) Page 1 of 1

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 16SW1501
Sample Location: 16SW16015
Sampled By: MC
C.O.C. No.: 4814 & 4813

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-27-03 / Time: 0900 / Depth: 2" / Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.43	0.231	8.93	10.4	10.59	290.5	-

SAMPLE ANALYSIS/CONTAINER INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

PONDED WATER

PHOTO # 0342

LOG

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

F Fuller

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W1601
Sample Location: 135W1601
Sampled By: MC / TK
C.O.C. No.: 4801 & 4802

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: PONDED H2O
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10-22-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0950	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Depth: MID	SL. Cloudy	7.17	0.254	12.18	6.5	8.48	213.7	—
Method: DIRECT								

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

-F

4-6" DEEP
PHOTO #2 (0304)
PONDED NO FLOW

Circle if Applicable:
MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W1B01
Sample Location: 135W1B
Sampled By: MC
C.O.C. No.: 4804

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other: PONDED AREA No Flow
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

FIELD MEASUREMENTS

Date: 10/23/03 Time: (24) 1555-0915	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Depth: M10 Method: Direct	CLEAR	7.12	0.347	12.11	1.03	7.19	175.6	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS / NOTES

Depth of ~~Stream~~ (TR) PONDED AREA ~1'

SKETCH

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W1901
Sample Location: 135W19
Sampled By: MC / FWT
C.O.C. No.: 4904

- [x] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [x] Other: PONDED No Flow
- [ ] QA Sample Type:

Type of Sample:
- [X] Low Concentration
- [ ] High Concentration

Date: 10/23/03 Time: 0935 Depth: MID Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.25	0.546	11.69	1.93	6.03	203.5	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

Depth of ponded area 1'

PHOTO (#0320)

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW2001
Sample Location: 13SW20
Sampled By: FW1/TK
C.O.C. No.: 4804

- [X] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [X] Other: Ponded
- [ ] QA Sample Type:

Type of Sample:
- [X] Low Concentration
- [ ] High Concentration

SAMPLING DATA

Date: 10/23/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1315								
Depth: MIN		7.75	0.300	13.22	6.25	4.39	158.3	—
Method: Direct								

SAMPLE DESCRIPTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS/NOTES

Depth 4"
Ponded
PHOTO (#0323)

45' Below original SD location.

MAP

Circle if Applicable:

MS/MSD ✓ | Duplicate ID No.: —

Signature(s):

Ty Kyle

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W2201
Sample Location: 135W22
Sampled By: MC/TR
C.O.C. No.: 4801 & 4802

[X] Stream Ponded No Flow
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10/22/03 Time: 1345 Depth: MID Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.02	0.434	13.65	1.5	3.71	264.7	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

60' FROM ORIGINAL LOCATION
DOWN STREAM

PHOTO # 13 (0314)

DEPTH 4"

MAP

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W2401
Sample Location: 135W/SD24
Sampled By: MC
C.O.C. No.: 4814 & 4813

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

MONITORING DATA

Date: 10-27-03 / Time: 1330 / Depth: 4" / Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	7.65	0.207	10.52	22.7	8.29	261.7	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS / NOTES

PONDED WATER

PHOTO # 0340

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W2501
Sample Location: 135W15001
Sampled By: FW
C.O.C. No.: 491455813

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

FIELD DATA

Date: 10-27-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1110								
Depth: 6"	CLEAR	7.63	0.262	10.95	0.0	8.64	288.0	—
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	✓

OBSERVATIONS/NOTES

FLOWING ~ 20GPM
PHOTO # ~~0344~~ 0345

MAP

Circle if Applicable:
MS/MSD
Duplicate ID No.: 13FD10270301

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W2601
Sample Location: 135W26
Sampled By: MC
C.O.C. No.: 4814 & 4813

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10-27-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1410								
Depth: 6"	CLEAR	6.87	0.260	12.25	8.04	6.70	341.3	—
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-F

OBSERVATIONS / NOTES

PONDED WATER
SURFACE WATER COLLECTED
100' UPSTREAM

PHOTO # 0341

MAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW2701
Sample Location: 13SW27
Sampled By: MC/JK
C.O.C. No.: 4804

[X] Stream ~10-15 gal
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10-23-03 Time: 1415	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Depth: MID Method: DIRECT	Clear	7.58	0.264	13.43	4.0	8.20	257.1	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

-1F

Flow ~10-15 gal
PHOTO # (0325)
Depth 6"

Circle if Applicable:
MS/MSD
Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13SW2801
Sample Location: 13SW/SD28
Sampled By: MC
C.O.C. No.: 4814 & 4813

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-27-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0940	CLEAR	6.37	0.073	8.84	22.1	7.97	330.8	—
Depth: 4"								
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	—

OBSERVATIONS/NOTES

PONDED WATER

PHOTO # 0343

MAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

FMW

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135SW3001
Sample Location: 135SW30
Sampled By: MC
C.O.C. No.: 4801 & 4802

- [X] Stream
- [] Spring
- [] Pond
- [] Lake
- [] Other:
- [] QA Sample Type:

Type of Sample:
- [X] Low Concentration
- [] High Concentration

SAMPLING DATA

Date: 10/22/03 Time: 1538 Depth: Mid Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	7.84	0.395	13.09	2.6	9.63	222.1	—

SAMPLE ANALYSIS/PARAMETER

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

-F

OBSERVATIONS/NOTES

6" Depth
PHOTO # (0319 @1615)

Flow:
1' in 4 sec
2" Deep
1' long

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W3101
Sample Location: 135W31
Sampled By: MC
C.O.C. No.: 4801 & 4802

- [X] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [ ] Other: _____
- [ ] QA Sample Type: _____

Type of Sample:
- [X] Low Concentration
- [ ] High Concentration

Date: 10/22/03 Time: 1300 Depth: MID Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	7.88	0.448	14.25	1.1	9.40	226.2	—

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	

OBSERVATIONS / NOTES:

Depth 6"
PHOTO # 11 (0312)

1', in 5 sec
~2' wide
1½" deep

REMARKS:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Rogers

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 135W3201
Sample Location: 135W32
Sampled By: MC
C.O.C. No.: 4806

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

Date: 10-24-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0840								
Depth: 4"	CLEAR	6.99	0.578	10.33	44	9.15	201.5	—
Method: DIRECT FILL								

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	~~Yes~~
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	~~Yes~~
Selected Ion Monitoring - PAHs	4°C	(2) L Glass Amber	YES

NO

FLOW — 3 GPM

DUG OUT ON 10-23-03

PHOTO # 0326

Circle if Applicable:
MS/MSD | Duplicate ID No.:

DUPLICATE ID NO: ~~BFD~~ FD

Signature(s):

APPENDIX C.3.3
SWMU 13
SURFACE WATER SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW0102
Sample Location: 13SW/SD01
Sampled By: SJC
C.O.C. No.: 0105

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Culvert Discharge
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/7/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0855								
Depth: 0-2"								
Method: Direct Fill	CLEAR	6.97	829	16.27	9.4	2.83	271.2	

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

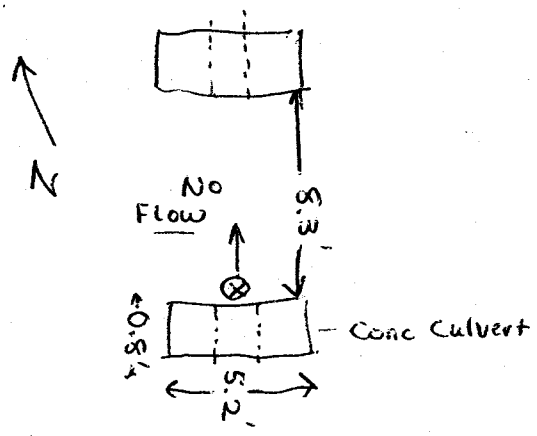
OBSERVATIONS/NOTES:

Filtered Sample Collected Yes[] No[] ~~13GWT~~ 13SW0102 -F

WATER WAS CLEAR W <10 TURB BUT TOOK FILTERED SAMPLE TO FILTER OUT GRASS, ETC

AREA RECENTLY MOWED

MAP:



⊗ SW/SD Sample.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW~~1402~~ (FC)
Sample Location: 13SW/SD~~02~~ 13
Sampled By: SJC/JG
C.O.C. No.: —

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/6/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1315								
Depth: NA	—	—	—	—	—	—	—	—
Method: NA								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[] No[] 13GWT_____-F

SEE SUPPLEMENTAL SHEET

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJConti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SW1402	**Date:** 10/6/04	**Time:** 1315	**Sampler:** SJC/JG	
Photograph Number/Direction: NA	Upstream	Downstream	East	West	North	South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	(No)	(Not present)		
Organisms Present: Fish (in) NA	Other (insects, frogs, etc.): NA			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 12'	**Channel Depth (ft):** 3'	BOTH SIDES.		
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: Bedrock	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW1402
Sample Location: 13SW/SD 14
Sampled By: T. ROJAHN
C.O.C. No.: 0125

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/27/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1028								
Depth: SURFACE	CLEAR	7.45	0.702	14.69	12.8	10.30	+81.7	—
Method: DIRECT								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	(Yes)/No
RDX Degradation Products SW-846, Modified	4°C	1 (2) L Glass Amber	(Yes)/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	1 (2) L Glass Amber	(Yes)/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[] No[] 13GWT NA -F

FILL FROM FALLS

FLOW 750 < 100 gpm
≈ 1 gal/sec

MAP

SEE FIG 3-3

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW1502
Sample Location: 13SW/SD15
Sampled By: SJC/JG
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 101604 / Time: 1305 / Depth: — / Method: —	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[] No[] 13GWT_____-F

SEE SUPPLEMENTAL SHEET

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 135W1502	**Date:** 10/6/04	**Time:** 1305	**Sampler:** SJC/JG	
Photograph Number/Direction: 1	Upstream SE	Downstream	East	West	North	South
Predominant Surrounding Land Use:	(Wooded)	~~Open Field~~	Other	
Canopy Cover:	Open	(Partly Open)	Shaded	
Dicharge Pipe Present:	Yes	(No)		
Aquatic Vegetation Present:	Yes	(No)	**Stream channelized:**	Yes	No
Water flowing:	Yes	(No)	(Not present)	
Organisms Present: Fish (in)	NA	Other (insects, frogs, etc.):	NA	
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA	
Channel Width (ft): 10'	**Channel Depth (ft):** 8'	8' E	
Signs of flooding (circle all that apply)	Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet):	Yes	(No)	If yes (approximate size)	
Sediment Substrate:	(Bedrock)	Boulder (>10 in)	(Cobble (2.5-10 in)	(Gravel (0.10-2.5 in)
(Circle all that apply)	(Sand)	(Silt)	Clay	Muck
	Debris	Detritus	Concrete	Iron deposits
Sediment Odors:	(Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils:	(Absent)	Slight	Moderate	Profuse
Water Odors: Normal	NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None	NA	Droplets	Sheen
Turbidity: Clear	NA	Slightly Turbid	Turbid	Opaque

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1502
Sample Location: 13SW/SD 15
Sampled By: T. ROJAHN
C.O.C. No.: 0125

■ Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10-27-04 / Time: 0950 / Depth: Direct 5 / Method: SURFACE WATER	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.41	0.361	14.22	23.8	11.97	*101.4	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	1 (2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	1 (2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT NA -F

Flow = <1 gpm

Direct Fill from FALL

Flow over bedrock
Depth < 1"
Width ~ 1'

MAP

SEE FIG. 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW~~002~~ FC
Sample Location: 13SW/SD 16
Sampled By: SJC/JG
C.O.C. No.: —

[] Stream
[X] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/6/04 Time: — Depth: — Method: —	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT_____-F

SEE SUPPLEMENTAL SHEET

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

SUPPLEMENTAL SURFACE WATER/SEDIMENT SAMPLE DOCUMENTATION SHEET
NSWC CRANE, INDIANA

Sample Number: 13SW1602	**Date:** 10/6/04	**Time:** 1245	**Sampler:** SJC/JG	
Photograph Number/Direction: ✓ Upstream (S)	Downstream	East	West	North	South
Predominant Surrounding Land Use: (Wooded)	Open Field	Other		
Canopy Cover: Open	(Partly Open)	Shaded		
Dicharge Pipe Present: Yes	(No)			
Aquatic Vegetation Present: Yes	(No)	**Stream channelized:** (Yes)	No	
Water flowing: Yes	No	(Not present)		
Organisms Present: Fish (in) NA	Other (insects, frogs, etc.): NA			
Water Width (ft): NA	**Water Depth (ft):** NA	**Estimated Flow/Velocity:** NA		
Channel Width (ft): 12	**Channel Depth (ft):** 4'	BOTH SIDES		
Signs of flooding (circle all that apply) Yes	(No)	Water marks on trees	Water-borne debris piles	Other:
Deep Pools Present (>2 feet): Yes	(No)	If yes (approximate size)		
Sediment Substrate: (Bedrock)	(Boulder (>10 in))	(Cobble (2.5-10 in))	(Gravel (0.10-2.5 in))	
(Circle all that apply) (Sand)	(Silt)	Clay	Muck	
Debris	Detritus	Concrete	Iron deposits	
Sediment Odors: (Normal)	Sewage	Petroleum	Chemical	Anaerobic
Sediment Oils: (Absent)	Slight	Moderate	Profuse	
Water Odors: Normal NA	Sewage	Petroleum	Chemical	Anaerobic
Water Surface Oils: None NA	Droplets	Sheen		
Turbidity: Clear NA	Slightly Turbid	Turbid	Opaque	

Other Comments/Observations: _____

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1602
Sample Location: 13SW/SD 16
Sampled By: T. ROJAHN
C.O.C. No.: 0125

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-27-04 Time: 1125 Depth: SURFACE Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.61	0.297	14.56	12.7	11.63	+71.5	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	(Yes) No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	(Yes) No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes) No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT NA -F

Filled From Falls over Rock

Flow > 5 L/10 ppm

MAP:

SEE FIG 3-3

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Ted Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 13SW —
Sample Location: 13SW/SD22
Sampled By: SJC/JG
C.O.C. No.: NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/7/04 / Time: 0930 / Depth: — / Method: —	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[] No[] 13GWT— -F

MAP

NO SAMPLE - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJConti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 2202
Sample Location: 13SW/SD 22
Sampled By: T. ROJAHN
C.O.C. No.: 0125

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/27/04 Time: 1055 Depth: 2" Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clear	7.70	0.205	15.14	21.3	10.84	+74.1	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13~~SW~~ 2202 -F

Flow

½" x 3' (3sec/ft)

MAP

SEE FIG 3-3

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW —
Sample Location: 13SW/SD 28
Sampled By: SJC/JG
C.O.C. No.: NA

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/6/04 Time: —	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Depth: Method:	—	—	—	—	—	—	—	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

MAP:

NO SAMPLE – DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 2802
Sample Location: 13SW/SD 28
Sampled By: T. ROJAHN
C.O.C. No.: 0124

[X] Stream (Pool)
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/26/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1600								
Depth: 2"	Sl. Cloudy	7.99	0.059	13.75	56.4	8.05	49.6	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	4 x (1) L HDPE	(Yes)/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	4 x (1) L HDPE	(Yes)/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/(No)
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/(No)
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/(No)

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13~~GW~~SW 2802 -F

Flow - NA (WATER PONDED)
Pool - 4" x 2' x 8'

MAP

SEE FIG - 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	13FD102604 01 & -F

Signature(s):

Ted Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 13SW —
Sample Location: 13SW/SD 30
Sampled By: SJC/JG
C.O.C. No.: NA

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/6/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: —								
Depth: —	—	—	—	—	—	—	—	—
Method: —								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT_____-F

MAP

NO SAMPLE / DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW3002
Sample Location: 13SW/SD 30
Sampled By: T. COSAHN
C.O.C. No.: 0124

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/26/04 Time: 1537 Depth: 2" Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.52	0.359	14.39	5.69	9.44	39.6	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	~~STET~~ (FT) 1 (X) L HDPE	(Yes)/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	~~STET~~ (FT) 1 (X) L HDPE	(Yes)/No
RDX Degradation Products SW-846, Modified	4°C	~~STET~~ (2) L Glass Amber	(Yes)/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)/No

OBSERVATIONS/NOTES:

Filtered Sample Collected Yes[] No[] 13~~SW~~SW3002-F

FLOW
STORM EVENT

1" x 15' 25¢/FT

MAP:

SEE FIG 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Cosahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 3102
Sample Location: 13SW/SD 31
Sampled By: SJC/JG
C.O.C. No.: 0104

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/6/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1515								
Depth: 0-2"	LT BRN	7.63	457	12.50	119	9.34	130	
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/(No)
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/(No)
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/(No)
		(2) TOTAL	

OBSERVATIONS / NOTES

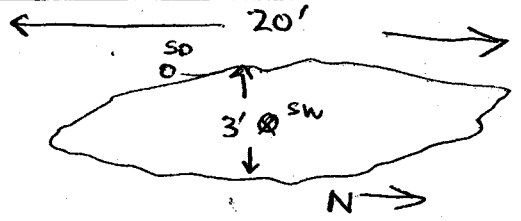
Filtered Sample Collected (Yes) No[] ~~10GWT~~ -F
13SW3102

CANNOT FIND ORIG STAKE

27' WIDTH

7' WEST
4' EAST

MAP



DS US

POOLED WATER
NO FLOW
SHADED
WATER BUGS

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW —
Sample Location: 13SW/SD 33
Sampled By: SJC/JG
C.O.C. No.: N/A

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: / Time: / Depth: / Method:	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes (No)
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes (No)
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes (No)

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT_____-F

MAP

NO SAMPLE TAKEN - DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJConti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW3301
Sample Location: 13SW/SD 33
Sampled By: T. Lanahan
C.O.C. No.: 0124

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/26/04 Time: 1510 Depth: 2" Method: Direct	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clears	7.74	0.347	14.28	5.92	11.45	39.3	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	Yes/No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT____-F

FLOW
Rain Event conditions
4" x 6' 2sec/ft

MAP

~~SEE FIG 3-3 or 3-4~~ (F4)
SEE FIG 3-3

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW3401
Sample Location: 13SW/SD34
Sampled By: SJC/JG
C.O.C. No.: 0104

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
(X) Low Concentration
[] High Concentration

SAMPLING DATA

Date: 10/6/04 Time: 1045 Depth: 0-2" Method: DIRECT FILL	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	CLEAR	7.12	373	10.79	1.3	10.05	166.5	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	(1) L HDPE	(Yes) No
RDX Degradation Products SW-846, Modified	4°C	(2) L Glass Amber	(Yes) No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes) No
		(5) TOTAL	

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[] No[] 13GWT NA -F

MAP

SEE DRAWING.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SJ Conti

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW3501
Sample Location: 13SW/SD 35
Sampled By: SJC / JG
C.O.C. No.: 0104

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA: Low Mile

Date: 10/6/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1345								
Depth: 0-2"								
Method: DIRECT FILL	CLEAR	7.39	512	14.50	3.8	8.72	151	-

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°/H_2SO_4	4 (1) L HDPE *	Yes/No
RDX Degradation Products SW-846, Modified	4°C	8 (2) L Glass Amber	Yes/No
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	8 (2) L Glass Amber	Yes/No
		20 5 TOTAL FOR SAMPLE	
		TOTAL	

OBSERVATIONS / NOTES

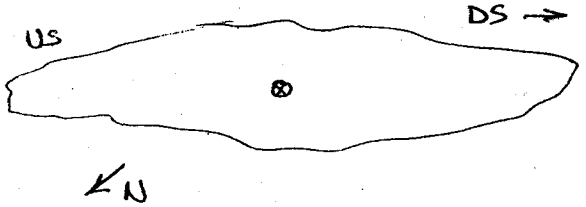
Filtered Sample Collected Yes/[No] 13GWT_____-F

TOOK DUP AND MS/MSD

SKETCH

SEE DRWG.

Sample Taken in pooled water No Flow.



Circle if Applicable: MS/MSD

Duplicate ID No.: 13FD10060401

Signature(s): SJ Conti

APPENDIX C.3.4
SWMU 13
SUMP WATER SAMPLE LOG SHEETS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU001-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL001			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:23	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU002-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL002			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:24	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU003-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID				**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:24	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU004-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL004			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:25	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU005-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL005			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:26	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU006-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL006			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:26	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	2/19/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU00701	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL007			**Printed Date**	2/6/07

Sample Collection Records

Date	2/19/06	**Color**	Lt Brown	**Temp (C)**	1.26
Time	15:20	**pH (S.U.)**	7.79	**ORP (mV)**	193
Depth (ft.)	Surface	**S.C. (mS/cm)**	1.144	**Salinity (%)**	NA
Method	Other - define in notes	**DO (mg/L)**	10.42		
MS/MSD Collected	N	**Turbidity (NTUs)**	+1000		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	2/19/06	15:20	Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4°C		112GN6878-2202006-3

General Observations and Notes

Sampled using a stainless steel scoop sampler.

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	3/6/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU008-DRY	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL008			**Printed Date**	2/6/07

Sample Collection Records

Date	3/6/06	**Color**		**Temp (C)**	
Time	12:27	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	DRY	**S.C. (mS/cm)**		**Salinity (%)**	
Method	-Select-	**DO (mg/L)**			
MS/MSD Collected	N	**Turbidity (NTUs)**			
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #

General Observations and Notes

DRY

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	2/19/06
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SU00901	**Status**	Archive	**Printed By**	James Goerdt
Sample Location ID	13SU/SL009			**Printed Date**	2/6/07

Sample Collection Records

Date	2/19/06	**Color**	Clear	**Temp (C)**	7.79
Time	14:40	**pH (S.U.)**	7.31	**ORP (mV)**	193
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.448	**Salinity (%)**	NA
Method	Direct bottle	**DO (mg/L)**	9.52		
MS/MSD Collected	N	**Turbidity (NTUs)**	31		
Duplicate Collected	Y				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	2/19/06	14:40	Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4°C		112GN6878-2202006-3

General Observations and Notes

No Notes

- End of Report -

APPENDIX C.4.1
SWMU 13
GROUND WATER SAMPLE LOG SHEETS
ROUND 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT01 01
Sample Location: 13MWT01
Sampled By: T. ROJAHN
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/26/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1024	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	4.68	0.229	12.59	3.8	1.28	NA	+220

PURGE DATA:

Date: 4/26/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.95	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 6.68								
One Casing Volume(gal/L): 7								
Start Purge (hrs): 0912								
End Purge (hrs): 1022								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 7.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Intake of Pump @ ~12.95'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MWT01
DATE: 4/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0912	6.68	—	—	—	—	—	—	—	START PURGE
0922	7.48	120	12.12	4.93	0.218	1.52	+158	3.8	1200 ml CLEAR
0932	7.56	110	12.27	4.77	0.224	1.39	+186	4.1	2300 ml "
0942	7.60	100	12.40	4.73	0.228	1.31	+200	3.5	3300 ml "
0952	7.64	100	12.42	4.71	0.228	1.32	+207	4.2	4300 ml "
1002	7.66	100	12.52	4.69	0.229	1.30	+214	3.2	5300 ml "
1012	7.68	100	12.60	4.67	0.231	1.28	+219	3.6	6300 ml "
1022	7.69	100	12.59	4.68	0.229	1.28	+220	3.8	7300 ml "
1024	—	—	—	—	—	—	—	—	Sample Time

SIGNATURE(S): Terry Boyd

TL: MIN VOL.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT02 01
Sample Location: 13MWT02
Sampled By: R. BALLOUEE
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/26/03 Time: 1536 Method: PERISTALTIC	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	SALINITY %	ORP mV
	CLEAR	4.61	1.344	15.28	6.8	1.98	NA	219.0

PURGE DATA:

Date: 4/26/03 Method: PERISTALTIC	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" dia. PVC								
Total Well Depth (TD): 29.50	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 17.28'								
One Casing Volume (gal/l): 2								
Start Purge (hrs): 1246								
End Purge (hrs): 1535								
Total Purge Time (min): 169								
Total Vol. Purged (gal/l): 3.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

- STARTED SAMPLING @ 1536 WELL RAN DRY AFTER 1L FOR EXP SAMPLES. WILL ALLOW WELL TO RECHARGE BEFORE SAMPLING IS RESUMED
- 4/27/03 WL: 21.35' : 8.15' OF WATER. FINISH SAMPLING @ 0830
  TURB 6.0 DURING SAMPLING.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Ballouee

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: BMW702
DATE: 4/26/05

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1246	17.28	START							CLEAR
1250	18.02	160	15.88	4.56	1.240	4.08	+239.1	19	.72 L
1255	18.49	130	15.24	4.37	1.228	2.91	+276.3	18	1.37 L
1300	18.85	75	15.58	4.31	1.241	2.76	+240.4	17	—
1305	19.61	75	15.62	4.29	1.243	2.73	+249.2	21	UNABLE TO LOWER RATE 2.1 L
1310	20.05	75	15.63	4.25	1.243	2.70	+303.1	20	—
1315	20.26	75	15.45	4.26	1.240	2.67	+304	20	2.85 L
1325	20.71	75	15.65	4.27	1.241	2.67	+306.1	20	—
1335	21.19	75	15.55	4.32	1.240	2.68	+306.2	19	3.6 L
1345	21.72	75	15.56	4.38	1.241	2.67	+301.1	16	—
1355	22.20	75	15.52	4.54	1.243	2.69	+284.7	17	5.1 L
1405	22.69	75	15.51	4.56	1.245	2.66	+282.9	17	—
1415	23.14	75	15.56	4.59	1.247	2.64	+276.6	15	6.6 L
1425	23.61	75	15.39	4.60	1.250	2.63	+257.9	16	—
1435	24.00	75	15.40	4.62	1.250	2.61	+240.1	15	7 1/2 vol 8.1 L
1445	24.40	75	15.40	4.63	1.250	2.57	+229.3	13	2HRS. —
1455	24.83	75	15.27	4.63	1.247	2.41	+198.7	13	9.6 L
1505	25.35	75	15.23	4.62	1.246	2.26	+188.6	12	—
1515	25.90	75	15.27	4.60	1.244	2.09	+192.6	12	11.1 L
1525	26.29	75	15.28	4.60	1.245	2.00	+192.7	8.9	—
1530	26.57	75	15.30	4.61	1.244	2.01	+191.4	7.4	~~12.6~~
1535	26.80	75	15.28	4.61	1.244	1.98	+191.0	6.8	3HRS 12.6 L
	END PURGE SAMPLED @	1536							

SIGNATURE(S): Robert Balthrop

7.5 L = 1 vol 24.8 TO.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT03 01 (S F)
Sample Location: 13MWT03
Sampled By: B Balkwill
C.O.C. No.: 0982
Type of Sample:
[X] Low Concentration
[] High Concentration

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

SAMPLING DATA:

Date: 4/26/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1146	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	5.56	0.445	13.14	38	4.50	NA	452.7

PURGE DATA:

Date: 4/26/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 18.05	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 8.67								
One Casing Volume (gal/L): 1.5								
Start Purge (hrs): 0745								
End Purge (hrs): 1145								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 4.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	↓
Explosives (8330)	4° C	(2) 1 L Amber	(Yes)
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	(Yes)
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	(Yes)
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	(Yes)

OBSERVATIONS / NOTES:

WL = 19.70 @ TIME OF SAMPLING.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkwill

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: BPMW03
DATE: 4/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0745	8.67	START							HAZY
0750	8.98	140	11.35	5.82	0.390	6.75	+147.2	200	.7L
0755	9.46	125	11.39	5.74	0.388	6.48	+173.1	150	1.33L
0800	9.64	100	11.47	5.73	0.389	6.46	+180.4	60	1.93L
0805	9.81	75	11.62	5.73	0.390	6.45	+186.0	30	2.2L
0810	10.03	75	11.76	5.71	0.392	6.44	+193.1	34	SLIGHT HAZE 2.6L
0815	10.15	70	12.05	5.70	0.393	6.51	+195.5	30	2.93 L
0820	10.32	70	12.22	5.70	0.396	6.56	+199.1	33	UNABLE TO PUMP BELOW 70 mL/min -
0825	10.51	70	12.30	5.70	0.399	6.67	+202.4	40	3.65 L
0830	10.65	70	12.42	5.70	0.401	6.74	+204.1	45	—
0835	10.80	70	12.46	5.70	0.402	6.61	+204.7	45	4.3 L
0840	10.96	70	12.47	5.70	0.403	6.54	+205.0	44	—
0845	11.12	70	12.49	5.70	0.404	6.48	+205.1	45	5.0 L
0850	11.30	70	12.53	5.69	0.404	6.21	+203.4	42	—
0855	11.52	70	12.57	5.68	0.404	6.04	+201.9	39	1 vol 5.7L
0900	11.65	70	12.64	5.66	0.404	5.80	+199.7	42	—
0905	11.78	70	12.65	5.61	0.398	4.62	+199.1	55	6.4L
0910	11.93	70	12.66	5.56	0.394	4.89	+147.7	52	—
0915	12.08	70	12.76	5.56	0.396	4.20	+194.1	50	7.1L
0925	12.30	70	12.88	5.55	0.400	4.30	+190.1	45	— 7.8L
0935	12.62	70	12.83	5.51	0.401	4.45	+191.0	45	[redacted] 8.5L
0945	12.93	70	12.98	5.51	0.402	4.71	+196.1	55	2 vols. — 9.2L
0955	13.20	70	13.09	5.55	0.410	4.80	+174.1	60	9.9L [redacted]
1005	13.48	70	13.15	5.63	0.421	4.93	+160.2	65	—
1015	13.73	70	13.05	5.65	0.429	4.88	+154.0	55	11.3
1025	13.96	70	13.20	5.66	0.435	4.78	+155.6	55	~ 2 vol —
1035	14.17	70	13.22	5.63	0.437	4.70	+156.0	45	12.7
1045	14.37	70	13.06	5.62	0.437	4.71	+153.6	45	3 VOLS —
1055	14.63	70	13.15	5.60	0.440	4.67	+153.3	40	14.1 L
1105	14.85	70	13.27	5.60	0.445	4.55	+154.4	29	—

SIGNATURE(S): Robert Balhoff

5.7 L = 1 vol. TO. 18.05

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MW703
DATE: 4/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	
1115	15.05	70	13.12	5.57	0.446	4.52	+153.3	72	.2 Drawdown in WL	15.51
1125	15.27	70	13.18	5.58	0.449	4.52	+153.1	25		
1135	15.44	70	13.16	5.57	0.447	4.52	+152.8	40	2.3 vol	16.41
1145	15.70	70	13.14	5.56	0.445	4.50	+152.7	38	4 hrs.	− 17.61
→	End Purge Sampled @	1146								

SIGNATURE(S): Robert Balthaser

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT04 01
Sample Location: 13MWT04
Sampled By: B. BALKOVEC
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03 Time: 1051 Method: PERISTALTIC	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	SALINITY %	ORP mV
	CLEAR	4.77	0.316	13.73	6.0	4.30	NA	+246.1

PURGE DATA:

Date: 4/27/03 Method: PERISTALTIC	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" dia. PVC								
Total Well Depth (TD): 17.80	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 13.86								
One Casing Volume (gal/L): .64								
Start Purge (hrs): 0946								
End Purge (hrs): 1050								
Total Purge Time (min): 94								
Total Vol. Purged (gal/L): 1.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ ND
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: BMW104
DATE: 4/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	Vol.
0916	13.86	START							BROWN	
0918	14.04	100								
0920	14.10	100							CELL NOT FILLED YET!	
0921	—	100	13.81	3.55	1.374	2-18	+265.7	7999		
0925	14.22							→	CLEANED OUT CELL	.9L
0930	14.37	80	13.10	4.87	0.263	7.42	+190.2	210	HAZY BROWN.	1.3L
0935	14.44	70	13.12	5.26	0.224	7.38	+168.6	70	UNABLE TO LOWER RATE	1.65L
0940	14.50	70	13.17	5.34	0.216	7.34	+172.1	100		—
0945	14.45	70	13.26	5.34	0.215	7.31	+176.9	130	2 1/2vol STABLE WL	2.35L
0950	14.61	70	13.30	5.32	0.214	7.27	+182.4	150	>1 1/2vol	2.7L
1000	14.61	70	13.29	5.30	0.224	6.47	+192.7	31		3.4L
1010	14.65	70	13.38	5.06	0.245	5.84	+194.4	20		4.1L
1020	14.67	70	13.39	4.91	0.277	5.14	+199.7	15	72 HRS. 2 vols.	4.8L
1030	14.69	70	13.69	4.76	0.310	4.50	+206.7	12		5.5L
1040	14.65	70	13.70	4.78	0.314	4.48	+214.2	8.0	CLEAR	6.2L
1045	14.66	70	13.71	4.77	0.316	4.35	+215.1	8.3		~~6.8L~~
1050	14.66	70	13.73	4.77	0.316	4.30	+216.1	6.0		6.9L
	→ END PURGE									
	SAMPLED @	1051								

2.4L = 1vol.

SIGNATURE(S): Robert Balthaser

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT05 01 & F
Sample Location: 13MWT05
Sampled By: T. ROJAHN
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 0910	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	5.83	0.632	15.18	8.8	0.60	—	176 → 195 (TJ)

PURGE DATA:

Date: 4/26/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 19.15	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 6.02								
One Casing Volume(gal/L): 8.2								
Start Purge (hrs): 1117								
End Purge (hrs): 1349								
Total Purge Time (min): 152								
Total Vol. Purged (gal/L): 23.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	No
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

W.L 4/27/03 - 7.35'
@ 0940 Hrs Turb. increased to 350 NTUs - NEED to collect a Filtered sample.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MWT05
DATE: 4/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1117	6.02	—	—	—	—	—	—	—	START PURGE
1127	7.32	1300	14.21	6.15	0.536	0.95	+160	85	1300 V. SL. Cloudy
1137	7.51	80.0	14.36	6.25	0.540	1.37	+157	75	2100 " " "
1147	7.81	100.0	14.39	6.27	0.544	1.54	+155	65	3100 " " "
1157	7.93	90.0	14.74	6.27	0.534	1.29	+148	55	4000 " " "
1207	8.30	90.0	15.06	6.19	0.544	1.60	+148	55	4900 " " "
1217	8.69	100.0	14.88	6.17	0.547	1.71	+147	55	5900 " " "
1227	9.08	100.0	15.01	6.15	0.553	1.47	+141	65	6900 " " "
1237	9.40	100.0	15.57	6.15	0.562	1.66	+143	70	7900 " " "
1247	9.70	90	15.06	6.13	0.562	1.50	+140	120	8800 SL. Cloudy
1257	10.03	100	15.26	6.13	0.573	1.67	+145	180	9800 TANISH
1307	10.32	80	14.71	6.09	0.576	1.68	+147	390	10600 TAN
1317	10.58	80	14.48	6.00	0.590	1.70	+151	650	11400 TAN
	Note → TURBIDITY ON THE INCREASE & WATER LEVEL								
	dropping rapidly - will pump to dryness								
1349	DRY	Removed AN Additional 12L to dryness							23,400 ORANGE BRN

SIGNATURE(S): Tony Nyl

8.2 MIN VOL IN LITERS

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT06 01 EF
Sample Location: 13MWT06
Sampled By: T. Rollins & B. Balkcom
C.O.C. No.: 0992, 0994, 0995
Type of Sample: 0996
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 0835	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	LT TAN	6.63	0.495	12.96	~~660~~	3.15	—	+ 98

PURGE DATA:

Date: 4/26/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.6	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 12.9								
One Casing Volume(gal/L): 3.1								
Start Purge (hrs): 0745								
End Purge (hrs): 0843								
Total Purge Time (min): 58								
Total Vol. Purged (gal/L): 6.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330) WL 16.9	4°C	4/27/03 (1) (2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	4/28/03 (1) 1 L HDPE @ 0748	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	5/6/03 (1) 1 L HDPE @ 1735	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	5/7/03 (1) 1 L HDPE @ 1700	Yes

OBSERVATIONS / NOTES:

W.L. @ 4/27/03 @ 0834 Hrs = 16.65'

Repurged well on 5/5/03 to dry - start purge @ 1720 Hrs
End purge @ 1724. Vol. purged ~ 1.5 gal.

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MWT06
DATE: 9/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0745	12.90	—	—	—	—	—	—	—	Start purge
0755	13.78	100	11.66	6.40	0.481	2.29	+84	70	1000ml V. Sl. Cloudy
0805	14.36	90	11.68	6.54	0.471	2.98	+86	27	1900 CLEAR
0815	14.91	80	12.09	6.57	0.475	3.20	+87	24	2700 CLEAR
0825	15.46	80	12.76	6.66	0.488	3.30	+87	85	3500 CLOUDY
0835	16.63	110	12.46	6.63	0.495	3.15	+88	650	4600 Lt Tan
0843	~~Both~~ (TD)	Turbidity on the increase & water level							6200 (DRY)
		dropping rapidly - will purge dry & sample later.							

SIGNATURE(S): Tim Neal

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0701
Sample Location: 13MWT07
Sampled By: T. Rolaha
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1200	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	3.98	1.030	15.60	6.8	0.34	—	278

PURGE DATA:

Date: 4/27/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.95	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 3.75								
One Casing Volume(gal/L): 8.9								
Start Purge (hrs): 1020								
End Purge (hrs): 1155								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	40
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MWT07
DATE: 4/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (SU)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1020	3.75	—	—	—	—	—	—	—	START PURGE
1030	5.12	130	15.30	4.02	0.962	0.05	+177	19	1300 ml CLEAR
1040	5.71	110	15.62	4.07	0.976	0.16	200	13	2400 ml "
1050	6.12	100	16.00	4.06	0.985	0.26	223	10	3400 ml "
1100	6.38	100	16.16	4.07	0.995	0.34	240	8.9	4400 ml "
1110	6.60	100	15.90	4.05	0.994	0.38	251	8.5	5400 ml "
1120	6.72	80	15.54	4.03	0.995	0.39	258	9.1	6200 ml "
1130	6.67	80	15.59	4.01	0.999	0.38	265	7.2	7000 ml "
1140	6.70	80	15.51	3.98	1.010	0.34	272	6.6	7800 ml "
1150	6.73	80	15.55	3.97	1.020	0.33	276	6.4	8600 ml "
1155	6.75	80	15.60	3.98	1.030	0.34	278	6.8	9000 ml "
1200	—	—	—	—	—	—	—	—	START SAMPLING

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0801
Sample Location: 13MWT03
Sampled By: T. ROJAHN
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/26/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1545	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	5.06	0.74	14.65	10	2.45	—	+206

PURGE DATA:

Date: 4/26/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.50	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 3.32								
One Casing Volume(gal/L): 8.9								
Start Purge (hrs): 1412								
End Purge (hrs): 1542								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO O279
WELL ID.: 13MWT08
DATE: 8/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1412	3.32	—	—	—	—	—	—	—	Start Purge
1422	3.61	120	14.16	5.34	0.88	1.33	+163	170	1200 ml Cloudy
1432	3.66	80	14.77	5.35	0.80	2.00	+170	90	2000 V.SL Cloudy
1442	3.72	100	14.74	5.18	0.77	2.10	+182	32	3000 CLEAR
1452	3.80	100	14.78	5.14	0.76	2.08	+188	21	4000 "
1502	3.85	100	14.92	5.12	0.76	2.18	+193	15	5000 "
1512	3.89	100	14.81	5.10	0.74	2.30	+197	13	6000 "
1522	3.93	100	14.80	5.09	0.74	2.37	+202	12	7000 "
1532	3.97	100	14.77	5.07	0.74	2.41	+204	11	8000 "
1542	4.00	100	14.65	5.06	0.74	2.45	+206	10	9000 "
1545	—	—	—	—	—	—	—	—	SAMPLE TIME

SIGNATURE(S): Terry Royal

8.9L = MIN VOL

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT09 01
Sample Location: 13MWT 04
Sampled By: A. Baumbek
C.O.C. No.: 0993
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/28/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 0911	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	5.36	0.889	13.33	3.0	1.69	NA	+205.6

PURGE DATA:

Date: 4/28/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 23.03	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 8.50								
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 0740								
End Purge (hrs): 0910								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 9.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	2x (3) 40 mL Vials	YES
VOCs 8015B	HCl / 4°C	2x (2) 40 mL Vials	YES
SVOCs (8270C)	4°C	2x (2) 1 L Amber	YES
SVOCs (SIM)	4°C	2x (2) 1 L Amber	YES
SVOCs (8151A)	4°C	2x (2) 1 L Amber	YES
Explosives (8330)	4°C	2x (2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	2x (1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	2x (1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD04280301

Signature(s): Robert Baumbek

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW104
DATE: 4/28/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0740	8.50	START							CLOUDY
0745	8.80	130	12.89	5.47	0.808	2.57	+235.0	200	
0750	8.85	130	12.80	5.48	0.815	2.15	+219.7	110	1.3
0755	8.87	110	12.92	5.47	0.823	2.05	+197.8	65	—
0800	8.89	100							CLEANED OUT CELL 2.3
0805	8.38	100	12.71	5.44	0.821	1.93	+195.6	21	UNABLE TO SLOW RATE PUMP SHUTS OFF
0810	8.90	100	12.69	5.47	0.821	1.79	+194.4	17	CLEAR 3.3
0815	8.93	100	12.64	5.46	0.821	1.72	+194.9	16	—
0820	8.96	100	12.55	5.46	0.819	1.68	+196.0	9.3	4.3
0825	8.97	100	12.85	5.46	0.825	1.67	+195.7	9.3	—
0830	8.97	100	12.85	5.46	0.826	1.68	+196.3	7.1	5.3
0835	8.98	100	12.92	5.47	0.826	1.66	+197.6	5.7	—
0840	8.98	100	12.91	5.43	0.828	1.65	+198.9	5.0	6.3
0845	8.98	100	12.98	5.42	0.829	1.66	+200.0	4.6	—
0850	8.99	100	13.00	5.41	0.831	1.67	+200.7	2.7	7.3
0855	8.98	100	13.10	5.39	0.834	1.69	+202.0	2.2	—
0900	8.99	100	13.28	5.37	0.830	1.68	+204.1	4.0	8.3
0905	9.00	100	13.30	5.37	0.830	1.68	+204.7	3.4	—
0910	9.00	100	13.33	5.36	0.829	1.64	+205.6	3.0	TURBID 9.3
	→ END PURGE SAMPLED @ 0911								

SIGNATURE(S): Robert Balthrop 4/28/03

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT0903
Sample Location: 13MWT09
Sampled By: T. ROJAHN
C.O.C. No.: 0989

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/9/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1000	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	5.38	0.725	14.36	0.10	1.21	—	+ 148

PURGE DATA:

Date: 5/9/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 23.03	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 7.47								
One Casing Volume(gal/L): 10								
Start Purge (hrs): 0818								
End Purge (hrs): 0958								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 10.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	2 X (2) 1 L Amber	Yes
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	FR
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: FD05090301

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO O279
WELL ID.: 13MW109
DATE: 5/9/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0818	7.47	—	—	—	—	—	—	—	START PURGE
0828	7.84	120	14.62	5.55	0.732	1.54	131	2.1	1200 ml CLEAR
0838	7.87	110	14.87	5.49	0.743	1.45	132	0.35	2300 ml CLEAR
0848	7.91	100	14.93	5.48	0.745	1.34	134	0.10	3300 ml CLEAR
0858	7.95	100	14.99	5.47	0.747	1.23	135	0.10	4300 ml CLEAR
0908	7.98	100	14.82	5.45	0.743	1.24	137	0.35	5300 ml CLEAR
0918	8.00	100	14.70	5.45	0.738	1.24	138	1.00	6300 ml CLEAR
0928	8.02	100	14.61	5.43	0.737	1.27	140	0.60	7300 ml CLEAR
0938	8.04	100	14.43	5.40	0.731	1.24	143	0.10	8300 ml CLEAR
0948	8.05	100	14.40	5.39	0.727	1.22	146	0.10	9300 ml CLEAR
0958	8.07	100	14.36	5.38	0.725	1.21	148	0.10	10,300 ml CLEAR
1000	—	—	—	—	—	—	—	—	START SAMPLING

SIGNATURE(S): Terry Rogers

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT10 01
Sample Location: 13MWT10
Sampled By: D. BAUGUESS
C.O.C. No.: 0993
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1811	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	3.01	0.582	15.60	10	1.40	NA	+364.0

PURGE DATA:

Date: 4/27/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 28.13	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 15.30								
One Casing Volume (gal/L): 2.1								
Start Purge (hrs): 1602								
End Purge (hrs): 1810								
Total Purge Time (min): 128								
Total Vol. Purged (gal/L): 2.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Ballheuser

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MW10
DATE: 4/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color) Vol
1602	15.30	START							~~START~~ START
1605	15.82	120	16.79	3.43	0.596	3.16	+343.7	160	
1610	16.15	120	15.83	3.33	0.583	2.03	+352.0	80	HAZY 1.2 L
1615	16.48	80	15.90	3.31	0.584	1.88	+352.7	28	UNABLE TO SLOW RATE DOWN
1620	16.85	80	15.90	3.29	0.582	1.80	+353.6	28	2 L
1625	17.13	80	15.93	3.27	0.582	1.75	+352.9	31	—
1630	17.38	80	15.80	3.25	0.581	1.72	+350.9	31	2.8 L
1640	17.78	80	15.81	3.23	0.579	1.64	+347.3	28	3.6 L
1650	18.52	80	15.74	3.20	0.577	1.58	+344.6	28	4.4 L
1700	18.85	80	15.68	3.18	0.574	1.53	+342.0	23	1HR. 5.2 L
1710	19.20	80	15.52	3.16	0.574	1.29	+340.8	17	6.0 L
1720	19.54	80	15.45	3.09	0.572	1.26	+342.1	15	6.8 L
1730	19.84	80	15.50	3.09	0.575	1.25	+345.6	13	7.6 L
1740	20.15	80	15.59	3.05	0.579	1.29	+352.4	13	1 vol. 8.4 L
1750	20.40	80	15.61	3.04	0.582	1.32	+358.0	12	9.2 L
1800	20.64	80	15.64	3.02	0.583	1.39	+361.7	10	2HR. 10.0 L
1810	20.88	80	15.60	3.01	0.582	1.40	+364.0	10	10.8 L
	→ END PURGE								
	SAMPLE 1811								

1715

SIGNATURE(S): Robert Bulthuis

8L = 1 vol. 28.13' TD.

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT11 01
Sample Location: 13MWT11
Sampled By: B Balcome
C.O.C. No.: 0992
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1506	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	3.64	0.351	15.23	40	0.85	NA	+265.0

PURGE DATA:

Date: 4/27/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.75	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 9.47								
One Casing Volume (gal/l): 1.3								
Start Purge (hrs): 1345								
End Purge (hrs): 1505								
Total Purge Time (min): 80								
Total Vol. Purged (gal/l): 3.75								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	(Yes)
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	(Yes)
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	(Yes)

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Robert Balcome

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW14
DATE: 4/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	WL.
1245	9.47	START							HAZY BROWN	—
1250	4.51	125	15.72	3.88	0.251	1.45	+233.7	>999		—
1255	9.56	125	15.14	3.83	0.245	1.00	+241.1	450		1.25 L
1300	4.61	110	15.19	3.81	0.244	0.89	+246.8	350	CLEANED OUT CELL	1.9 L
1305	9.64	100	15.09	3.82	0.243	1.08	+249.3	300		—
1310	9.66	100	15.26	3.80	0.244	0.90	+250.5	260		2.4 L
1315	4.69	90	15.39	3.80	0.245	0.87	+250.7	235	CLOUDY.	2.35 L
1320	9.71	90	15.34	3.78	0.245	0.84	+252.4	200		—
1325	4.72	90	15.42	3.78	0.246	0.82	+253.3	180		3.25 L
1330	9.71	90	15.67	3.78	0.244	0.82	+255.7	130	CLEANED OUT CELL INT.	—
1335	9.72	90							STABLE WL.	4.15 L
1340	9.72	90	15.86	3.85	0.252	1.12	+256.6	120		—
1345	9.73	90	15.91	3.79	0.252	0.98	+256.9	100	3 1 VOL 1HR.	5.05 L
1355	9.73	90	16.06	3.78	0.253	0.91	+260.2	70		5.95 L
1405	9.74	90	15.83	3.75	0.252	0.89	+261.7	45		2 6.9 L
1415	9.75	90	15.89	3.74	0.252	0.85	+262.4	30		7.8 L
1425	9.76	90	15.93	3.74	0.252	0.85	+262.8	27		8.7 L
1435	9.76	90	15.80	3.73	0.252	0.87	+263.0	17		9.6 L
1445	9.77	90	15.75	3.70	0.251	0.86	+264.8	12	2HRS. 2VOLS	10.5 L
1455	9.77	90	15.72	3.64	0.251	0.86	+264.6	10		11.4 L
1505	9.78	80	15.73	3.64	0.251	0.85	+265.0	10		12.3 L
→	END PURGE SAMPLED @	1505								

SIGNATURE(S): Robert Balthrop 5.1 L

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT12 01 E F
Sample Location: 13MWT12
Sampled By: T. ROJAHN
C.O.C. No.: 0992 & 0993
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/27/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1710	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	V.SL.Cloudy	4.83	0.135	14.46	60	2.35	—	+242

PURGE DATA:

Date: 4/27/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: SAME								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 22.40	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 8.50								
One Casing Volume(gal/L): 8.7								
Start Purge (hrs): 1305								
End Purge (hrs): 1705								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO O279

WELL ID.: 13MWT12
DATE: 4/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1305	8.50	—	—	—	—	—	+ −	—	Start Purge
1315	8.65	100	16.04	4.76	0.137	0.22	200	25	1000 ml CLEAR
1325	10.80	110	15.63	4.74	0.135	0.33	205	7.7	2100 ml "
1335	11.64	100	16.04	4.75	0.136	0.49	206	6.9	3100 ml "
1345	12.13	90	17.19	4.75	0.141	0.62	206	16	4000 ml "
1355	12.76	90	16.48	4.77	0.138	0.69	208	14	4900 ml "
1405	13.05	90	16.33	4.81	0.137	0.73	207	12	5800 ml "
1415	13.28	90	16.38	4.77	0.137	0.75	207	16	6700 ml "
1425	13.52	90	16.63	4.78	0.137	0.52	205	23	7600 ml "
1435	13.83	90	16.41	4.72	0.137	0.68	210	31	8500 ml "
1445	14.10	90	16.65	4.74	0.140	0.82	211	45	9400 ml "
1455	14.33	90	15.77	4.76	0.138	0.94	212	50	10300 ml "
1505	14.65	90	15.31	4.71	0.136	0.89	215	45	11200 ml "
1515	14.95	90	14.67	4.76	0.136	0.99	214	60	12100 ml V. SL Cloudy
1525	15.23	90	14.99	4.80	0.141	1.33	215	70	13000 ml " " "
1535	15.47	85	14.71	4.84	0.144	1.58	217	75	13850 ml " " "
1545	15.71	85	14.82	4.91	0.147	1.79	220	85	14700 ml " " "
1555	15.95	85	14.59	4.92	0.148	1.97	223	90	15550 ml SL. Cloudy
1605	16.21	85	14.60	4.91	0.149	2.16	226	95	16400 ml " "
1615	16.43	85	14.63	4.92	0.148	2.29	229	95	17250 ml " "
1625	16.67	85	14.58	4.90	0.146	2.32	232	90	18100 ml " "
1635	16.86	85	14.61	4.89	0.145	2.32	234	90	18950 ml " "
1645	17.10	85	14.49	4.87	0.142	2.29	239	80	19800 ml V. " "
1655	17.33	85	14.62	4.83	0.138	2.36	241	65	20650 ml " " "
1705	17.56	85	14.46	4.83	0.135	2.35	242	60	21500 ml
1710	—	—	—	—	—	—	—	—	SAMPLE TIME

SIGNATURE(S): Terry Kopek

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT13 01
Sample Location: 13MWT13
Sampled By: B. BALKWILL
C.O.C. No.: 0993
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/7/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 0947	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PEristaltic	CLEAR	4.20	0.106	13.87	5.8	3.37	NA	+268.2

PURGE DATA:

Date: 5/7/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 21.44	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 3.83								
One Casing Volume (gal/L): 2.9								
Start Purge (hrs): 0730								
End Purge (hrs): 0945								
Total Purge Time (min): 135								
Total Vol. Purged (gal/L): 3.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330)	4°C	2x (2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4°C	2x (1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	2x (1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD05070301

Signature(s): Robert Balkwill

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO O279

WELL ID.: 13MW713
DATE: 5/7/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0730	3.83	START							CLOUDY
0735	3.99	120	14.32	4.29	0.126	5.11	+228.7	230	.6
0740	4.03	95	14.00	4.24	0.100	4.45	+246.6	140	1.1 L
0745	4.06	95	13.69	4.21	0.096	4.28	+259.1	85	HAZY 1.55 L
0750	4.05	95	13.78	4.21	0.095	4.16	+262.9	75	2.03 L
0800	4.05	95	13.81	4.22	0.095	4.05	+263.0	75	2.98 L
0810	4.09	95	13.66	4.21	0.096	3.96	+264.4	55	—
0820	4.09	95	13.66	4.22	0.096	3.84	+263.1	50	4.88 L
0830	4.08	95	13.65	4.23	0.097	3.79	+261.5	40	—
0840	4.09	95	13.56	4.23	0.097	3.69	+260.9	31	6.78 L
0850	4.09	95	13.62	4.22	0.099	3.67	+262.3	22	—
0900	4.10	95	13.60	4.21	0.100	3.58	+263.4	19	8.68 L
0910	4.10	95	13.80	4.21	0.102	3.47	+264.5	14	—
0920	4.10	95	13.72	4.20	0.104	3.44	+265.4	12	10.58 L
0930	4.10	95	13.76	4.21	0.105	3.41	+266.1	11	2hrs —
0940	4.10	95	13.80	4.20	0.106	3.39	+267.0	8.4	> 12hr. 12.44 L
0945	4.10	95	13.82	4.20	0.106	3.37	+268.2	5.8	12.96 L
	→ END PURGE SAMPLED @	0947							

SIGNATURE(S): Robert Balkhaver W.S.L. Hrs

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT14 01
Sample Location: 13MWT14
Sampled By: B. BALKOVEC
C.O.C. No.: 0994
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/29/03 Time: 0926 Method: PERISTALTIC	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	SALINITY %	ORP mV
	CLEAR	5.50	0.885	14.34	1.6	1.20	NA	+23.2

PURGE DATA:

Date: 4/29/03 Method: PERISTALTIC	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" dia. PVC								
Total Well Depth (TD): 25.00	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 13.81								
One Casing Volume (gal/L): 1.9								
Start Purge (hrs): 0755								
End Purge (hrs): 0925								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW714
DATE: 4/29/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0755	13.81	START							
0800	14.00	110	13.80	5.73	0.928	3.57	+74.7	11	CLEAR.
0805	14.00	110	13.77	5.69	0.926	2.31	+58.6	12	1.1L
0810	14.02	80	13.57	5.68	0.900	1.95	+49.3	10	
0815	14.03	80	13.64	5.68	0.840	1.81	+45.4	9.7	1.9
0820	14.05	80	13.66	5.67	0.835	1.72	+36.7	8.4	UNABLE TO PUMP SLOWER THAN 80ML/min
0825	14.06	80	13.71	5.67	0.830	1.60	+32.9	7.2	2.7
0830	14.07	80	13.78	5.66	0.822	1.53	+31.5	8.4	—
0835	14.07	80	13.80	5.65	0.787	1.36	+28.0	6.1	3.3
0840	14.08	80	13.92	5.63	0.783	1.28	+27.6	6.9	—
0845	14.07	80	13.99	5.63	0.766	1.26	+26.5	5.0	4.3
0850	14.08	80	13.98	5.61	0.850	1.20	+24.1	4.8	—
0855	14.08	80	13.96	5.60	0.919	1.11	+23.3	4.4	5.1
0900	14.09	80	14.11	5.60	0.907	1.09	+23.6	4.5	—
0905	14.10	80	14.20	5.58	0.896	1.21	+23.4	3.6	5.9
0910	14.10	80	14.21	5.56	0.890	1.15	+23.0	2.7	—
0915	14.10	80	14.30	5.53	0.888	1.16	+23.0	2.5	6.7
0920	14.10	80	14.30	5.51	0.886	1.17	+23.1	1.8	—
0925	14.11	80	14.34	5.50	0.885	1.20	+23.2	1.6	>1vol. 7.5
	→ END PURGE								
	SAMPLED @ 0925								

7.2L = 1vol.

SIGNATURE(S): Robert Balthaser

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT15 01
Sample Location: 13MWT15
Sampled By: B. BALKCOM
C.O.C. No.: 0895
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/6/03 Time: 1702 Method: PEristaltic	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	SALINITY %	ORP mV
	CLEAR	3.74	0.341	15.89	7.3	0.53	NA	+286.9

PURGE DATA:

Date: 5/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 27.87	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 13.07								
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 1445								
End Purge (hrs): 1700								
Total Purge Time (min): 135								
Total Vol. Purged (gal/L): 9.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	↓
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

1445

Circle if Applicable:
MS/MSD Duplicate ID No.:

Signature(s): Robert Balkcom

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MW15
DATE: 5/6/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1445	13.07	START							HAZY —
1450	13.20	100	17.21	3.53	0.458	1.83	+342.8	50	.5L
1455	14.18	80	16.70	3.35	0.443	1.37	+391.9	40	.9L
1500	14.46	75	16.64	3.32	0.442	1.35	+386.1	40	UNABLE TO LOWER RATE —
1505	14.72	75	16.56	3.30	0.443	1.26	+388.3	39	1.65L
1515	15.20	75	16.25	3.30	0.438	1.00	+371.4	36	2.4
1525	15.60	75	16.07	3.32	0.433	0.68	+350.7	32	—
1535	15.91	75	15.90	3.37	0.430	0.66	+341.8	30	3.9
1545	16.26	75	15.77	3.44	0.426	0.61	+324.8	30	—
1555	16.54	75	15.89	3.52	0.423	0.58	+312.5	24	5.4
1605	16.72	75	15.80	3.57	0.416	0.58	+304.8	23	—
1615	16.81	75	15.79	3.60	0.411	0.55	+300.0	21	6.9
1625	16.86	75	15.91	3.63	0.407	0.54	+298.1	19	—
1635	16.93	75	16.00	3.67	0.405	0.53	+294.6	14	8.4
1645	16.94	75	15.92	3.71	0.397	0.53	+291.2	11	2HRS —
1655	16.96	75	15.84	3.73	0.393	0.53	+288.7	8.7	1 HOUR 9.9L
1700	16.97	75	15.89	3.74	0.391	0.53	+286.8	7.3	
→	END PURGE								
	SAMPLED	1702							

SIGNATURE(S): Robert Baltrus

9.1 L: 1 hr.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT16 01
Sample Location: 13MWT16
Sampled By: B. BALKCOM
C.O.C. No.: 0995
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/6/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 0842	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	6.46	0.356	14.27	2.7	0.81	NA	-30.4

PURGE DATA:

Date: 5/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.31	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 9.81								
One Casing Volume (gal/L): 1.2								
Start Purge (hrs): 0748								
End Purge (hrs): 0840								
Total Purge Time (min): 52								
Total Vol. Purged (gal/L): 1.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	(Yes)
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	(Yes)
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	(Yes)

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Balkcom

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MW16
DATE: 5/6/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color) Vol.
0749	9.81	START							CLEAR —
0755	10.21	120	14.72	6.31	0.381	1.20	-53.7	8.1	.84L
0800	10.44	100	14.25	6.20	0.370	1.24	-51.0	6.7	1.34L
0805	10.71	90	14.26	6.17	0.363	1.06	-46.4	4.5	1.8L
0810	10.85	85	14.12	6.17	0.360	0.99	-44.0	5.5	UNABLE TO LOWER PUMP RATE —
0815	10.97	85	14.29	6.18	0.360	0.97	-42.2	5.7	2.65L
0820	11.18	85	14.19	6.17	0.360	0.90	-41.4	6.2	-
0825	11.39	85	14.30	6.17	0.360	0.87	-38.6	3.8	3.5L
0830	11.44	85	14.20	6.17	0.358	0.86	-36.1	3.6	-
0835	11.51	85	14.31	6.17	0.357	0.84	-34.2	3.0	4.35L
0840	11.67	85	14.27	6.16	0.356	0.81	-30.4	2.7	5 liter 4.8L
	→ END PURGE SIMULTANEOUS	0842							

SIGNATURE(S): Robert Balthrop

4161 liter

1731 TO

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT17 01
Sample Location: 13MWT17
Sampled By: T. ROJAHN
C.O.C. No.: 0995
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/7/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1022	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	5.35	0.170	15.70	10	0.53	--	112

PURGE DATA:

Date: 5/7/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 20.30	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 9.00								
One Casing Volume(gal/L): 7								
Start Purge (hrs): 0750								
End Purge (hrs): 1020								
Total Purge Time (min): 150								
Total Vol. Purged (gal/L): 15.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
VOCs 8260B	HCl / 4°C		(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C		(2) 40 mL Vials	↓
SVOCs (8270C)	4°C		(2) 1 L Amber	
SVOCs (SIM)	4°C		(2) 1 L Amber	
SVOCs (8151A)	4°C		(2) 1 L Amber	
Explosives (8330)	4°C	3X	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	3X	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C		(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	3X	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD YES

Duplicate ID No.: ———

Signature(s): Tony Rojahn

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MWT17
DATE: 5/7/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0750	9.00	—	—	—	—	—	—	—	START PURGE
0800	9.03	120	14.92	5.32	0.171	1.48	+75	14	1200 ml CLEAR
0810	9.03	100	14.90	5.33	0.169	1.39	77	13	2200 "
0820	9.03	100	14.63	5.33	0.167	1.31	79	15	3200 "
0830	9.03	100	14.99	5.34	0.168	0.59	82	15	4200 "
0840	9.03	100	15.13	5.34	0.167	0.60	85	18	5200 "
0850	9.03	100	15.15	5.33	0.166	0.57	89	18	6200 "
0900	9.03	100	15.21	5.35	0.166	0.56	93	17	7200 "
0910	9.03	100	15.36	5.34	0.167	0.55	94	15	8200 "
0920	9.03	100	15.38	5.34	0.167	0.55	97	15	9200 "
0930	9.03	100	15.51	5.35	0.168	0.54	100	15	10200 "
0940	9.03	100	15.52	5.34	0.167	0.55	102	14	11200 "
0950	9.03	100	15.69	5.34	0.168	0.54	104	13	12200 "
1000	9.05	100	15.73	5.35	0.171	0.54	108	12	13200 "
1010	9.06	100	15.69	5.35	0.170	0.54	110	11	14200 "
1020	9.06	100	15.70	5.35	0.170	0.53	112	10	15200 "

SIGNATURE(S): Tony Ryder

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT18 01 F
Sample Location: 13MWT18
Sampled By: B BALKOVEC
C.O.C. No.: 0995

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/6/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1342	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PEristaltic	Clear	3.88	0.514	16.75	450	2.17	NA	+324.1

PURGE DATA:

Date: 5/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 33.27	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 19.23								
One Casing Volume (gal/L): 2.3								
Start Purge (hrs): 0438								
End Purge (hrs): 1340								
Total Purge Time (min): 242								
Total Vol. Purged (gal/L) 18.8L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
~	~

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW18
DATE: 5/6/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	
0938	[redacted] 19.23	START							HAZY	→
0945	20.24	110	16.11	4.69	0.389	3.20	+226.4	50		.77 L
0950	20.73	80	16.46	4.28	0.399	2.06	+282.9	40		—
1000	21.64	80	16.84	4.27	0.378	1.92	+296.8	26	UNABLE TO LOWER RATE.	1.2 L
1010	22.65	80	16.56	4.28	0.341	1.87	+305.8	65		2.0 L
1020	23.71	80	16.51	4.21	0.343	1.82	+312.1	90		2.8 L
1030	24.15	80	17.40	4.12	0.379	1.77	+323.9	75		3.6 L
1040	24.58	80	17.46	4.08	0.348	1.84	+329.3	70		4.4 L
1050	25.00	80	17.55	3.94	0.354	1.85	+342.4	120		5.2 L
1100	25.32	80	18.00	3.85	0.361	1.77	+357.8	220		6.0 L
1110	25.68	80	18.10	3.71	0.381	1.64	+361.7	250		6.8 L
1120	25.97	80	18.16	3.68	0.401	1.57	+370.2	280		7.6 L
1130	26.27	80	17.17	3.56	0.421	1.51	+369.1	280		8.4 L
1140	26.53	80	17.09	3.61	0.451	1.47	+363.9	250	7 liter 2 HRS	9.2 L
1150	26.76	80	17.32	3.67	0.477	1.44	+356.2	230		10.0 L
1200	27.01	80	17.30	3.70	0.481	1.47	+340.1	300		10.8 L
1210	27.16	80	17.29	3.74	0.500	1.50	+331.3	350		11.6 L
1220	27.35	80	17.28	3.77	0.525	1.53	+326.8	450	CLEANED OUT CELL	12.4 L
1230	27.51	80	17.80	3.84	0.544	2.22	+327.4	450		13.2 L
1240	27.65	80	17.48	3.81	0.532	1.73	+330.6	450	3 HRS	14.0 L
1250	27.82	80	17.17	3.79	0.526	1.83	+334.8	450		14.8 L
1300	27.90	80	17.18	3.79	0.525	1.90	+335.0	450		15.6 L
1310	28.01	80	17.20	3.80	0.524	1.91	+335.1	450		16.4 L
1320	28.14	80	16.90	3.87	0.519	2.00	+324.7	450		17.2 L
1330	28.30	80	16.78	3.87	0.517	2.10	+324.5	450		18.0 L
1340	28.51	80	16.75	3.88	0.514	2.17	+324.1	450	4 HRS. 2 liter	18.8 L
	→ END PURGE									
	SAMPLED @ 1342									

SIGNATURE(S): Robert Balkwill 8.6 Liter 33.27' T.D.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT19 01
Sample Location: 13MWT19
Sampled By: B. BALKOVEC
C.O.C. No.: 0995
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/7/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1347	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	5.12	1.241	13.81	5.0	3.51	NA	+224.1

PURGE DATA:

Date: 5/7/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 22.05'	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 8.33'								
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 1155								
End Purge (hrs): 1345								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW719
DATE: 5/7/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1155	8.33	START							CLEAR
1200	8.75	100	14.58	5.18	1.209	4.09	+240.6	11	
1205	8.96	80	14.45	5.24	1.232	3.96	+226.4	7.2	.9L
1210	9.09	90	14.10	5.24	1.217	3.73	+210.1	6.2	—
1215	9.15	80	14.11	5.25	1.217	3.71	+217.7	7.6	≈1.7L
1225	9.18	80	14.15	5.24	1.228	3.66	+217.1	8.3	UNABLE TO LOWER RATE — 2.5
1235	9.30	80	13.21	5.23	1.229	3.65	+224.3	8.5	3.3
1245	9.30	80	14.02	5.22	1.234	3.65	+224.7	7.9	— 4.1
1255	9.36	80	14.07	5.19	1.239	3.58	+224.3	7.0	4.9
1305	9.39	80	14.02	5.17	1.240	3.55	+225.1	3.5	— 5.7
1315	9.41	80	13.89	5.15	1.239	3.59	+224.8	4.1	6.5
1325	9.43	80	13.75	5.13	1.240	3.55	+224.7	5.0	— 7.3
1335	9.45	80	13.80	5.13	1.239	3.53	+226.0	5.3	8.1
1345	9.46	80	13.81	5.12	1.241	3.51	+224.1	5.0	>1YOL — 9.4L
	→ END PURGE								
	SAMPLED @	1347							

SIGNATURE(S): Robert Faulkner 8.5L=1YOL

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2001 EF
Sample Location: 13MWT 20
Sampled By: B. BALKOVEC
C.O.C. No.: 0994
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/28/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1606	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PURGE METER	CLEAR	3.48	1.504	15.78	19	0.41	NA	+265.0

PURGE DATA:

Date: 4/28/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 22.85	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 4.77								
One Casing Volume(gal/L): 11.2								
Start Purge (hrs): 1205								
End Purge (hrs): 1605								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 22.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	YES
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	YES
SVOCs (8270C)	4° C	(2) 1 L Amber	YES
SVOCs (SIM)	4° C	(2) 1 L Amber	YES
SVOCs (8151A)	4° C	(2) 1 L Amber	YES
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

INTAKE MID SCREEN

Circle if Applicable:

MS/MSD	Duplicate ID No.:
~~	~~~~

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MWT20
DATE: 4/28/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1205	4.77	—	—	—	—	—	—	—	Start Purge
1215	6.20	140	17.19	3.23	1668	0.01	+290	~~290~~ 120	1400 ml V. SL CLOUDY
1225	6.61	100	17.92	3.26	1685	0.01	+291	110	2400 ml " " "
1235	6.88	90	17.01	3.27	1.649	0.04	289	100	3300 ml " " "
1245	7.16	90	17.19	3.31	1.623	0.05	283	70	4200 ml " " "
1255	7.41	90	17.38	3.36	1.607	0.07	276	40	5100 ml CLEAR
1305	7.71	90	17.72	3.40	1.607	0.05	273	38	6000 ml "
1315	7.94	90	18.55	3.39	1.633	0.04	271	33	6900 ml "
1325	8.18	90	18.40	3.39	1.620	0.08	270	33	7800 ml "
1335	8.39	90	17.92	3.39	1.601	0.08	271	31	8700 ml "
1345	8.52	90	17.92	3.40	1.599	0.08	272	31	9600 ml "
1355	8.71	90	18.18	3.37	1.608	0.09	271	30	10500 ml "
1405	8.82	90	18.27	3.45	1.617	0.10	271	29	11400 ml "
1415	8.94	90	17.92	3.41	1.597	0.11	270	27	12300 ml "
1425	9.06	90	17.68	3.40	1.586	0.11	270	25	13200 ml "
1435	9.21	90	16.69	3.42	1.544	0.11	269	24	14100 ml "
1445	9.35	90	16.94	3.46	1.552	0.11	267	23	15000 ml "
1455	9.44	90	17.33	3.46	1.561	0.11	266	23	15900 ml "
1505	9.51	90	17.55	3.45	1.562	0.13	267	23	16800 ml "
1515	9.63	90	16.42	3.43	1.513	0.11	266	21	17700 ml "
1525	9.71	90	16.15	3.44	1.512	0.12	265	21	18600 ml "
1535	9.81	90	15.97	3.46	1.494	0.11	264	21	19500 ml "
1545	9.85	90	15.90	3.47	1.500	0.11	+263.1	22	20400 ml
1555	9.90	90	15.80	3.47	1.501	0.11	+264.1	20	21300 ml
1605	9.93	90	15.78	3.48	1.504	0.11	+265.0	19	22200 ml [illegible]
→	END PURGE								
	SAMPLED @ 1606								

SIGNATURE(S): [signature] / Robert Balkum [illegible] 2L = 1 vol

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2003
Sample Location: 13MWT 20
Sampled By: T.R.-J.H.N
C.O.C. No.: 0989
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Date: 5/9/03	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Time: 1505								
Method: SAME	CLEAR	3.65	1.445	16.70	1.4	0.54	—	+224

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Date: 5/9/03								
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 22.85	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 4.17								
One Casing Volume(gal/L): 11.7								
Start Purge (hrs): 1103								
End Purge (hrs): 1503								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	NO
SVOCs (8270C)	4° C	(2) 1 L Amber	(YES)
SVOCs (SIM)	4° C	(2) 1 L Amber	NO
SVOCs (8151A)	4° C	(2) 1 L Amber	NO (YES)
Explosives (8330)	4° C	(2) 1 L Amber	Yes NO
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW12O
DATE: 5/9/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1103	4.17	—	—	—	—	—	—	—	Start PURGE
1113	5.55	160	16.39	3.72	2.157	1.05	193	8.2	1600 ml CLEAR
1123	6.30	140	17.71	3.75	1.796	1.10	195	6.7	3000 ml CLEAR
1133	6.82	100	17.44	3.90	1.667	1.07	180	6.9	4000 ml CLEAR
1143	7.22	100	17.10	4.11	1.500	1.05	166	7.0	5000 ml CLEAR
1153	7.83	100	16.63	3.95	1.451	0.77	173	6.7	6000 ml CLEAR
1203	8.34	100	16.21	3.88	1.399	0.57	186	6.7	7000 ml CLEAR
1213	8.65	100	16.15	3.83	1.410	0.55	190	6.0	8000 ml CLEAR
1223	8.93	100	16.10	3.79	1.418	0.53	194	5.4	9000 ml CLEAR
1233	9.24	100	16.35	3.75	1.417	0.53	197	5.2	10000 ml CLEAR
1243	9.48	100	16.55	3.72	1.417	0.54	205	5.0	11000 ml CLEAR
1253	9.63	100	16.86	3.72	1.428	0.56	205	4.3	12000 ml CLEAR
1303	9.78	100	17.06	3.90	1.458	0.58	206	3.7	13000 ml CLEAR
1313	9.92	100	17.01	3.68	1.449	0.56	209	3.4	14000 ml CLEAR
1323	10.06	100	16.96	3.66	1.440	0.55	212	3.2	15000 ml CLEAR
1333	10.20	100	16.94	3.66	1.433	0.54	215	3.1	16000 ml CLEAR
1343	10.33	100	16.90	3.66	1.425	0.53	217	3.0	17000 ml CLEAR
1353	10.50	100	16.88	3.66	1.428	0.53	218	2.9	18000 ml CLEAR
1403	10.66	100	16.86	3.66	1.431	0.53	219	2.7	19000 ml CLEAR
1413	10.82	100	16.85	3.64	1.433	0.53	220	2.7	20000 ml CLEAR
1423	10.89	100	16.40	3.65	1.438	0.52	220	2.5	21000 ml CLEAR
1433	10.97	100	16.36	3.65	1.443	0.50	221	2.4	22000 ml CLEAR
1443	11.05	100	16.48	3.65	1.440	0.50	223	1.8	23000 ml CLEAR
1453	11.12	100	16.55	3.65	1.433	0.52	224	1.4	24000 ml CLEAR
1503	11.19	100	16.70	3.65	1.445	0.54	224	1.4	25000 ml CLEAR
1505	—	—	—	—	—	—	—	—	Start SAMPLING

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT21 01
Sample Location: 13MWT21
Sampled By: B. BALKCOM
C.O.C. No.: 0991
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/25/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1346	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PER25MAY03	CLEAR	5.46	0.212	13.01	8.2	1.45	N/A	+193.6

PURGE DATA:

Date: 4/25/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PER25MAY03								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.76	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 8.26								
One Casing Volume (gal/L): 1.5								
Start Purge (hrs): 1237								
End Purge (hrs): 1345								
Total Purge Time (min): 68								
Total Vol. Purged (gal/L): 1.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330)	4°C	2x (2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	2x (1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	Yes NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	2x (1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

5.8 L 2 Vol

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD04250301

Signature(s): Robert Balkcom

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW24
DATE: 4/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	Vol.
1237	8.26	START							CLEAR/SL. HAZY	
1240	8.52	160	12.51	5.66	0.213	1.38	+165.0	51		.48L
1245	8.57	130	12.34	5.59	0.211	1.03	+160.1	40		—
1250	8.62	100	12.45	5.56	0.211	0.99	+161.5	18	CLEAR	1.8L
1255	8.64	100	12.08	5.53	0.210	1.02	+166.8	15		—
1300	8.65	100	12.74	5.52	0.210	1.04	+171.8	13		2.8L
1305	8.69	100	12.73	5.52	0.210	1.05	+175.2	29	SLIGHT HAZE	—
1310	8.70	100	12.78	5.51	0.210	1.14	+177.8	29		3.8L
1315	8.72	100	12.80	5.50	0.211	1.22	+180.4	21	UNABLE TO PUMP LOWER	—
1320	8.74	100	12.92	5.49	0.211	1.33	+182.9	17	THAN 100 mL/min.	4.8L
1325	8.76	100	13.00	5.48	0.213	1.37	+186.3	15	PUMP SHUTS OFF	—
1330	8.77	100	12.99	5.47	0.212	1.40	+188.7	11		5.8L
1335	8.77	100	13.02	5.46	0.213	1.41	+191.1	10		—
1340	8.78	100	12.99	5.47	0.212	1.42	+191.8	8.5		6.8L
1345	8.78	100	13.01	5.46	0.213	1.45	+193.6	8.2		
→	END PURGE									
	SAMPLED @	1346								

SIGNATURE(S): Robert Bullmer 5.8 L-Final

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT2201
Sample Location: 13MWT22
Sampled By: T. ROJAHN
C.O.C. No.: 0995
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/06/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1542	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	3.95	0.245	14.15	0.00	0.64	—	+264

PURGE DATA:

Date: 5/06/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 17.76	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 7.64								
One Casing Volume(gal/L): 6.3								
Start Purge (hrs): 1400								
End Purge (hrs): 1540								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 10.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MWT22
DATE: 5/06/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
1400	7.64	–	–	–	–	–	–	–	START PURGE
1410	8.35	1600	14.37	4.97	0.255	1.97	+172	12	1600 CLEAR
1420	8.28	100	15.38	4.82	0.256	1.39	181	12	2600 "
1430	8.31	100	15.11	4.66	0.251	1.50	181	7.9	3600 "
1440	8.30	100	15.04	4.40	0.248	1.03	205	9.0	4600 "
1450	8.33	100	14.92	4.22	0.247	0.92	223	5.0	5600 "
1500	8.35	100	14.83	4.13	0.247	0.86	235	0.15	6600 "
1510	8.35	100	14.83	4.01	0.247	0.76	250	0.10	7600 "
1520	8.40	100	14.10	3.95	0.243	0.70	258	0.10	8600 "
1530	8.45	100	14.01	3.92	0.242	0.68	261	0.10	9600 "
1540	8.40	100	14.15	3.95	0.245	0.64	264	0.00	10600 "

SIGNATURE(S): Tony Nash

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT23 01
Sample Location: 13MWT23
Sampled By: T. ROJAHN
C.O.C. No.: 0995
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 5/06/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1242	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: SAME	CLEAR	5.19	0.314	16.46	0.7	4.09	—	+131

PURGE DATA:

Date: 5/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 24.50	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 7.62								
One Casing Volume(gal/L): 10.5								
Start Purge (hrs): 0840								
End Purge (hrs): 1240								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 22.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tony Rojahn

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO O279
WELL ID.: 13MWT23
DATE: 5/06/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	
0840	7.62	-	-	-	-	-	-	-	Start Purge	
0850	9.08	110	14.46	5.15	0.302	4.77	100	400	1100	CLEAR
0900	9.55	90	15.02	5.17	0.305	4.58	106	13.0	2000	"
0910	10.08	100	14.87	5.16	0.304	4.47	116	6.2	3000	"
0920	10.43	90	15.50	5.18	0.311	4.91	125	18.0	3900	"
0930	10.50	100	14.77	5.16	0.305	4.29	127	290	4900	"
0940	10.86	100	14.65	5.15	0.304	4.17	129	13.0	5900	"
0950	11.11	90	15.50	5.21	0.311	4.18	130	7.2	6800	"
1000	11.32	90	15.76	5.19	0.313	4.13	132	7.3	7700	"
1010	11.44	90	15.76	5.18	0.312	4.16	133	7.5	8600	"
1020	11.63	90	16.00	5.15	0.313	4.14	137	6.2	9500	"
1030	11.71	90	16.54	5.13	0.318	4.15	140	4.6	10400	"
1040	11.76	90	17.08	5.14	0.322	4.11	141	2.4	11300	"
1050	11.80	90	17.06	5.09	0.322	4.09	142	1.8	12200	"
1100	11.89	90	17.09	5.10	0.321	4.10	144	2.0	13100	"
1110	11.96	90	16.93	5.11	0.320	4.11	145	2.4	14000	"
1120	12.01	90	16.99	5.07	0.320	4.09	146	2.3	14900	"
1130	12.02	90	16.86	5.11	0.314	4.09	145	2.2	15800	"
1140	12.07	90	15.73	5.11	0.310	4.17	143	1.6	16700	"
1150	12.10	90	16.35	5.17	0.313	4.13	140	1.2	17600	"
1200	12.14	90	16.14	5.17	0.312	4.19	138	1.1	18500	"
1210	12.17	90	16.00	5.16	0.311	4.15	137	1.4	19400	"
1220	12.20	90	15.73	5.18	0.308	4.15	136	1.3	20300	"
1230	12.23	90	16.20	5.19	0.312	4.08	132	0.9	21200	"
1240	12.26	90	16.46	5.19	0.314	4.09	131	0.7	22100	"
1242	-	-	-	-	-	-	-	-	Start Sampling	

SIGNATURE(S): Tay Lopez

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT24 01
Sample Location: 13MWT24
Sampled By: B. BALKCOM
C.O.C. No.: 0993
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/28/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1456	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	5.90	0.671	16.76	5.2	2.89	NA	+284.0

PURGE DATA:

Date: 4/28/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 25.19	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 9.04								
One Casing Volume (gal/L): 2.6								
Start Purge (hrs): 1341								
End Purge (hrs): 1455								
Total Purge Time (min): 104								
Total Vol. Purged (gal/L): 2.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4°C	(2) 1 L Amber	
SVOCs (SIM)	4°C	(2) 1 L Amber	
SVOCs (8151A)	4°C	(2) 1 L Amber	
Explosives (8330)	4°C	(2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A)	HNO3 / 4°C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4°C	(1) 1 L HDPE	~~Yes~~ NO
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4°C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkcom

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW24
DATE: 4/28/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	
1311	9.04	START							HAZY.	-
1315	9.53	150	17.21	6.09	0.734	4.07	+178.1	33		-
1320	10.13	150	16.33	5.89	0.689	3.54	+176.1	19		1.4L
1325	10.43	100	16.57	5.95	0.687	3.38	+193.6	17		1.9L
1330	10.61	90	17.01	5.96	0.695	3.30	+212.4	21		-
1335	10.76	90	16.93	5.95	0.694	3.29	+223.0	19	UNABLE TO SLOW RATE.	2.8L
1345	11.04	90	16.76	5.94	0.688	3.25	+246.5	15		3.7L
1355	11.11	90	17.31	5.95	0.693	3.18	+220.3	12		4.6L
1405	11.19	90	17.18	5.92	0.691	3.19	+287.0	11		5.5L
1415	11.25	90	17.06	5.91	0.690	3.08	+304.0	7.7	CLEAR	6.3L
1425	11.30	90	16.85	5.91	0.685	3.07	+303.0	8.2		7.3L
1435	11.31	90	16.80	5.91	0.674	3.00	+284.0	8.8		8.2L
1445	11.33	90	16.78	5.91	0.672	2.90	+285.1	4.7		9.0L
1455	11.34	90	16.76	5.90	0.671	2.89	+284.0	5.2	1 vol.	10.0L
	→ END PURGE									
	SAMPLED @	1456								

SIGNATURE(S): Robert Belkner

10L = 1 vol.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT25 01 SF
Sample Location: 13MWT25
Sampled By: B. Balkovec
C.O.C. No.: 0996, 0994
Type of Sample: 0995 & 0992
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: START 4/26/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1230	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	BRN	6.45	0.511	12.00	> 999	4.21	—	+ 219

PURGE DATA:

Date: 4/25/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" dia. PVC								
Total Well Depth (TD): 18.02	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 14.76								
One Casing Volume (gal/L): .53								
Start Purge (hrs): 1110								
End Purge (hrs): 1210								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	NO
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330) @ 1230 4/26/03	4° C	1 (2) 1 L Amber	Yes
Total Metals (6020) & Total Hg (7470A) 4/28/03	HNO3 / 4° C	@1220 (1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	@ (1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2) ~~4/26/03~~ 5/6/03	H2SO4/ 4° C	@ ~~1530~~ @1440 (1) 1 L HDPE	Yes

5/7/03

OBSERVATIONS / NOTES:

WL= 17.31' @ 0748 ON 4/26/03
WL= 17.24' @ 1228 ON 4/26/03
- START SAMPLING EXPLOSIVES @ 1230 ON 4/26/03
- FINISHED @ 1230 ON 4/27/03

* 4/28/03 STARTED W FULL METALS @1220. ½ FULL. FINISHED 4/28/03
* 4/28/03 W/O STARTED AMMONIA PUMPED DRY ON 5/5/03 WL=16.6'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279

WELL ID.: 13MW125
DATE: 4/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)	Vol
1110	14.76	START							HAZY BROWN	—
1120	15.39	100	12.68	6.42	0.588	7.20	-245.2	130		1L
1125	15.69	80	12.22	6.25	0.504	8.14	-242.7	90	HAZY	1.4L
1130	15.85	75	12.27	6.22	0.462	7.44	-240.8	140	UNABLE	1.78L
1135	16.01	75	12.24	6.22	0.456	7.76	-239.6	110	[redacted] TO PUMP LOWER	—
1140	16.24	75	12.30	6.21	0.457	7.71	-239.3	100	THAN 75mL/min	≈2.5L
1145	16.48	75	12.32	6.22	0.474	7.50	-238.8	400	PUMP SHUTS OFF.	—
1150	16.70	75	12.31	6.19	0.495	7.20	-238.2	140	* CAN NOT STOP DRAWDOWN!	3.25L
1155	16.79	DRY								—
		WITH LOWER TURBINE TO 18.03' AND PUMP ENTIRE WELL DRY.								
1200	—	75							.8L MORE THAN 1200	
1205	17.48	120	11.98	6.37	0.691	3.61	-204.4	7999	BROWN	
1210	DRY	100	12.00	6.45	0.511	4.21	-214.1	7994		≈ 5.25L
	→ END PURGE ALLOW RECHARGE BEFORE SAMPLING.									

SIGNATURE(S): Robert Balthaser

2L = 1 vol. TD. 18.03

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT26 01
Sample Location: 13MWT26
Sampled By: B. Balthaser
C.O.C. No.: 0991
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4/25/03	Color	pH	S.C.	Temp.	Turbidity	DO	SALINITY	ORP
Time: 1022	Visual	Standard	mS/cm	°C	NTU	mg/l	%	mV
Method: PERISTALTIC	CLEAR	6.05	0.352	17.01	7.1	4.20	NA	+189.0

PURGE DATA:

Date: 4/25/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	SALINITY	ORP
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" dia. PVC								
Total Well Depth (TD): 22.18	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 10.31								
One Casing Volume (gal/L): 2								
Start Purge (hrs): 0804								
End Purge (hrs): 1020								
Total Purge Time (min): 136								
Total Vol. Purged (gal/L): 2.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs 8260B	HCl / 4°C	(3) 40 mL Vials	
VOCs 8015B	HCl / 4°C	(2) 40 mL Vials	
SVOCs (8270C)	4° C	(2) 1 L Amber	
SVOCs (SIM)	4° C	(2) 1 L Amber	
SVOCs (8151A)	4° C	(2) 1 L Amber	
Explosives (8330)	4° C	(2) 1 L Amber	Yes
Total Metals (6020) & Tolal Hg (7470A)	HNO3 / 4° C	(1) 1 L HDPE	Yes
Dissolved Metals (6020) & Dis. Hg (7470A)	HNO3/ 4° C	(1) 1 L HDPE	Yes
Ammonia (350.1) & Nitrate (353.2)	H2SO4/ 4° C	(1) 1 L HDPE	Yes

OBSERVATIONS / NOTES:

PAR PROBLEM

75 ml/ min + WL STILL DROPS.

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s):

Robert Balthaser

TBD: To Be Determined

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060 CTO 0279
WELL ID.: 13MW26
DATE: 4/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celsius)	pH (S.U.)	Cond. (mS/cm)	DO (mg/L)	ORP (mV)	Turb. (NTU)	Comments (Volume & Color)
0804	10.31	START							CLEAR —
0807	10.51	120	12.08	6.32	0.362	5.49	+183.7	15	—
0810	11.01	120	11.93	6.13	0.358	5.13	+149.0	14	.72L
0815	11.83	100	11.81	6.08	0.350	5.03	+156.6	10	—
0820	12.45	100	11.75	6.09	0.345	4.95	+161.7	8.6	CLEAR 1.7L
0825	12.61	~~100~~ 75	11.76	6.07	0.343	4.87	+165.5	16	—
0830	12.89	~~100~~ 75	11.78	6.05	0.343	4.83	+166.2	33	2.5L
0835	12.94	95	11.74	6.07	0.343	4.80	+167.1	30	SLIGHT HAZE —
0840	13.18	80	11.77	6.07	0.343	4.79	+167.9	28	3.3L
0845	13.26	75	11.76	6.07	0.344	4.75	+169.9	30	—
0850	13.39	75	11.79	6.07	0.345	4.72	+171.2	29	1 1/2 VOL. 4.1L
0855	13.50	75	11.77	6.08	0.346	4.73	+171.5	27	—
0900	13.62	75	11.78	6.07	0.346	4.70	+173.6	25	UNABLE TO PUMP 4.85L
0905	13.75	75	11.82	6.08	0.347	4.69	+176.0	22	LOWER THAN 75ml/min —
0910	13.89	75	11.85	6.08	0.348	4.64	+177.2	23	PUMP SHUTS OFF. 5.6L
0915	14.02	75	11.87	6.08	0.350	4.60	+177.4	24	—
0920	14.15	75	11.95	6.09	0.351	4.53	+178.5	23	6.35
0925	14.26	75	11.98	6.08	0.353	4.51	+179.5	22	—
0930	14.39	75	12.02	6.09	0.353	4.47	+179.8	22	7.1L
0935	14.43	75	12.07	6.09	0.355	4.42	+181.5	17	—
0940	14.47	75	12.09	6.09	0.355	4.39	+182.4	15	1 1/2 VOL. 7.85L
0950	14.72	75	12.04	6.06	0.354	4.30	+186.0	11	—
1000	14.81	75	11.98	6.06	0.351	4.24	+187.6	8.6	9.35L
1010	14.85	75	12.00	6.06	0.352	4.23	+188.1	8.0	—
1020	14.87	75	12.01	6.05	0.352	4.20	+189.0	7.1	10.85L
	→ END PURGE								
	SAMPLED @ 1022								

7.3L = 2 vol.

SIGNATURE(S): Robert Balhuse

15'

APPENDIX C.4.2
SWMU 13
GROUND WATER SAMPLE LOG SHEETS
ROUND 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0102
Sample Location: 13GWT01
Sampled By: Goerdt
C.O.C. No.: 4825
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-23-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1320	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	Clear	4.17	0.233	17.04	4.39	1.40	385.4	--

PURGE DATA:

Date: 11-23-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 7.95								
One Casing Volume(gal/L): 6.17								
Start Purge (hrs): 1215								
End Purge (hrs): 1315								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 6.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

17.95
7.95
10.00 (.163) = 1.63 gal = (6.17 L)

Circle If Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 136WT01
DATE: 11-23-03
WEATHER: Cloudy 50°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1215	7.95	-	-	-	-	-	-	-	-	Start Purge
1225	8.47	1.3	1300	4.27	0.225	6.61	2.44	16.92	354.0	Clear
1235	8.60	2.5	1200	4.23	0.228	6.41	1.92	17.01	369.2	"
1245	8.63	3.7	1200	4.20	0.229	4.89	1.71	16.98	377.8	"
1255	8.65	4.7	1000	4.20	0.230	4.01	1.58	17.02	381.1	"
1305	8.65	5.7	1000	4.18	0.232	3.52	1.47	17.10	383.9	"
1315	8.65	6.7	1000	4.17	0.233	4.39	1.40	17.04	385.4	Stop purge

Water Quality Meter (S/N) 98F0478AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth 12.9'

SIGNATURE(S): J. Bennett

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0208
Sample Location: 13GWT02
Sampled By: Goerdt
C.O.C. No.: 4833
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-7-03 / Time: 0850 / Method: Peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	5.25	1.230	10.43	6.62	5.75	157.9	---

PURGE DATA:

Date: 12-6-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 29.50								
Static Water Level (WL): 20.05								
One Casing Volume(gal/L): 5.8								
Start Purge (hrs): 1210								
End Purge (hrs): 1345								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 19								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Well was purged on 12/6/03.
Sampled on 12/7/03 @ 0850

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 279
Sampled By: Goerdt
Field Analyst: Goerdt
Field Form Checked as per QA/QC Checklist (initials): TC

Sample ID No.: 13GWT0202
Sample Location: 13GWT02
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 12-7-03 / Time: 0850 / Method: Peristaltic	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
	Clear	5.25	1.230	10.43	6.62	5.75	~~15~~ 80	152.9

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 4.0 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	4.0

Analysis Time: 0917

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: < 10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	< 10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 0929

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 40 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	40
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 0934

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 2.05 ppm

Analysis Time: 0942

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 0949

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 279
Sampled By: Gosdt
Field Analyst: Gosdt

Sample ID No.: 136WT0202
Sample Location: 136WT02
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-8 __ Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.0 ppm
Analysis Time: 0959 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-8 __ Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.003 ppm
Analysis Time: 0922 Filtered: ☐
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-8 __ Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 5.4 ppm
Analysis Time: 1007 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT0302
Sample Location: 13MWT03
Sampled By: TR/EW
C.O.C. No.: 4820

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/11/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0925								
Method: SAME	CLOUDY	6.37	0.487	18.00	328	4.95	+345	---

PURGE DATA:

Date: 11-10-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 18.05								
Static Water Level (WL): 12.55								
One Casing Volume(gal/L): 34								
Start Purge (hrs): 1005								
End Purge (hrs): 1209								
Total Purge Time (min): 124								
Total Vol. Purged (gal/L): 10.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	YES
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	YES

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

18.05 - 12.55 = 5.5 x 0.163 = 0.9 gal or 3.4L

INTAKE NEAR bottom - Historically WELL draws down

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Ryan

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT03 ~~13GW0202~~ (TA)
DATE: 11/10/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1005	12.55	–	–	–	–	–	–	–	–	START PURGE
1015	13.17	100	5.67	0.447	43.7	6.92	16.23	–	189	1000 CLEAR
1025	13.73	90	5.64	0.442	42.1	6.55	16.68	–	226	1900 "
1035	14.29	90	5.54	0.442	23.4	6.15	16.49	–	243	2800 "
1045	14.61	90	5.49	0.441	12.3	5.70	16.33	–	261	3700 "
1055	14.89	90	5.44	0.440	8.16	5.37	16.21	–	280	4600 "
1105	15.22	90	5.46	0.447	5.35	5.12	16.53	–	284	5500 "
1115	13.57	90	5.43	0.459	4.65	4.81	16.74	–	291	6400 "
1125	15.91	90	5.40	0.468	12.8	4.49	16.98	–	297	7300 "
11.35	16.25	90	5.18	0.480	54.9	3.73	17.55	–	315	8200 "
1145	16.60	90	5.04	0.494	43.3	3.12	17.86	–	338	9100 "
1155	16.95	90	5.16	0.485	112	3.97	18.01	–	346	10000 SL CLOUDY
1205	17.21	90	5.32	0.487	328	4.45	18.00	–	345	10900 CLOUDY
1209	DRY	—	—	–	—	—	–	–	–	DRY will sample 11/11

SIGNATURE(S): Troy Agee

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: TL/FW
Field Analyst: TL/FW
Field Form Checked as per QA/QC Checklist (initials): TLL

Sample ID No.: 13GWT0302
Sample Location: 13MWT03
Duplicate: ☐
Blank: ☐

SAMPLING DATA: Clear 11/11 Start 11/11

Date: 11/11/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 0925	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	Cloudy	5.32	0.487	18.00	328	4.45	—	~~345~~

← 11/10 Purge Data

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 6 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	6

Analysis Time: 0947

Notes: —

Alkalinity: FW
Equipment: Chemetrics Test Kit
Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 0955
Filtered: ☐

Notes: At 23 ppm colorless ... No Green Color

Carbon Dioxide: FW
Equipment: Chemetrics Test Kit
Concentration: 50 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	50
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 0949

Notes: — —

Ferrous Iron (Fe^{2+}): TL
Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L
Program/Module: 500nm 33
Concentration: 0.03 ppm
Analysis Time: 1019
Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): TL
Range: 0 - 5 mg/L
Equipment: HS-C Other: _____
Exceeded 5.0 mg/L range on color chart: ☐
Concentration: 0.0 ppm
Analysis Time: 1002

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT0302
Project No.: 9060	Sample Location: 13MWT03
Sampled By: FW / TR	Duplicate: ☐
Field Analyst: FW / TR	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 90 | Range: 0 - 0.70 mg/L | Concentration: 0.06 ppm | TR

Program/Module: 610nm | 93 | Analysis Time: 1026 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.006 ppm | TR

Equipment: DR-850 | DR-8 50 | Range: 0 - 0.350 mg/L | Analysis Time: 1026 | Filtered: ☐

Program/Module: | 62

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.1 ppm | TR

Equipment: DR-850 | DR-8 50 | Range: 0 - 20.0 mg/L | Analysis Time: 1039 | Filtered: ☐

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT0402
Sample Location: 13GWT04
Sampled By: Goard
C.O.C. No.: 4825

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-23-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1044	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	Clear	5.24	0.228	16.45	6.85	4.14	243.6	---

PURGE DATA:

Date: 11-23-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.80								
Static Water Level (WL): 14.93								
One Casing Volume(gal/L): 3.87	1.77							
Start Purge (hrs): 0942								
End Purge (hrs): 1042								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

17.80
14.93
2.87 (0.163) = .469 gal = 1.77 L
qs qs

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 13GWT04
DATE: 11-23-03
WEATHER: Cloudy 50°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0942	14.93	—	—	—	—	—	—	—	—	Start purge
0952	15.41	1.2	1200	5.71	0.244	31.0	8.52	16.26	166.0	clear
1002	15.45	2.2	1000	5.75	0.239	14.0	7.59	16.31	182.2	"
1012	15.48	3.2	1000	5.65	0.231	10.7	6.60	16.37	212.4	"
1022	15.48	4.1	900	5.50	0.218	9.05	5.37	16.45	232.6	"
1032	15.49	5.0	900	5.33	0.221	7.89	4.48	16.57	236.7	"
1037	15.49	5.45	450	5.26	0.226	8.35	4.18	16.50	241.3	"
1042	15.48	5.90	450	5.24	0.228	6.85	4.14	16.45	243.6	stop

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth — 16.0'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0502
Sample Location: 13MWT05
Sampled By: T. Rojahn
C.O.C. No.: 4816
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-6-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1320								
Method: SAME	CLEAR	5.40	0.558	15.42	18.6	3.96	432	--

PURGE DATA:

Date: 11/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 19.15								
Static Water Level (WL): 8.81								
One Casing Volume(gal/L): 6.4								
Start Purge (hrs): 0920								
End Purge (hrs): 1320								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	YES -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

19.15 - 8.81 = 10.34 x 0.163 = 1.7 gal or 6.4L

INTAK @ MID SCREEN

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Ty Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT05
DATE: 11/06/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0920	8.81	—	—	—	—	—	—	—	—	Start PURGE
0930	9.60	120	5.21	0.619	23	4.86	14.58	-	347	1200 ml CLEAR
0940	10.18	80	5.16	0.622	10.8	3.88	14.57	-	371	2000 ml "
0950	10.68	80	5.13	0.618	11.5	3.87	14.21	-	384	2800 ml "
1000	11.28	90	5.13	0.617	12.6	3.69	14.64	-	392	3700 ml "
1010	11.76	90	5.12	0.614	18.2	3.53	14.90	-	400	4600 ml "
1020	12.23	90	5.07	0.615	23.4	3.29	15.02	-	401	5500ml "
1030	12.68	90	5.02	0.615	26.2	2.81	15.13	-	402	6400ml "
1040	12.95	90	4.99	0.609	20.4	2.87	15.03	-	410	7300ml "
1050	13.26	90	4.96	0.602	17.7	2.92	14.89	-	416	8200 ml "
1100	13.58	90	5.02	0.612	18.0	3.18	15.35	-	410	9100 ml "
1110	13.85	90	5.10	0.626	19.2	3.40	15.63	-	402	10000 ml "
1120	14.31	90	5.10	0.624	13.3	3.37	15.61	-	409	10900 ml "
1130	14.65	90	5.10	0.624	10.9	3.35	15.60	-	406	11800 ml "
1140	15.02	90	5.10	0.622	7.60	3.32	15.58	-	421	12700 ml "
1150	15.38	90	5.16	0.622	8.13	3.26	15.63	-	421	13600 ml "
1200	15.64	90	5.21	0.619	8.78	3.23	15.62	-	422	14500ml "
1210	15.95	90	5.25	0.613	10.35	3.16	15.42	-	422	15400ml "
1220	16.70	90	5.30	0.608	16.3	3.24	15.36	-	422	16300 ml "
1230	16.20	90	5.34	0.602	23.5	3.30	15.31	-	422	17200 ml "
1240	16.35	90	5.35	0.594	19.4	3.32	15.29	-	422	18100 ml "
1250	16.48	90	5.37	0.585	19.3	3.42	15.54	-	424	19000 ml "
1300	16.65	90	5.40	0.577	19.1	3.58	15.47	-	425	19900 ml "
1310	16.81	90	5.40	0.565	18.8	3.77	15.45	-	429	20800 ml "
1320	16.91	90	5.40	0.558	18.6	3.96	15.42	-	432	21700 ml "
1320	—	—	—	—	—	—	—	—	—	Start Sampling

SIGNATURE(S): Troy Nash

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials): TAR

Sample ID No.: 13GWT0502
Sample Location: 13MWT05
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 11-6-03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 1320	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	5.40	0.558	15.42	18.6	3.96	–	432

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI
Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 4 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	4

Analysis Time: 1326

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1336

Filtered: ☐

Notes: Colorless @ 27 but NO GLEN

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 33 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	33
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1348

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-820 Range: 0 - 3.00 mg/L
Program/Module: 500nm 33

Concentration: 0.11 ppm

Analysis Time: 1354

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1358

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT05
Project No.: N9060	Sample Location: 13MWT05
Sampled By: T. ROJAHN	Duplicate: ☐
Field Analyst: T. ROJAHN	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-890 | Range: 0 - 0.70 mg/L | Concentration: 0.09 ppm

Program/Module: 610nm | 93 | Analysis Time: 1403 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.012 ppm

Equipment: DR-850 | DR-850 | Range: 0 - 0.350 mg/L | Analysis Time: 1343 | Filtered: ☐

Program/Module: | 62

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 1.3 ppm

Equipment: DR-850 | DR-890 | Range: 0 - 20.0 mg/L | Analysis Time: 1411 | Filtered: ☐

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT0602
Sample Location: SWMU 13
Sampled By: T.R.
C.O.C. No.: 4837, 4836
Type of Sample:
[X] Low Concentration
[] High Concentration

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

SAMPLING DATA:

Date: 12-07-03 / Time: 1300 / Method: Peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	6.45	0.363	12.50	22	7.35	+180.4	--

PURGE DATA:

Date: 12/6/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.55'								
Static Water Level (WL): 13.58'								
One Casing Volume(gal/L): 2.5								
Start Purge (hrs): 1510								
End Purge (hrs): 1628 — purged dry								
Total Purge Time (min): 78								
Total Vol. Purged (gal/L): 2.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	12/7 @ 1300 (1)(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/9 @ 1730 (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/10 @ 1800 (1) L HDPE	Yes + F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	12/11 @ 1615 (1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes■ No[]

Well Historically Dries Out.

Well 13MWT06 wet dry @ 1628

Total Vol. purged 2.0g

Collected samples WEEK DAYS @ 1730 Hrs

12/7 Collected 500ml of Ext. Sample (TC)
12/8 " " " " " (SG)
12/9 " Total Metals (TC)
12/10 " Filtered Metals (SG)
12/11 " Nitrate, Nitrite & Ammonia (TA)

due to SECURITY RESTRICTIONS INSIDE the BLDG #165 BUFFER ZONE

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT06
DATE: 12/6/03
WEATHER: Sunny, Breezy, 40°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1510	13.85	0	100	6.26	0.489	230	5.23	15.00	73.8	Cloudy, No odor
1520	14.70		100	6.45	0.414	200	6.30	14.45	118.2	"
1530	15.26		<100	6.51	0.360	50	8.25	14.31	148.5	Clear
1540	15.80			6.47	0.342	33	10.13	14.13	162.0	"
1550	16.10			6.48	0.340	29	10.11	13.73	169.4	"
1600	16.50			6.50	0.346	26	10.08	13.73	172.3	"
1610	16.90			6.48	0.363	23	8.91	13.63	176.9	"
1620	17.11	2.0 gal		6.45	0.363	22	7.35	12.50	180.4	"
1630	—	—	—	—	—	—	—	-	-	DRY

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) Peristaltic #4000
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 16.75'

SIGNATURE(S): Scott Grue

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 136WT0702
Sample Location: 13MWT07
Sampled By: FW
C.O.C. No.: 4818
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-10-03 / Time: 1330 / Method: PERISTALTIC	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	3.90	1.054	18.45	3.01	1.32	383.6	—

PURGE DATA:

Date: 11-10-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 4.65								
One Casing Volume(gal/L): 2.2								
Start Purge (hrs): 1120								
End Purge (hrs): 1330								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 2.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]
Intake mid screen

Circle If Applicable:

~~MS/MSD~~

Duplicate ID No.: 13FD1110301

Signature(s):

FW —

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT07
DATE: 11-10-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1120	4.65									START
1130	5.63	85	4.12	0.971	10.0	3.56	16.48	—	330.9	
1140	6.24	↓	4.10	0.983	8.0	2.79	16.99	—	360.0	
1150	6.52	80	4.08	0.985	7.0	2.26	17.17	—	371.1	
1200	6.89		4.04	0.992	6.55	1.92	17.21	—	375.5	
1210	7.11		4.02	1.000	6.02	1.76	17.17	—	375.8	
1230	7.44		3.98	1.007	5.24	1.61	17.70	—	377.8	
1240	7.67		3.96	1.019	4.04	1.50	18.06	—	376.9	
1250	7.89	↓	3.95	1.031	4.49	1.42	18.41	—	376.4	
1300	8.05	75	3.93	1.046	3.69	1.38	18.78	—	378.8	
1307	8.13		3.92	1.049	4.70	1.35	18.66	—	380.7	
1316	8.19		3.90	1.052	3.89	1.33	18.61	—	382.7	
1323	8.26		3.90	1.054	3.38	1.32	18.54	—	383.1	
1330	8.31	↓	3.90	1.054	3.01	1.32	18.45		383.6	SAMPLE
1618										END

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0802
Sample Location: 13MWT08
Sampled By: S. GRIER
C.O.C. No.: 4826
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/22/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1515	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	Clear	5.00	0.076	15.18	36	6.44	266.7	—

PURGE DATA:

Date: 11/22/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2"			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 16.60								
Static Water Level (WL): 4.11								
One Casing Volume(gal/L):								
Start Purge (hrs): 1330								
End Purge (hrs): 1505								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	YES
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NONE

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	13FD1123030 1

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: 13 SWMU

WELL ID.: 13 MWT 08
DATE: 11/22/03
WEATHER: Cloudy, 68° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(gal/L)~~ mL	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1330	4.41	0	400	5.17	0.087	>1000	6.07	15.52	191.3	GREY - NO ODOR
1335	4.69	~~400~~	200	4.87	0.079	>1000	6.11	15.02	200.6	
1340	4.71		200	4.89	0.079	738	6.12	15.01	210.4	
1345	4.73		150	4.90	0.079	100	6.13	15.00	228.3	Clearing
1350	4.76		150	4.90	0.079	91	6.19	15.00	235.6	
1355	4.82		150	4.90	0.078	84	6.26	15.00	239.8	
1400	4.88		150	4.90	0.078	70	6.30	14.99	247.1	
1405	4.90		150	4.93	0078	55	6.33	15.00	248.9	
1415	5.00		150	4.94	0.077	53	6.39	15.07	250.8	
1425	5.05		150	4.96	0.077	50	6.40	15.18	253.1	
1435	5.15		175	4.98	0.076	45	6.44	15.03	259.2	
1445	5.30		150	4.99	0.076	35	6.36	15.01	262.6	
1455	5.31		150	4.99	0.076	36	6.44	15.08	264.4	
1505	5.39	5gal	150	5.00	0.077	36	6.44	15.23	266.7	
										Sample 13GWT0802 taken @ 1515

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 11.0'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT0802
Project No.: N9060
Sample Location: 13MWT08
Sampled By: S. GRICE
Duplicate: ☐
Field Analyst: T. ROJAHN
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials): TR

SAMPLING DATA:

Date: 11-22-03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: (TR) Peristaltic	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: ↘ 1515	CLEAR	5.00	0.076	15.18	36	6.44	–	+266.7

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	5

Analysis Time: 1615

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1649

Filtered: ☑

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 45 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	45
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1626

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-890) Program/Module: 500nm 33 Range: 0 - 3.00 mg/L

Concentration: 0.21 ppm

Analysis Time: 1646

Filtered: ☑

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1709

SG

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT0802
Project No.:	N9060	Sample Location:	13MWT08
Sampled By:	S.G.	Duplicate:	☐
Field Analyst:	T.R.	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 90 | Range: 0 - 0.70 mg/L | Concentration: 0.00 ppm

Program/Module: 610nm | 93 | Analysis Time: 1659 | Filtered: ☑

Notes:

Nitrite (NO_2^--N):

Equipment: DR-850 | DR-8 50 | Range: 0 - 0.350 mg/L | Concentration: 0.001 ppm

Program/Module: | 62 | Analysis Time: 1655 | Filtered: ☑

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Equipment: DR-850 | DR-8 60 | Range: 0 - 20.0 mg/L | Concentration: 0.0 ppm

Program/Module: 525nm | 41 | Analysis Time: 1705 | Filtered: ☑

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☑ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0903 (TR)
Sample Location: 13GWT09
Sampled By: JG
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-4-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1018								
Method: Peristaltic	Clear	5.33	0.640	12.82	4.07	1.14	251.0	--

PURGE DATA:

Date: 12-4-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.96								
Static Water Level (WL): 8.60								
One Casing Volume(gal/L): 8.86								
Start Purge (hrs): 0835								
End Purge (hrs): 1015								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 9.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

MTA

22.96
8.60
14.36 (.163) = 2.34 gal = 8.86 L

Circle if Applicable:
MS/MSD
Duplicate ID No.: 13FD120403~~00~~01

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT0903 (TR1)
DATE: 12-4-03
WEATHER: Overcast 38°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0835	8.60	-	-	-	-	-	-	-	-	Start purge
0845	8.95	0.9	900	5.43	0.588	1.15	1.37	11.78	298.8	clear
0855	9.02	1.8	900	5.47	0.580	1.37	1.27	11.87	225.7	"
0905	9.02	2.7	900	5.46	0.572	2.48	1.17	12.34	231.6	"
0915	9.05	3.6	900	5.43	0.577	9.70	1.13	12.01	236.5	"
0925	9.09	4.5	900	5.41	0.586	7.60	1.13	12.31	239.7	"
0935	9.12	5.4	900	5.41	0.593	5.60	1.11	12.19	240.0	"
0945	9.14	6.3	900	5.38	0.606	5.23	1.13	12.64	245.1	"
0955	9.17	7.2	900	5.38	0.624	4.66	1.11	12.77	246.5	"
1005	9.19	8.1	900	5.37	0.636	4.21	1.14	12.58	246.6	"
1015	9.20	9.0	900	5.32	0.640	4.07	1.14	12.82	251.0	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth ~18'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

TK

Project Site Name: NSWC CRANE

Project No.: N9060 CTO279

Sampled By: Gerdt

Field Analyst: Gerdt

Field Form Checked as per QA/QC Checklist (initials): TK

Sample ID No.: 13GWT090 3 A

Sample Location: 13GWT09 M (TK)

Duplicate: ☐

Blank: ☐

SAMPLING DATA:

Date: 12-4-03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 1018	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	Clear	5.38	0.640	12.82	4.07	1.14	—	251.0

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☒	1 to 12 ppm	K-7512	1.5

Analysis Time: 1040

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 0.0 ppm

Range Used:	Range	Method	Concentration ppm
☒	10 to 100 ppm	K-9810	0.0
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1110

Filtered: ☐

Notes: No color change

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 48 ppm

Range Used:	Range	Method	Concentration ppm
☒	10 to 100 ppm	K-1910	48
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1119

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: (DR-850) DR-8__ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.0 ppm

Analysis Time: 1128

Notes: color less

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1135

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc. **Page 2 of 2** (TK)

Project Site Name: **NSWC CRANE** Sample ID No.: 136WT090 3/2

Project No.: N9060 CTO 279 Sample Location: 136WT09 1/M (TK)

Sampled By: Goerdt Duplicate: ☐

Field Analyst: Goerdt Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 __ Range: 0 - 0.70 mg/L Concentration: 0.01 ppm

Program/Module: 610nm 93 Analysis Time: 1147 Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.023 ppm

Equipment: DR-850 DR-8 __ Range: 0 - 0.350 mg/L Analysis Time: 1048 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.4 ppm

Equipment: DR-850 DR-8 __ Range: 0 - 20.0 mg/L Analysis Time: 1157 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 136WT1002
Sample Location: 136WT10
Sampled By: [illegible]/TR
C.O.C. No.: 4822
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-20-03 / Time: 1322	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Method: Peristaltic	Clear	4.74	.520	19.73	5.79	4.83	230.3	—

PURGE DATA:

Date: 11-20-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.13								
Static Water Level (WL): 16.79								
One Casing Volume(gal/L): 7.0								
Start Purge (hrs): 0917								
End Purge (hrs): 1317								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 18.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NA
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	YES

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

28.13
16.79
11.34 (0.163) = 18.48 gal = 7.0 L

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 136WT1002
DATE: 11-20-03
WEATHER: Sun 50 F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0917	16.79	—	—	—	—	—	—	—	—	Start purge
0927	18.40	1.2	120	4.31	0.460	11.1	1.37	14.99	253.3	clear
0937	18.98	2.0	80	4.26	0.464	5.72	0.76	15.12	263.9	"
0947	19.43	3.0	100	4.03	0.473	3.88	1.10	15.53	289.4	"
0957	19.79	3.7	70	3.90	0.479	5.28	1.53	15.49	336.1	"
1007	20.16	4.4	70	3.90	0.479	5.67	1.61	15.53	343.3	"
1017	20.51	5.1	70	3.99	0.478	4.36	1.52	15.66	329.7	"
1027	20.89	5.8	70	4.06	0.477	4.57	1.42	15.72	320.8	"
1037	21.22	6.5	70	4.15	0.480	7.07	1.33	16.07	306.8	"
1047	21.58	7.2	70	4.25	0.479	9.78	1.19	16.06	290.1	"
1057	21.93	7.9	70	4.35	0.477	37.2	1.13	16.09	277.4	jump in turb.
1107	22.22	8.6	70	4.43	0.476	60.2	0.90	1603	267.7	slight cloudy
1117	22.53	9.3	70	4.48	0.481	102.6	0.76	16.24	262.3	"
1127	22.83	10.0	70	4.59	0.484	105.9	0.71	16.27	246.0	"
1137	23.14	10.7	70	4.67	0.486	340.0	0.80	16.31	228.8	cloudy
1147	23.44	11.55	85	4.76	0.487	447.0	0.87	16.26	215.4	"
1157	23.58	12.40	85	4.81	0.521	392	1.62	17.88	207.7	"
1207	23.58	13.25	85	4.87	0.531	117	2.89	19.09	205.8	"
1217	23.59	14.10	85	4.88	0.526	39.3	3.37	19.22	207.2	"
1227	23.59	14.95	85	4.87	0.517	11.9	3.72	18.95	211.6	TURB MEAS PNOR TO FLOW THRU CELL
1237	23.59	15.80	85	4.84	0.516	22.8	4.14	19.05	215.8	
1247	23.59	16.65	85	4.81	0.519	16.5	4.23	19.46	218.9	CLOUDY

Water Quality Meter (S/N) 98P0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ~27' this well draws down

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT102
DATE: 11-20-03
WEATHER: SUNNY 60°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1257	23.59	17.50	85	4.77	0.521	13.5	4.48	19.69	223.3	CLEAR
1307	23.59	17.90	40	4.76	0.521	8.01	4.59	19.70	226.5	CLEAR
1317	23.59	18.60	70	4.74	0.520	5.79	4.83	19.73	230.3	~~Stop Purge~~

Water Quality Meter (S/N) 98P0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 - 4298

Pump Intake Depth ~27'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT10 02
Project No.: 9060
Sample Location: 13MWT10
Sampled By: JGeindt
Duplicate: ☐
Field Analyst: TROJAHN
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials): TK

SAMPLING DATA:

Date: 11-20-03 / Time: 1322	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	Clear	4.74	0.520	19.73	5.79	4.83	—	+230.3

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): ~~Silver-Silver Chloride~~ / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 3.5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	3.5

Analysis Time: 1330

Notes:

Alkalinity:
Equipment: Chemetrics Test Kit
Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1339
Filtered: ☐

Notes:

Carbon Dioxide:
Equipment: Chemetrics Test Kit
Concentration: 154 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	154
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1344

Notes:

Ferrous Iron (Fe^{2+}):
Equipment: DR-850 / DR-850 Range: 0 - 3.00 mg/L
Program/Module: 500nm / 33
High Limit
Concentration: >3.30 ppm
Analysis Time: 1350
Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L
Equipment: HS-C Other: _____
Concentration: 0.0 ppm
Exceeded 5.0 mg/L range on color chart: ☐
Analysis Time: 1400

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT1002
Project No.:	9060	Sample Location:	13[illegible]WT10
Sampled By:	JG	Duplicate:	☐
Field Analyst:	TR	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-890 | Range: 0 - 0.70 mg/L | Concentration: 0.05 ppm

Program/Module: 610nm | 93 | Analysis Time: 1410 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.003 ppm

Equipment: DR-850 | DR-850 | Range: 0 - 0.350 mg/L | Analysis Time: 1344 | Filtered: ☐

Program/Module: | 62

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 1.8 ppm

Equipment: DR-850 | DR-850 | Range: 0 - 20.0 mg/L | Analysis Time: 1414 | Filtered: ☐

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1102
Sample Location: 13MWT 11
Sampled By: T. LOJAHN
C.O.C. No.: 4822
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-20-03 / Time: 1055 / Method: PERISTALTIC	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	3.93	0.238	16.35	4.52	3.49	+355	--

PURGE DATA:

Date: 11-20-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.75								
Static Water Level (WL): 8.45								
One Casing Volume(gal/L): 5.7								
Start Purge (hrs): 0930								
End Purge (hrs): 1050								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 7.65								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

17.75 - 8.45 = 9.3 x 0.163 = 1.5 gal or 5.7L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT11
DATE: 11/20/03
WEATHER: Mostly sunny & Low 40's

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0930	8.45	—	—	—	—	—	—	—	—	Start Purge
0940	8.78	1.00	100	3.88	0.229	41.5	6.77	15.11	299	CLEAR
0950	9.00	2.00	100	3.86	0.232	18.5	5.26	15.69	312	CLEAR
1000	9.14	2.950	95	3.86	0.227	8.57	4.22	15.70	324	CLEAR
1010	9.28	3.900	95	3.88	0.230	8.10	4.05	15.88	332	CLEAR
1020	9.39	4.850	95	3.90	0.233	7.85	3.92	16.09	340	CLEAR
1030	9.48	5.800	95	3.91	0.235	7.57	3.78	1621	347	CLEAR
1040	9.53	6.750	95	3.95	0.236	5.11	3.60	1629	353	CLEAR
1050	9.56	7.650	90	3.93	0.238	4.52	3.49	16.35	355	CLEAR
1055	—	—	—	—	—	—	—	—	—	Start Sampling

Water Quality Meter (S/N) 99B1412 AA
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth MID SCREEN ~12.75'

SIGNATURE(S): TJ Nyak

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: TK
Field Analyst: TK
Field Form Checked as per QA/QC Checklist (initials): TK

Sample ID No.: 13GWT1102
Sample Location: 13MWT11
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11-20-03								
Time: 1055	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	3.93	0.238	16.35	4.52	3.49	—	+355

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	1.5

Analysis Time: 1106

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1115

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 165 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	165
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1120

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 90 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

High Limit

Concentration: >3.30 ppm

Analysis Time: 1136

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1140

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT11OZ
Project No.: 9060
Sample Location: 13MWT11
Sampled By: TR
Duplicate: ☐
Field Analyst: TR
Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 (5) Range: 0 - 0.70 mg/L
Concentration: 0.01 ppm
Program/Module: 610nm 93
Analysis Time: 1147 Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.009 ppm
Equipment: DR-850 DR-8 (5) Range: 0 - 0.350 mg/L
Analysis Time: 1122 Filtered: ☐
Program/Module: 62
Standard Solution: ☐ Results: _____
Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.3 ppm
Equipment: DR-850 DR-8 (9) Range: 0 - 20.0 mg/L
Analysis Time: 1154 Filtered: ☐
Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13 GWT 1202 ~~13 BRWT 1202~~
Sample Location: SWMU 13
Sampled By: GOULD
C.O.C. No.: 4821

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-18-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1408	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	slight cloudy	4.87	0.131	16.37	29.1	2.02	305.9	--

PURGE DATA:

Date: 11-18-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.40								
Static Water Level (WL): 9.81								
One Casing Volume(gal/L): 7.8								
Start Purge (hrs): 1002								
End Purge (hrs): 1402								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Turbidity checked prior to filling total metals bottle. Reading of 1.86 (NTU)

22.40 ogl
- 9.51 ogl
12.59(.163) = 2.05 ogl = 7.8L

Circle If Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MW12
DATE: 11-18-03
WEATHER: 55° Rain

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0952	9.81	—	—	—	—	—	—	—	—	Start Purge
1002	11.59	1.2	120	4.85	0.135	9.50	1.52	16.20	237	Clear
1012	12.49	2.1	90	4.80	0.126	8.85	1.03	16.19	251.2	"
1022	13.10	3.0	90	4.79	0.125	5.13	1.05	16.21	256.4	"
1032	13.52	3.9	90	4.80	0.124	2.82	1.43	16.20	267.5	"
1042	13.90	4.8	90	4.79	0.123	6.99	1.65	16.19	277.0	"
1052	14.52	5.7	90	4.75	0.125	11.8	1.63	16.19	286.9	" pump off
1102	14.50	6.6	90	4.70	0.129	16.2	1.55	16.17	285.9	"
1112	14.78	7.3	70	4.69	0.133	17.9	1.41	16.10	285.2	" pump off short time
1122	15.10	8.1	80	4.68	0.138	15.1	1.35	16.17	291.5	"
1132	15.22	8.9	80	4.69	0.136	13.1	1.37	15.94	295.0	"
1142	14.97	9.7	80	4.70	0.136	12.8	1.47	15.86	298.6	"
1152	15.12	10.4	80	4.70	0.137	12.6	1.68	15.55	300.3	"
1202	15.48	11.4	80	4.70	0.140	13.2	1.23	16.11	299.1	"
1212	15.86	12.2	80	4.70	0.142	14.3	1.18	16.20	300.8	"
1222	16.19	13.0	80	4.72	0.141	16.7	1.19	16.22	305.3	"
1232	16.54	13.8	80	4.71	0.143	15.3	1.47	16.30	305.5	"
1242	16.84	14.6	80	4.71	0.144	27.5	1.39	16.33	309.3	"
1252	17.18	15.4	80	4.72	0.142	28.3	1.34	16.37	312.4	"
1302	17.49	16.2	80	4.73	0.138	27.2	1.45	16.39	313.4	"
1312	17.82	17.0	80	4.76	0.132	16.9	1.78	16.37	315.0	"
1322	18.14	17.8	80	4.77	0.130	19.8	1.95	16.39	318.9	"

Water Quality Meter (S/N): 98F0478 AB
Control Box Type (S/N): N/A
Turbidity Meter (S/N): 3317-2402

Pump Intake Depth: ~1' OFF Bottom
Well Historically draws down

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT12
DATE: 11-18-03
WEATHER: 55° Rain

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1332	18.47	18.7	90	4.77	0.129	27.4	2.03	16.39	329.0	slight cloudiness
1342	18.85	19.6	90	4.79	0.129	41.7	2.13	16.39	323.9	cloudy
1352	19.07	20.5	90	4.80	0.129	37.2	2.17	16.37	321.2	"
1402	19.47	21.4	90	4.87	0.131	29.1	2.02	16.37	305.9	end purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 3317-2402

Pump Intake Depth ~1' off bottom

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: JGoerdt
Field Analyst: TRAHAN
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13MWT12 (TL)
Sample Location: 13GWT1202
Duplicate: ☐
Blank: ☐

1.86 prior to sampling [illegible]

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11/18/03	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Time: 1408								
Method: Peristaltic	CLEAR	4.87	0.131	16.37	29.1	2.02	—	+305.9

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 2 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	2

Analysis Time: 1430

Notes: —

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	—
☐	100 to 1000 ppm	K-9820	—

Analysis Time: 1439

Filtered: ☐

Notes: — —

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 135 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	135
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1446

Notes: — —

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-890) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.10 ppm

Analysis Time: 1455

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Concentration: 0.0 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1457

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: JG
Field Analyst: TR

Sample ID No.: 13GWT1202
Sample Location: 13MWT12
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.01 ppm
Analysis Time: 1509 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-850 Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.000 ppm
Analysis Time: 1441 Filtered: ☐
Standard Solution: ☐ Results: _____
Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-850 Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 0.4 ppm
Analysis Time: 1514 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1302
Sample Location: 13GWT13
Sampled By: Gorat
C.O.C. No.: 4827
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-25-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1150								
Method: Peristaltic	Clear	3.56	0.113	12.33	0.38	3.26	385.1	—

PURGE DATA:

Date: 11-25-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.44								
Static Water Level (WL): 4.49								
One Casing Volume(gal/L): 10.46								
Start Purge (hrs): 1016								
End Purge (hrs): 1146								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 10.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

21.44
4.99
16.95(.163) = 2.76 gal = 10.46 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT13
DATE: 11-25-03
WEATHER: Partly cloudy 35°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
1016	4.49	—	—	—	—	—	—	—	—	Start purge
1026	4.50	1.3	1300	4.59	0.140	9.20	3.28	12.20	198.8	Clear
1036	4.51	2.5	1200	3.90	0.104	5.38	3.65	12.19	261.4	"
1046	4.50	3.7	1200	3.75	0.104	3.17	3.59	11.99	297.8	"
1056	4.51	4.9	1200	3.64	0.106	3.10	3.54	12.99	332.7	"
1106	4.50	6.1	1200	3.61	0.109	1.05	3.40	12.85	350.1	"
1116	4.50	7.3	1200	3.35	0.111	1.14	3.39	12.51	365.5	"
1126	4.50	8.5	1200	3.57	0.111	1.25	3.35	12.69	380.8	"
1136	4.50	9.7	1200	3.60	0.112	0.50	3.31	12.92	382.2	"
1146	4.50	10.9	1200	3.56	0.113	0.38	3.26	12.33	385.1	Stop purge

Water Quality Meter (S/N)
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2702

Pump Intake Depth ~16.9'

SIGNATURE(S): J. M. Doerr

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: J. Goerdt
Field Analyst: T. Rojahn
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT1302
Sample Location: 13MWT13
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 11-25-03 / Time: 1150	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	Clear	3.56	0.113	12.33	0.38	3.26	—	+385.1

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 11 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	11

Analysis Time: 1654 (SG)

Notes: —

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm (SG)

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1658

Filtered: ☐

Notes: Dark Pink @

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 120 ppm TR

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	120
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1659

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 9C Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.03 ppm (TR)

Analysis Time: 1701

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1703

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT1302
Project No.:	N9060	Sample Location:	13MWT13
Sampled By:	J.G.	Duplicate:	☐
Field Analyst:	T.R	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 90 | Range: 0 - 0.70 mg/L | Concentration: 0.00 ppm

Program/Module: 610nm | 93 | Analysis Time: 1717 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.000 ppm

Equipment: DR-850 | DR-8 50 | Range: 0 - 0.350 mg/L | Analysis Time: 1709 | Filtered: ☐

Program/Module: | 62

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.5 ppm

Equipment: DR-850 | DR-8 50 | Range: 0 - 20.0 mg/L | Analysis Time: 1719 | Filtered: ☐

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☒ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1402
Sample Location: 13MWT14
Sampled By: S.GRIER
C.O.C. No.: 4825
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/24/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1115	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic Pump	Clear	5.48	0.623	10.77	0.0	0.52	100.5	---

PURGE DATA:

Date: 11/24/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 25.60								
Static Water Level (WL): 14.67								
One Casing Volume (gal/L): 1.78								
Start Purge (hrs): 0935								
End Purge (hrs): 1105								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 2.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total.Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes (No)

Circle If Applicable:

MS/MSD

Duplicate ID No.: ---

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13 MWT 14
DATE: 11/24/03
WEATHER: Cloudy, Snow flurries, 30°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0935	14.67	~~100~~ 0	100	5.57	0.986	24	1.15	11.90	54.8	Clear, No odor
0945	14.90	-	80	5.52	0.906	20	1.09	11.95	63.9	"
0955	14.92	.65	80	5.47	0.791	13	0.89	10.57	72.1	"
1005	14.93	-	-	5.46	0.796	8.5	0.81	11.04	85.7	"
1015	14.93	1.0	-	5.50	0.703	6.0	0.67	11.94	89.0	"
1025	14.93	-	-	5.50	0.670	3.0	0.56	11.38	93.2	"
1035	14.93	-	-	5.46	0.628	1.2	0.54	10.70	96.6	"
1045	14.94	1.60	-	5.48	0.623	0.0	0.52	10.81	98.0	"
1055	14.94	-	-	5.48	0.624	0.0	0.51	10.78	99.6	"
1105	14.94	2.0	-	5.48	0.623	0.0	0.52	10.77	100.5	"

Water Quality Meter (S/N) 0280141
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 20.00

SIGNATURE(S): S. Brue

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1502
Sample Location: 13MWT15
Sampled By: T. KOHAN
C.O.C. No.: 4827
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-25-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1347	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAME	CLEAR	3.98	0.346	12.28	45.4	7.79	+322	--

PURGE DATA:

Date: 11-25-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2"Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.87								
Static Water Level (WL): 15.62								
One Casing Volume(gal/L) 7.6								
Start Purge (hrs): 0945								
End Purge (hrs): 1345								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 18								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	YES -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	3 x (2) 40ml Vails	YES

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

27.87 - 15.63 = 12.24 X .163 = 2gal or 7.6L

(TOC only)

Circle If Applicable:

MS/MSD YES

Duplicate ID No.: 13FD112503 01

Signature(s):

Ty Kohan

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT15
DATE: 11-25-03
WEATHER: Partly Cloudy TEMP 32° (AM)

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0945	15.62	—	—	—	—	—	—	—	—	Start Purge
0955	16.53	0.850	85	4.77	0.576	34.5	3.30	10.79	258	CLEAR
1005	17.00	1.700	85	4.75	0.583	16.7	3.16	11.52	261	CLEAR
1015	17.36	2.55	85	4.70	0.587	15.5	2.85	11.92	264	CLEAR
1025	17.46	3.40	85	4.65	0.565	12.7	2.48	10.97	260	CLEAR
1035	17.55	4.25	85	4.65	0.544	24.0	2.71	10.90	261	CLEAR
1045	17.62	4.95	70	4.59	0.524	29.1	3.27	10.81	269	CLEAR
1055	17.68	5.65	70	4.38	0.485	63.8	3.86	10.84	283	V. Sl Cloudy
1105	17.73	6.35	70	4.29	0.450	95.6	4.70	10.89	296	Sl. Cloudy
1115	17.76	7.05	70	4.29	0.441	94.8	5.01	11.23	299	Sl. Cloudy
1125	17.79	7.75	70	4.29	0.438	87.6	5.19	11.45	304	Sl. Cloudy
1135	17.88	8.45	70	4.19	0.417	86.9	5.62	11.65	311	Sl. Cloudy
1145	17.92	9.15	70	4.15	0.402	77.2	5.92	11.70	311	V. Sl. Cloudy
1155	17.95	9.85	70	4.12	0.394	75.0	6.08	11.34	313	V. Sl. Cloudy
1205	18.01	10.55	70	4.10	0.393	84.0	6.09	11.96	313	Sl. Cloudy
1215	18.10	11.75	70	4.09	0.384	81.2	6.26	12.36	313	Sl. Cloudy
1225	18.16	12.45	70	4.08	0.372	68.0	6.73	12.44	316	V. Sl. Cloudy
1235	18.24	13.15	70	4.05	0.368	74.8	6.75	12.22	317	V. Sl. Cloudy
1245	18.20	1385	70	4.06	0.372	65.0	6.46	11.98	316	V. Sl. Cloudy
1255	18.19	14.55	70	4.10	0.367	68.3	6.66	11.95	312	V. Sl. Cloudy
1305	18.19	15.25	70	4.05	0.360	61.7	7.01	12.13	312	V. Sl. Cloudy
1315	18.20	15.95	70	4.03	0.359	63.2	7.06	12.50	314	V. Sl. Cloudy

Water Quality Meter (S/N) 998 1412 AA
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth MID SCREEN ~ 22.9'

SIGNATURE(S): Terry Hazel

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MW17502
DATE: 11/25/03
WEATHER: Mostly Cloudy (Temp 30's) PM

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1325	18.20	16.65	70	4.02	.358	65.1	7.11	12.99	316	V. Sl. Cloudy
1335	18.22	17.35	70	4.00	.347	51.8	7.55	12.52	320	CLEAR
1345	18.23	18.05	70	3.98	.340	45.4	7.79	12.28	322	CLEAR
1347	—	—	—	—	—	—	—	—	—	Start Sampling

Water Quality Meter (S/N) SEE Page 2 of 3
Control Box Type (S/N)
Turbidity Meter (S/N)

Pump Intake Depth ~22.9'

SIGNATURE(S): Ty Rojek

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT1502
Project No.: N9060
Sample Location: 13MWT15
Sampled By: T. ROSAHL
Duplicate: ☐
Field Analyst: T.R.
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials): TR

SAMPLING DATA:

Date: 11-25-03 / Time: 1347	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: PEA-Stalt--	CLEAR	3.98	0.340	12.28	45.4	7.79	—	+322

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.07 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.07
☑	1 to 12 ppm	K-7512	

Analysis Time: 1356

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1400

Filtered: ☐

Notes: Sol. Bright red @ start

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 137 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	137
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1406

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-890) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: >3.30 ppm

Analysis Time: 1415

Notes: Limit

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1418

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT1502
Project No.: N9060	Sample Location: 13MWT15
Sampled By: T.R.	Duplicate: ☐
Field Analyst: T.R.	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 50 / 93 | Range: 0 - 0.70 mg/L | Concentration: 0.14 ppm | Filtered: ☐

Program/Module: 610nm | Analysis Time: 1432

Notes:

Nitrite (NO_2^--N):

Concentration: 0.001 ppm

Equipment: DR-850 | DR-8 53 / 62 | Range: 0 - 0.350 mg/L | Analysis Time: 1418 | Filtered: ☐

Program/Module:

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.7 ppm

Equipment: DR-850 | DR-8 90 / 41 | Range: 0 - 20.0 mg/L | Analysis Time: 1436 | Filtered: ☐

Program/Module: 525nm

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ N/A

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 136WT1602
Sample Location: 136WT16
Sampled By: Gorski
C.O.C. No.: 4822

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-20-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1537	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	clear	6.13	0.402	18.83	8.49	3.87	237.8	--

PURGE DATA:

Date: 11-20-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.31								
Static Water Level (WL): 10.40								
One Casing Volume(gal/L): 4.26								
Start Purge (hrs): 1404								
End Purge (hrs): 1534								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 8.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

17.31
10.40
6.91 (.163) = 1.13 gal = 4.26 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT16
DATE: 11-20-03
WEATHER: Sun 65°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1404	10.40	—	—	—	—	—	—	—	—	Start purge
1414	10.78	1.2	120	6.25	0.505	8.30	3.95	18.23	182.6	Clear
1424	11.09	2.0	80	6.19	0.485	4.76	4.17	18.06	209.7	"
1434	11.45	2.8	80	6.01	0.400	1.70	4.83	18.19	278.9	"
1444	11.81	3.7	90	6.00	0.397	0.89	4.84	18.01	278.6	"
1454	12.19	4.6	90	6.04	0.402	0.68	4.41	17.89	258.8	" ✓
1504	12.46	5.5	90	6.06	0.411	0.59	3.92	17.95	253.3	" ✓
1514	12.60	6.5	90	6.05	0.397	6.21	3.59	18.45	248.0	"
1524	12.63	7.3	90	6.06	0.407	6.73	4.08	19.05	245.0	"
1534	12.79	8.2	90	6.13	0.402	8.49	3.87	18.83	237.8	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ~14' MID water col.

SIGNATURE(S)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1702
Sample Location: 13MWT17
Sampled By: T. ROJAHN
C.O.C. No.: 4816
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-05-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1047	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAMP	CLEAR	5.38	0.153	15.97	3.74	0.84	338	—

PURGE DATA:

Date: 11-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.30								
Static Water Level (WL): 10.83								
One Casing Volume(gal/L): 5.8								
Start Purge (hrs): 0945								
End Purge (hrs): 1045								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]
Pump Intake MID SCREEN
20.3 - 10.83 = 9.47 X 0.163 = 1.5gal or 5.8L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	13FD1105030 1

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT17
DATE: 11-5-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)	
0945	10.83	–	–	–	–	–	–	NA	–	0ml	CLEAR
0955	10.84	100	5.47	0.162	18.3	1.29	15.93	"	282	1000	"
1005	10.84	100	5.41	0.157	14.5	0.98	15.26	"	307	2000	"
1015	10.87	100	5.41	0.156	5.42	1.05	15.61	"	326	3000	"
1025	10.87	100	5.42	0.156	4.09	0.93	15.90	"	338	4000	"
1035	10.87	100	5.40	0.154	4.14	0.86	16.03	"	334	5000	"
1045	10.87	100	5.38	0.153	3.74	0.84	15.97	"	338	6000	"
1047									→	Samples Taken	

SIGNATURE(S): Tay Kyle

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T.ROJAHN
Field Analyst: T.ROJAHN
Field Form Checked as per QA/QC Checklist (initials): TRR

Sample ID No.: 13GWT1702
Sample Location: 13MWT17
Duplicate: ☑
Blank: ☐

SAMPLING DATA:

Date: 11-05-03 / Time: 1047	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	CLEAR	5.38	0.153	15.97	3.74	0.84	—	338

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.9 / 0.9 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	0.9 0.9
☑	1 to 12 ppm	K-7512	>1

Analysis Time: 1050 / 1052

Notes: —

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 / <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10 / <10
☑	50 to 500 ppm	K-9815	
☑	100 to 1000 ppm	K-9820	

Analysis Time: 1100 / 1105

Filtered: ☐

Notes: Colorless ~45-48 But No green Color

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 170 / 180 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	170 / 180
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1110 / 1115

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-850) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.06 / 0.07 ppm

Analysis Time: 1137 / 1143

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1144

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: T. ROJAHN

Sample ID No.: 13GWT1702
Sample Location: 13MWT17
Duplicate: ☑
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-8 50 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.02/a00 ppm
Analysis Time: 1155/1204 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-8 90 Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.006/a006 ppm
Analysis Time: 1210/1228 Filtered: ☐
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-8 50 Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 0.0/0.0 ppm
Analysis Time: 1227/1235 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ N/A
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1802
Sample Location: 13GWT18
Sampled By: GO+2+
C.O.C. No.: 4834
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-7-03 / Time: 1538	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Method: Peristaltic	Clear	4.26	0.351	9.78	40.2	4.61	422.2	--

PURGE DATA:

Date: 12-7-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic	16.45	4.26	0.351	9.78	6.71	4.61	—	-
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ϕ PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 33.27								
Static Water Level (WL): 20.23								
One Casing Volume(gal/L): 8.01								
Start Purge (hrs): 1155								
End Purge (hrs): 1535								
Total Purge Time (min): ~~1538~~ 220								
Total Vol. Purged (gal/L): 1645								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

Turbidity checked prior to metals and it was 40 NTU's. Filtered sample taken.

33.27
20.23
13.04 (.163) = 2.13 gal = 8.01 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT18
DATE: 12-7-03
WEATHER: Sun 39° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1155	20.23	—	—	—	—	—	—	—	—	Start purge
1205	21.99	1.20	1200	4.75	0.320	18.9	2.17	12.26	258.1	clear
1215	23.49	2.15	950	4.79	0.285	4.64	1.19	11.74	282.9	"
1225	23.89	3.05	900	4.79	0.269	5.83	1.48	10.63	308.1	"
1235	24.20	3.95	900	4.76	0.281	38.6	1.52	10.57	314.8	"
1245	24.97	4.95	600	4.67	0.289	40.7	1.28	10.10	327.8	"
1255	25.85	~~25.85~~ 5.85	700	4.68	0.298	42.5	1.13	10.70	326.9	"
1305	25.18	~~25.95~~ 6.95	700	4.57	0.322	69.6	0.97	10.80	346.4	slightly cloudy
1315	25.39	6.65	700	4.50	0.339	84.1	0.95	10.97	355.5	"
1325	25.65	7.35	700	4.37	0.363	83.6	0.95	11.09	365.0	"
1335	25.89	8.05	700	4.34	0.368	88.1	0.83	11.02	367.9	
1345	26.19	8.75	700	4.28	0.395	150	0.85	12.18	368.4	cloudy
1355	26.45	9.45	700	4.22	0.413	174.	0.85	12.04	371.5	cloudy
1405	27.10	10.15	700	4.25	0.418	186.0	0.83	11.73	373.6	cloudy
1415	27.18	10.85	700	4.26	0.410	120	0.95	11.55	374.4	"
1425	27.26	11.55	700	4.28	0.391	95.4	1.07	10.63	375.8	"
1435	27.39	12.25	700	4.28	0.378	55.5	1.98	10.17	376.9	"
1445	27.39	12.95	700	4.26	0.369	22.7	2.18	10.05	382.7	"
1455	27.38	13.65	700	4.26	0.358	17.5	3.22	9.51	397.4	clear
1505	27.38	14.35	700	4.26	0.357	12.7	3.71	9.63	405.2	"
1515	27.38	15.05	700	4.26	0.354	9.66	4.31	9.83	416.1	"
1525	27.38	15.75	700	4.26	0.354	8.72	4.36	9.85	417.5	"

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) —
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth 28'

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 13GWT18 ~~0002~~ 2nd
DATE: 12-7-03
WEATHER: Sun 39° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (+/- mV)	Comments
1535	27.38	16.45	700	4.26	0.351	6.71	4.61	9.78	422.2	Clear and Stopping

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth 28'

SIGNATURE(S): J. M. Dow

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 279
Sampled By: Goodall
Field Analyst: Goodall
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 136WT1802
Sample Location: 136WT18
Duplicate: ☐ MS/MSD
Blank: ☐

SAMPLING DATA:

Date: 12-7-03 / Time: 1538	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	Clear	4.26	0.351	9.78	40.2	4.61	—	422.2

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 5.5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	5.5

Analysis Time: 1557

Notes: —

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: < 10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	< 10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1602

Filtered: ☐

Notes: — —

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 45 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	45
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1609

Notes: — —

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.33 ppm

Analysis Time: 1619

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1624

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	136WT18-02
Project No.:	N9060 CTO 279	Sample Location:	136WT18
Sampled By:	Gorrdt	Duplicate:	☐ MS/MSD
Field Analyst:	Gorrdt	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 __ | Range: 0 - 0.70 mg/L | Concentration: 0.07 ppm

Program/Module: 610nm | 93 | Analysis Time: 1637 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.0 ppm

Equipment: DR-850 | DR-8 __ | Range: 0 - 0.350 mg/L | Analysis Time: 1604 | Filtered: ☐

Program/Module: | 62

Standard Solution: ☐ | Results: 0.0 | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 1.4 ppm

Equipment: DR-850 | DR-8 __ | Range: 0 - 20.0 mg/L | Analysis Time: 1642 | Filtered: ☐

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

* MNA taken prior to adjusting tubing in well which caused turbidity to rise. MNA was taken w/ a 6.62 NTU turbidity, therefore not filtered. RD. 12/7/03

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

(FM) 13

Project Site Name: NSWC CRANE, SWMU 13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT1902 ~~HGGWT0502~~
Sample Location: 13MWT19
Sampled By: MGC
C.O.C. No.: 4815

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-28-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1555								
Method: PERISTALTIC	CLEAR	4.87	1.210	14.98	5.5	34.37	209.6	--

PURGE DATA:

Date: 10-28-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.05								
Static Water Level (WL): 11.96								
One Casing Volume(gal) 6.27								
Start Purge (hrs): 1410								
End Purge (hrs): 1550								
Total Purge Time (min): 100								
Total Vol. Purged (gal) 10								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles SW-846 8260B	4°C/HCl	(3) 40ml Vails	(FD) ~~Yes~~ NO
Volatiles SW-846 8015B	4°C/HCl	(3) 40ml Vails	(FD) ~~Yes~~ NO
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia	4°C/H_2SO_4	(1) L HDPE	Yes
Sulfate & Chloride	4°C	(1) L HDPE	(FD) ~~Yes~~ NO
Methane, Ethane &Ethene	4°C	(2) 40ml Vails	
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle If Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13 MW T19
DATE: 10-28-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1410	11.96	150	6.18	1.140	11	37.66	14.70	–	-10.9	0 CLEAR
1420	12.59	100	6.00	1.092	2.8	39.04	14.69	–	1.6	1000
1430	12.59	100	5.82	1.111	3.0	38.38	14.32	–	41.3	2000
1440	12.75	100	5.64	1.140	1.7	39.56	14.40	–	62.2	3000
1450	13.06	100	5.25	1.175	3.2	39.57	14.69	–	134.6	4000
1500	13.10	100	6.20	1.178	3.8	38.84	14.70	–	138.9	5000
1510	13.22	100	5.03	1.192	5.3	38.95	14.81	–	146.5	6000
1520	13.32	100	4.92	1.216	5.8	39.30	14.97	–	170.3	7000
1530	13.47	100	4.86	1.216	5.4	36.80	14.84	–	191.2	8000
1540	13.59	100	4.87	1.213	5.4	34.86	14.76	–	201.2	9000
1550	13.109	100	4.87	1.210	5.5	34.37	14.98	–	209.6	10000

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT2003
Sample Location: 13MWT20
Sampled By: Gerald
C.O.C. No.: 482

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-19-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1235	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	Clear	3.43	1.30	15.90	6.91	0.76	376.2	—

PURGE DATA:

Date: 11-19-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC				See Low Flow Purge Data Sheets				
Total Well Depth (TD): 22.85								
Static Water Level (WL): 4.40								
One Casing Volume(gal/L): 11.39								
Start Purge (hrs): 0828								
End Purge (hrs): 1228								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 29.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Turbidity just prior to total metals was 5.04 NTU.

22.85
4.40
18.45 (.163) = 3.01 g = 11.39 L

Circle if Applicable:

MS/MSD ~ | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 13mwT20
DATE: 11-19-03
WEATHER: Sunny 55° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
0828	4.40	—	—	—	—	—	—	—	—	Start purge
0838	5.41	1.1	110	3.93	1.31	18.0	0.98	13.47	39.2	clear
0848	6.12	2.2	110	3.88	1.24	9.71	0.63	13.79	303.6	"
0858	6.69	3.5	120	3.57	1.20	4.95	0.52	13.99	355.9	"
0908	7.09	4.6	110	3.34	1.22	9.40	0.50	14.14	392.5	"
0918	7.34	5.6	100	3.28	1.21	9.72	0.56	14.19	406.6	"
0928	7.62	6.6	100	3.30	1.23	7.85	0.71	14.41	405.2	"
0938	7.85	7.6	100	3.33	1.25	13.3	0.82	14.47	400.0	"
0948	8.10	8.6	100	3.34	1.26	15.9	0.76	14.74	397.8	"
0958	8.31	9.6	100	3.36	1.23	29.7	0.77	14.75	394.7	"
1008	8.51	10.6	100	3.36	1.25	17.5	0.76	14.78	394.1	"
1018	8.73	11.6	100	3.36	1.25	18.5	0.79	15.01	393.8	"
1028	8.91	12.6	100	3.35	1.25	15.6	0.81	15.19	394.5	"
1038	9.11	13.6	100	3.34	1.26	18.8	0.81	15.33	396.6	"
1048	9.31	14.6	100	3.36	1.25	12.2	0.78	15.26	396.7	"
1058	9.47	15.6	100	3.38	1.25	10.7	0.78	15.39	392.9	"
1108	9.67	16.6	100	3.39	1.25	11.0	0.77	15.43	390.4	"
1118	9.91	17.6	100	3.41	1.26	10.0	0.77	15.49	387.4	"
1128	10.09	18.6	100	3.40	1.26	9.82	0.78	15.46	385.9	"
1138	10.31	19.6	100	3.40	1.26	9.66	0.78	15.47	386.4	"
1148	10.51	20.6	100	3.41	1.28	11.7	0.79	15.53	385.7	"
1158	10.52	21.6	100	3.44	1.29	9.71	0.77	15.56	381.7	"

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920-4298

Pump Intake Depth MID SCREEN

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT20
DATE: 11-19-03
WEATHER: Sun 55° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1208	10.56	22.6	100	3.45	1.28	7.66	0.76	15.56	378.0	Clear
1218	10.60	23.6	100	3.45	1.30	7.24	0.77	15.83	375.9	"
1228	10.65	24.6	100	3.43	1.30	6.91	0.76	15.90	376.2	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920-4298

Pump Intake Depth MID SCREEN

SIGNATURE(S)

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: J Gocht
Field Analyst: TR
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT2003
Sample Location: 13MWT20
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 11-19-03 / Time: 1235 / Method: Peristaltic	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
	CLEAR	3.43	1.30	15.90	6.91	0.76	—	+376.2

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.02 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.02
☑	1 to 12 ppm	K-7512	<1

Analysis Time: 1322

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1329

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 400 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	400
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1349

Notes:

Ferrous Iron (Fe^{2+}):

>3.30ppm (Limit)

Equipment: DR-850 (DR-850) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: ____ ppm

Analysis Time: 1419

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: (HS-C) Other: ____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1418

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT2003
Project No.: N9060	Sample Location: 13MWT20
Sampled By: J.G.	Duplicate: ☐
Field Analyst: T.R.	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 90 (93) | Range: 0 - 0.70 mg/L | Concentration: 0.03 ppm

Program/Module: 610nm | Analysis Time: 1409 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.000 ppm

Equipment: DR-850 | DR-8 50 (62) | Range: 0 - 0.350 mg/L | Analysis Time: 1340 | Filtered: ☐

Program/Module:

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 8.3 ppm

Equipment: DR-850 | DR-8 50 (41) | Range: 0 - 20.0 mg/L | Analysis Time: 1429 | Filtered: ☐

Program/Module: 525nm

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☐

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT2102
Sample Location: 13MWT21
Sampled By: FCW
C.O.C. No.: 4816

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-5-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0950	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: LOW FLOW	CLEAR	5.59	0.195	15.17	2.61	2.09	247.2	—

PURGE DATA:

Date: 11-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: LOW FLOW								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 17.76								
Static Water Level (WL): 9.64								
One Casing Volume(gal/L): 1.3								
Start Purge (hrs): 0825								
End Purge (hrs): 0950								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 2.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	~~Yes~~
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	~~Yes~~

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]
INTAKE MID SCREEN

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 13MWT21
DATE: 11-5-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celsius	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0825	9.64									START
0835	9.90	100	5.63	0.227	37	2.73	16.10	–	218.9	
0845	10.00	110	5.64	0.202	18.9	2.29	15.91	–	208.8	
0855	10.08	↓	5.68	0.203	13.6	2.24	15.94	–	208.0	
0905	10.13	↓	5.72	0.208	10.4	2.28	15.87	–	211.2	
0915	10.12	100	5.69	0.206	8.07	2.25	15.63	–	222.8	
0925	10.14	↓	5.69	0.203	6.04	2.22	15.71	–	223.3	
0935	10.16	↓	5.62	0.198	4.54	2.10	15.50	–	236.2	
0940	10.16	↓	5.58	0.196	4.09	2.13	15.27	–	245.3	
0945	10.16	↓	5.58	0.195	4.26	2.03	15.13	–	247.4	
0950	10.16	↓	5.59	0.195	2.61	2.09	15.17	–	247.2	SAMPLE
1400										END

SIGNATURE(S): [signature]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: F. WUOKWYCH
Field Analyst: T. ROJAHN / FW
Field Form Checked as per QA/QC Checklist (initials): TLC

Sample ID No.: 13GWTZ102
Sample Location: 13MWTZ1
Duplicate: ☐
Blank: ☐
END SAMPLING ON 11/5 @ 1400 HRS

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11-05-03								
Time: 0950	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: PERISTALTIC	CLEAR	5.59	0.195	15.17	2.61	2.09	~~2~~ (FW)	+247.2

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen: FW

Equipment: Chemetrics Test Kit

Concentration: 1 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	1
☑	1 to 12 ppm	K-7512	1

Analysis Time: 1319 11/5/03

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm FW

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1331

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 125 ppm FW

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	125
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1323

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.10 ppm TA

Analysis Time: 1332

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L FW

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1335

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT2102
Project No.: 9060	Sample Location: 13MWT21
Sampled By: K.W	Duplicate: ☐
Field Analyst: T.R / F.W	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-890 (DR-893) | Range: 0 - 0.70 mg/L | Concentration: 0.04 ppm

Program/Module: 610nm | Analysis Time: 1341 | Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.031 ppm TR

Equipment: DR-850 | DR-859 (DR-862) | Range: 0 - 0.350 mg/L | Analysis Time: 1339 | Filtered: ☐

Program/Module:

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.6 ppm

Equipment: DR-850 | DR-890 (DR-841) | Range: 0 - 20.0 mg/L | Analysis Time: 1349 | Filtered: ☐

Program/Module: 525nm

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 136WT2202
Sample Location: 136WT22
Sampled By: Goetz
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-4-03 / Time: 1510 / Method: Peristaltic	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Clear	4.09	0.243	11.90	1.03	1.65	351.6	---

PURGE DATA:

Date: 12-4-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" ϕ PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.76								
Static Water Level (WL): 8.45								
One Casing Volume(gal/L): 5.74								
Start Purge (hrs): 1340								
End Purge (hrs): 1455								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 7.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

$$\frac{17.76}{8.45}\overline{9.31}\,(.163) = 1.52\ \text{gal} = 5.74\ \text{L}$$

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT22
DATE: 12-4-03
WEATHER: Overcast 41° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1340	8.45	—	—	—	—	—	—	—	—	Start Purge
1350	8.80	1.1	1100	4.49	0.230	2.72	3.79	12.48	323.9	Clear
1400	8.95	2.2	1100	4.32	0.236	3.60	2.82	12.23	342.8	"
1410	9.11	3.2	1000	4.29	0.234	3.80	2.45	12.42	343.9	"
1420	9.18	4.2	1000	4.21	0.242	3.11	2.16	12.27	348.1	"
1430	9.20	5.2	1000	4.13	0.239	2.44	1.69	11.96	348.6	"
1440	9.23	6.2	1000	4.22	0.239	2.23	2.18	12.01	347.1	"
1445	9.24	6.7	500	4.13	0.242	2.18	1.69	12.00	349.8	"
1450	9.27	7.2	500	4.12	0.247	1.06	1.73	11.70	351.0	"
1455	9.28	7.5	500	4.09	0.243	1.03	1.65	11.90	351.6	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N A
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth ~13'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 <TO279
Sampled By: Goad
Field Analyst: Goad
Field Form Checked as per QA/QC Checklist (initials): TL

Sample ID No.: 136WT2202
Sample Location: 136WT22
Duplicate: ☒ M (TL)
Blank: ☐

SAMPLING DATA:

Date: 12-4-03 / Time: 1510	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	Clear	4.09	0.243	11.40	1.03	1.65	—	+351.6

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.0/1.0 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☒	1 to 12 ppm	K-7512	1.0/1.0

Analysis Time: 1600/1603

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10/<10 ppm

Range Used:	Range	Method	Concentration ppm
☒	10 to 100 ppm	K-9810	<10/<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1546/1550

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 50/70 ppm

Range Used:	Range	Method	Concentration ppm
☒	10 to 100 ppm	K-1910	50/70
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1609/1615

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: (DR-850) DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.37/0.40 ppm

Analysis Time: 1626/1634

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0/0.0 ppm

Analysis Time: 1639/1644

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 136WT2202
Project No.: NY9060 CTO 279
Sample Location: 136WT22
Sampled By: Gorski
Duplicate: ☒ MS (TC)
Field Analyst: Gorski
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-8__ Range: 0 - 0.70 mg/L
Concentration: 0.06/0.04 ppm
Program/Module: 610nm 93
Analysis Time: 1654/1705 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Concentration: 0.005/ ppm 0.001
Equipment: DR-850 DR-8__ Range: 0 - 0.350 mg/L
Analysis Time: 1537/1555 Filtered: ☐
Program/Module: 62
Standard Solution: ☐ Results: 0.005/0.001 Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Concentration: 0.1/0.0 ppm
Equipment: DR-850 DR-8__ Range: 0 - 20.0 mg/L
Analysis Time: 1712/1717 Filtered: ☐
Program/Module: 525nm 41
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ N/A
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 136WT2302
Sample Location: 13MWT23
Sampled By: FW
C.O.C. No.: 4815

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-28-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1255								
Method: LOW FLOW	CLEAR	5.50	0.329	13.67	2.09	2.37	397.5	--

PURGE DATA:

Date: 10-28-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: LOW FLOW								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 24.50								
Static Water Level (WL): 8.98								
One Casing Volume(gal/L): 2.5								
Start Purge (hrs): 0850								
End Purge (hrs): 1255								
Total Purge Time (min): 345								
Total Vol. Purged (gal/L): 7.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Circle if Applicable:

MS/MSD —

Duplicate ID No.: ———

Signature(s): FWh

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT23
DATE: 10-28-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (ml/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0850	8.98									START
0900	9.99	~~70~~ 85	5.46	0.349	15.3	2.69	13.68	NA	351.8	
0910	10.64	85	5.41	0.352	12.4	2.47	13.88		363.7	
0920	11.10		5.39	0.350	8.9	2.47	13.78		374.4	
0930	11.41		5.39	0.346	6.54	2.46	13.16		390.2	
0940	11.59		5.40	0.345	5.20	2.44	13.16		384.6	
0950	11.75		5.41	0.346	4.47	2.36	13.34		387.8	
1000	11.92		5.43	0.346	4.49	2.29	13.34		389.3	
1010	12.09		5.44	0.344	4.07	2.22	13.30		392.3	
1020	12.20		5.45	0.343	3.65	2.24	13.49		393.1	
1035	12.38		5.46	0.338	4.39	2.32	13.48		389.4	
1045	12.43		5.47	0.338	3.69	2.37	13.71		396.8	
1055	12.55		5.49	0.337	3.66	2.37	13.71		395.3	
1105	12.63		5.49	0.336	2.81	2.40	13.57		393.6	
1115	12.70		5.49	0.335	2.66	2.42	13.64		385.2	
1125	12.76		5.49	0.333	2.32	2.42	13.47		384.3	
1135	12.80		5.49	0.333	2.81	2.41	13.61		384.5	
1145	12.83		5.49	0.333	2.75	2.39	13.50		384.5	
1155	12.83		5.50	0.333	1.83	2.40	13.63		386.2	
1205	12.84		5.50	0.333	2.32	2.38	13.67		386.0	
1215	12.89		5.50	0.332	1.74	2.40	13.75		390.7	
1225	12.89		5.50	0.330	1.91	2.38	13.82		392.3	
1235	12.77		5.50	0.331	2.12	2.39	13.65		396.1	
1245	12.77		5.50	0.329	1.99	2.34	13.60		396.2	
1255	12.74		5.50	0.329	2.09	2.37	13.67		397.5	SAMPLE
1430										END

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: F. WLODKOWYCH
Field Analyst: T.R / FW
Field Form Checked as per QA/QC Checklist (initials): TRR

Sample ID No.: 13GWT2302
Sample Location: 13MWT23
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 10/28/03								
Time: 1255	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	5.50	0.309	13.67	2.09	2.37	~~397~~ 73	+397.5

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen: FW

Equipment: Chemetrics Test Kit

Concentration: 7 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	7

Analysis Time: 1355

Notes:

Alkalinity: FW

Equipment: Chemetrics Test Kit

Concentration: 25 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	25
☑	50 to 500 ppm	K-9815	No END Point
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1400

Filtered: ☐

Notes:

Carbon Dioxide: FW

Equipment: Chemetrics Test Kit

Concentration: 23 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	23
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1405

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-890) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.09 ppm

Analysis Time: 1408

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1354

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT2302
Project No.: N9060	Sample Location: ~~13MWT2~~ 13MWT23
Sampled By: FW	Duplicate: ☐
Field Analyst: TL/FW	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L Concentration: 0.01 ppm

Program/Module: 610nm 93 Analysis Time: 1432 Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.004 ppm

Equipment: DR-850 DR-890 Range: 0 - 0.350 mg/L Analysis Time: 1423 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.1 ppm

Equipment: DR-850 DR-890 Range: 0 - 20.0 mg/L Analysis Time: 1438 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☑

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT2402
Sample Location: 13MWT24
Sampled By: MGC
C.O.C. No.: 4815

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 10-28-03	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Time: 1045								
Method: PERISTALTIC	CLEAR	6.14	.672	14.27	1.66	29.68	59.9	---

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10-28-03								
Method: PERISTALTIC								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 25.19								
Static Water Level (WL): 9.49								
One Casing Volume(gal): 9.8								
Start Purge (hrs): 0900								
End Purge (hrs): 1045								
Total Purge Time (min): 135								
Total Vol. Purged (gal): 10								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13 MW T24
DATE: 10-28-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0900	~~10~~ 9.49	120	5.92	.885	2.20	26.86	15.10	—	62.3	~~CLEAR~~ 0 CLEAR
0910	10.49	120	5.94	.885	7.08	31.98	15.14	—	56.7	1200 CLEAR
0920	11.51	100	5.99	.879	7.20	33.65	14.93	—	49.8	2400 CLEAR
0930	12.40	120	6.05	.813	3.52	35.41	14.73	—	49.6	3400 CLEAR
0940	12.50	100	6.08	.761	2.52	30.17	14.23	—	51.8	4400 CLEAR
0950	12.53	100	6.09	.727	1.85	38.55	14.36	—	51.9	5400 CLEAR
1000	12.53	100	6.10	.706	.94	32.61	14.20	—	54.6	6400 CLEAR
1010	12.58	100	6.12	.695	.66	29.52	14.26	—	57.8	7400 CLEAR
1020	12.61	100	6.12	.688	.35	30.52	14.37	—	58.0	8400 CLEAR
1030	12.61	100	6.14	.678	.68	29.15	14.37	—	59.4	9400 CLEAR
1040	12.68	100	6.14	.672	1.66	29.68	14.27	—	59.9	10400 CLEAR

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: M. COCHRAN
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials): TLR

Sample ID No.: 13GWT2402
Sample Location: 13MWT24
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 10-28-03								
Time: 1045	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	6.14	0.672	14.27	1.66	29.68	—	529

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.5 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.5
☑	1 to 12 ppm	K-7512	<1

Analysis Time: 1050

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 90 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	90
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1108

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 28 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	28
☑	100 to 1000 ppm	K-1920	LT PINK @ BOTTOM
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1127

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-890 Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 3.21 ppm

Analysis Time: 1054

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1138

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: MC
Field Analyst: TR

Sample ID No.: 13GWT2402
Sample Location: 13MWT24
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.00 ppm
Analysis Time: 1140 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Concentration: 0.000 ppm
Equipment: DR-850 DR-890 Range: 0 - 0.350 mg/L
Analysis Time: 1115 Filtered: ☐
Program/Module: 62
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Concentration: 1.8 ppm
Equipment: DR-850 DR-890 Range: 0 - 20.0 mg/L
Analysis Time: 1151 Filtered: ☐
Program/Module: 525nm 41
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☑
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: ~~13MWT25~~ (TR) 13GWT2502
Sample Location: 13MWT25
Sampled By: T. ROJAHN
C.O.C. No.: 4822

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-6-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0845								
Method: SAMS								—

PURGE DATA:

Date: 11-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 7.99								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 0930								
End Purge (hrs): 0925								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 15.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	WL 16.89 1(2) L Glass Amber 11/6/03	Yes
Micellaneous Explosives SW-846 8330	4°C	11/7 - 0845 (2) L Glass Amber 11/7&8/03	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/9 - 0911 (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/19 2000 (1) L HDPE 11/19 @ 0815	YES -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	11/20 @ 1610 (1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	N/O

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

17.95 - 7.99 = 9.96 x .163 = 1.62 gal or 6.1 L
Historically this well dries out! W.L. will not stabilize... Pump to dry

WL = 17.53 on 11/9/03 @ 0910

REPURGED ON 11/20/03 by S. Grier - DRIED out WELL ~2L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	Ty Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT25
DATE: 11-05-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0835	7.99	200	-	-	-	-	-	-	-	0000ml CLEAR
0840	9.53	200	5.32	0.407	19.5	1.33	16.32	-	266	2000ml "
0850	10.60	200	5.56	0.332	6.07	3.88	16.27	-	361	4000ml "
0900	11.63	200	5.61	0.306	3.61	4.26	16.24	-	386	6000ml "
0905	12.00	100 *	High draw down - pump to dryness					-	-	6500ml "
0910	12.95	300	5.67	0.291	6.29	3.27	16.44	-	366	8000ml "
0920	15.95	400	5.29	0.341	39	0.96	16.70	-	333	12800ml "
0925	DRY								→	15200ml "
	REPURGED	11-18-03								
1345									→	Dried out WELL (S.Grier)

SIGNATURE(S): Tony Rojek

* Historically this well pumps to dryness... unstable W.L.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT2602
Sample Location: 13MWLT26
Sampled By: T ROJAHN
C.O.C. No.: 4821
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA: FINAL @ 1251 HRS

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 11/19/03	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Time: 1140								
Method: SAME	CLEAR	5.95	6.333	15.68	9.81	1.70	+354	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 11-19-03								
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.18								
Static Water Level (WL): 9.96								
One Casing Volume(gal/L): 7.5								
Start Purge (hrs): 0855								
End Purge (hrs): 1135								
Total Purge Time (min): 160								
Total Vol. Purged (gal/L): 13.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

22.18
9.96
12.22 × 0.163 = 2 gal or 7.5L

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT26
DATE: 11/19/03
WEATHER: Mostly Sunny 49°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0855	9.96	—	—	—	—	—	—	—	—	Start Purge
0905	11.49	1.000	100	5.75	0.205	29.7	2.33	14.59	335	CLEAR
0915	12.35	1.850	85	5.76	0.206	8.27	2.05	14.53	336	CLEAR
0925	12.85	2.700	85	5.76	0.205	5.84	1.97	14.68	338	CLEAR
0935	13.13	3.550	85	5.76	0.206	4.78	1.97	14.61	338	CLEAR
0945	13.36	4.400	85	5.78	0.211	6.07	1.92	14.70	336	CLEAR
0955	13.61	5.200	80	5.77	0.217	8.41	1.77	14.88	336	CLEAR
1005	13.86	6.000	80	5.77	0.221	13.00	1.63	14.90	336	CLEAR
1015	14.11	6.800	80	5.80	0.232	18.9	1.52	15.25	338	CLEAR
1025	14.35	7.600	80	5.81	0.235	21.1	1.52	15.38	340	CLEAR
1035	14.57	8.400	80	5.82	0.252	19.7	1.50	15.48	342	CLEAR
1045	14.79	9.200	80	5.85	0.265	19.8	1.48	15.39	344	CLEAR
1055	14.97	10.000	80	5.88	0.274	20.2	1.52	15.38	346	CLEAR
1105	15.14	10.800	80	5.90	0.293	19.5	1.58	15.45	348	CLEAR
1115	15.33	11.600	80	5.92	0.313	17.4	1.61	15.79	352	CLEAR
1120	15.39	12.000	80	5.92	0.316	15.7	1.60	15.89	353	CLEAR
1125	15.49	12.400	80	5.95	0.321	15.6	1.63	15.87	354	CLEAR
1130	15.55	12.800	80	5.95	0.328	16.6	1.68	15.70	354	CLEAR
1135	15.59	13.200	80	5.95	0.333	16.3	1.70	15.68	354	CLEAR
1140	—	—	—	—	—	—	—	—	—	Start Sampling
1251						9.87	PRIOR	to Sampling		Total Metals

Water Quality Meter (S/N) 9981412 AA
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 - 2402

Pump Intake Depth MID SCREEN ~17'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: TROJANI
Field Analyst: TROJANI
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT2602
Sample Location: 13MWT26
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 11/19/03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 1140	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Peristaltic	CLEAR	5.95	0.333	15.68	9.81	1.70	—	+354

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.7 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	1.7

Analysis Time: 1145

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 60 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	60
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1155

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 50 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	50
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1204

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-850) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.0 ppm

Analysis Time: 1230

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1223

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: 9060
Sampled By: TROJAHN
Field Analyst: TROJAHN

Sample ID No.: 13GWT2602
Sample Location: 13MWT26
Duplicate: ☐
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-850 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.05 ppm
Analysis Time: 1240 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-850 Range: 0 - 0.350 mg/L
Program/Module: 62
Concentration: 0.010 ppm
Analysis Time: 1206 Filtered: ☐
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-890 Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 0.3 ppm
Analysis Time: 1242 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2701
Sample Location: SWMU 13
Sampled By: S.GRIER
C.O.C. No.: 48.27
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA: 9.8, 9.6

Date: 11-25-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1425	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAMPLE	Cloudy	4.40	0.288	14.29	110	1.67	223.2	--

PURGE DATA:

Date: 11/25/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristoltic Pump								
Monitor Reading (ppm): 0.6								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 22.40								
Static Water Level (WL): 10.05								
One Casing Volume (gal/L): 2.0								
Start Purge (hrs): 1005								
End Purge (hrs): 1415								
Total Purge Time (min): 250								
Total Vol. Purged (gal/L): 9.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

After filling the Explosives, Nitrate/Nitrite, etc. the turbidity was checked again before filling the Diss. Metals @ 1510 → TURBIDITY = 9.8 therefore the Diss Metals was NOT filtered
1520 → TURB = 9.6

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13 MWT 27
DATE: 11/25/03
WEATHER: SUNNY, ~~Lt. BREEZE~~, 28°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1005	10.05	0	100	5.33	0.298	70	2.87	13.94	109.7	Clear, No odor
1015	11.10	—	80	4.88	0.259	59	1.92	13.28	172.6	Pumping slow as
1025	12.10	—	80	4.41	0.294	39	2.17	12.76	223.5	pump allows.
1035	12.65	—	80	4.22	0.227	20	2.23	13.37	263.4	
1045	12.75	1.25	80	4.19	0.207	16	2.24	13.43	281.0	
1055	13.10	—	80	4.24	0.200	12	2.21	13.67	287.0	
1105	13.45	—	80	4.32	0.195	36	2.21	13.69	291.1	
1115	13.65	—	80	4.39	0.196	28	2.26	13.94	284.2	
1125	13.80	2.5	80	4.43	0.199	20	2.16	13.98	283.3	
1135	14.18	—	80	4.45	0.207	17	1.82	14.16	279.7	
1145	14.45	—	80	4.40	0.217	18	1.33	14.02	280.8	
1155	14.70	—	80	4.27	0.224	20	1.12	13.83	288.4	
1205	14.98	3.75	80	4.17	0.227	39	0.98	13.88	296.8	
1215	15.20	—	80	3.82	0.242	75	0.77	14.06	332.6	
1225	15.40	—	80	3.75	0.235	100	0.90	12.79	344.9	
1235	15.60	—	80	3.90	0.241	130	0.77	14.09	328.6	
1245	15.83	5.0	80	4.08	0.239	310	0.79	14.61	296.2	
1255	16.25	—	80	4.55	0.255	450	0.80	14.39	205.4	
1305	16.55	—	80	4.65	0.257	478	0.76	14.34	193.6	
1315	16.85	—	80	4.67	0.268	500	0.61	14.38	195.0	
1325	17.02	7.5	80	4.56	0.278	394	0.58	14.55	203.7	
1335	17.40	—	80	4.46	0.285	330	0.73	14.53	214.3	

Water Quality Meter (S/N) ~~3106-1402~~ 02B0141
Control Box Type (S/N) N/A Peristaltic pump
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 19.5'

SIGNATURE(S): Scott Irvin

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT27
DATE: 11/25/03
WEATHER: Cold, Sunny, Windy, 28°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1345	17.80	~~8.0~~	80	4.44	0.284	410	0.82	14.39	208.1	
1355	17.85	—	80	4.39	0.285	500	1.15	14.41	216.0	
1405	18.08	—	80	4.39	0.292	300	1.47	14.66	220.0	
1415	18.25	8.5	80	4.40	0.288	110	1.67	14.29	223.2	
1425	sampled									sample 13GWT27 taken @ 1425

Water Quality Meter (S/N) 0280141
Control Box Type (S/N) Peristaltic Pump
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 19.5'

SIGNATURE(S): Scott Brin

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT2801
Sample Location: SWMU 13
Sampled By: SG
C.O.C. No.: 4834, 4833
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-7-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1410								
Method: SAME	Cloudy	9.15	0.495	13.59	260	0.57	-34.1	--

PURGE DATA:

Date: 12/7/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 91.70								
Static Water Level (WL): 80.40								
One Casing Volume (gal/L): 1.84								
Start Purge (hrs): 0930								
End Purge (hrs): 1400								
Total Purge Time (min): 235								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(1) Collected 12-7 (2) L Glass Amber (1) Collected 12-8	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

1500 - After collecting 1 L well dried up to pump intake.

(1) Explosive sample collected 12/7 remainder of sample collected 12/8

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Scott Grin

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT28
DATE: 12/7/03
WEATHER: P.SUNNY, FOG, 35°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0930	~~80.88~~	0	—	—	—	—	—	—	—	GREY, SLIGHTLY CLOUDY
0935	81.23'	~~80~~	80	8.70	0.504	1000	4.38	8.98	135.8	NO ODOR
0945	81.51'	~~60~~	60	9.25	0.506	900	1.79	8.98	121.8	
0955	81.74'		60	9.31	0.511	900	1.36	9.35	114.2	
1005	~~82.99'~~ 19'	↓	60	9.35	0.523	850	1.19	9.72	106.3	
1015	82.35'	1.0	60	9.35	0.532	750	1.00	9.82	99.4	
1025	82.72'		60	9.34	0.550	750	1.03	9.89	94.8	
1035	83.01		60	9.32	0.555	725	1.00	9.72	90.9	
1045	83.28'		60	9.30	0.559	700	0.98	9.57	88.0	
1055	83.50		60	9.29	0.565	628	0.91	9.81	84.3	
1105	83.82	↓	60	9.28	0.570	650	0.86	9.93	81.6	
1115	84.12	2.0	60	9.30	0.560	522	0.77	9.81	70.8	
1125	84.42		60	9.34	0.561	450	0.69	9.78	69.9	
1135	84.60			9.39	0.531	400	0.75	9.34	66.6	
1145	—	—	—	—	—	—	—	—	→	1140 Stopped
1215	84.55'		60	9.05	0.530	380	1.32	11.38	26.5	pumping to change
1225	84.78		60	9.18	0.524	370	0.81	11.43	21.8	Nitrogen bottle
1235	84.97		60	9.28	0.521	360	0.63	11.52	19.5	
1245	85.16		60	9.01	0.515	328	0.55	11.55	6.9	1215 BEGAN
1255	85.36		60	8.81	0.497	310	0.51	11.48	-2.5	PUMPING
1305	85.61	↓	60	8.86	0.499	320	0.55	12.00	-16.0	
1315	85.85	3.0	60	8.93	0.501	330	0.57	12.10	-24.8	

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) MP1U-1550
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 87.0'

SIGNATURE(S): Scott Brien

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT28
DATE: 12/17/03
WEATHER: SUNNY, LT. BREEZE, 45°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1325	86.06		60	8.91	0.493	310	0.40	12.33	-33.7	
1335	86.21		60	8.99	0.474	300	0.46	12.09	-38.1	
1345	86.40		60	9.04	0.481	300	0.66	12.94	-39.1	
1355	86.50		60	9.07	0.496	270	0.56	13.84	-36.6	
1400	86.61	3.5	60	9.15	0.495	260	0.57	13.59	-34.1	
										PURGED 4 HRS.

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) MP10-1550
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 87.0'

SIGNATURE(S): Scott Davis

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: S. GRIER
Field Analyst: TR / JG
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT2801
Sample Location: 13MWT28
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 12-7-03 E 12/8	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 1410	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Bladder Pump	Cloudy	9.15	0.495	13.59	260	0.57	—	-341

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.5 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0.5
☐	1 to 12 ppm	K-7512	

Analysis Time: 1419 12/7

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 150 ppm (175)

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	150
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1426 12/7 (1347)

Filtered: ☑ 12/9

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	<10
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1433 12/7

Notes:

Ferrous Iron (Fe^{2+}): 12/9

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.01 ppm

Analysis Time: 1400

Notes:

Filtered: ☑

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L 12/9

Equipment: HS-C Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1402

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT2801
Project No.:	N9060	Sample Location:	13MWT28
Sampled By:	S. GRIER	Duplicate:	☐
Field Analyst:	TR / JG	Blank:	☐

Sulfide (S^{2-}):

Equipment: (DR-850) DR-8 __ Range: 0 - 0.70 mg/L Concentration: 0.00 ppm

Program/Module: 610nm 93 Analysis Time: 1411 Filtered: ☑ 12/9

Notes:

Nitrite (NO_2^--N):

Concentration: 0.007 ppm

Equipment: (DR-850) DR-8 __ Range: 0 - 0.350 mg/L Analysis Time: 1428 12/7 Filtered: ☑ 12/9

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐ 0.108 1354

Notes:

Manganese (Mn^{2+}):

Concentration: 0.0 ppm

Equipment: (DR-850) DR-8 __ Range: 0 - 20.0 mg/L Analysis Time: 1419 Filtered: ☑ 12/9

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☑ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13MWT2901
Sample Location: 13MWT29
Sampled By: T. ROJAHN
C.O.C. No.: 4817
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-7-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1205	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAME	CLEAR	5.56	0.589	15.52	9.36	0.44	-473	---

PURGE DATA:

Date: 11-7-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" @ PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.20								
Static Water Level (WL): 6.08								
One Casing Volume(gal/L): 9.3								
Start Purge (hrs): 0935								
End Purge (hrs): 1205								
Total Purge Time (min): 150								
Total Vol. Purged (gal/L): 15								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

21.2 - 6.08 = 15.12 x 0.163 = 2.46 or 9.3 L

Intake MID SCREEN

Circle if Applicable:		Signature(s):
MS/MSD —	Duplicate ID No.: —	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MW729
DATE: 11/7/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0935	6.08	—	—	—	—	—	—	—	-	START PURGE
0945	6.68	100	5.58	1.37	206	1.39	13.63	—	-470	1000 CLOUDY
0955	6.81	100	5.71	0.812	155	1.17	13.72	-	-469	2000 SI Cloudy
1005	6.93	100	5.80	0.585	83	0.91	13.81	—	-467	3000 V. SI Cloudy
1015	6.98	100	5.80	0.597	49.3	0.71	13.87	—	-460	4000 CLEAR
1025	7.03	100	5.83	0.602	30.7	0.63	14.05	—	-450	5000 CLEAR
1035	7.06	100	5.78	0.600	24.8	0.60	14.23	—	-470	6000 CLEAR
1045	7.09	100	5.74	0.599	20.2	0.57	14.41	—	-484	7000 CLEAR
1055	7.12	100	5.71	0.589	16.4	0.67	14.40	—	-494	8000 CLEAR
1105	7.12	100	5.69	0.588	16.2	0.60	14.50	—	-494	9000 CLEAR
1115	7.12	100	5.67	0.588	16.0	0.55	14.55	—	-494	10000 CLEAR
1125	7.15	100	5.67	0.595	14.0	0.52	15.16	-	-479	11000 CLEAR
1135	7.18	100	5.68	0.592	12.3	0.50	15.14	-	-488	12000 CLEAR
1145	7.18	100	5.62	0.590	11.4	0.46	15.20	-	-488	13000 CLEAR
1155	7.19	100	5.59	0.587	11.7	0.45	15.42	-	-473	14000 CLEAR
1205	7.22	100	5.56	0.589	9.36	0.44	15.52	-	-473	15000 CLEAR
1205									→	SAMPLE TIME

SIGNATURE(S): Taylor

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials): TKR

Sample ID No.: 13GWT2901
Sample Location: 13MWT29
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 11/7/03								
Time: 1205	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: PERISTALTIC	CLEAR	5.56	0.509	15.52	9.36	0.04	—	-173

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI 600XLM

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.02 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	

Analysis Time: 1214

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1220

Filtered: ☐

Notes: Colorless @ 55 but No Green

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 150 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-1910	
☑	100 to 1000 ppm	K-1920	150
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1234

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-850) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 9.15 ppm

Analysis Time: 1245

Notes: Dilute 2 3.05 x 3 = 9.15

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1303

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE	Sample ID No.: 13GWT290i
Project No.: 9060	Sample Location: 13MWT29
Sampled By: TK	Duplicate: ☐
Field Analyst: TK	Blank: ☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-8 50 Range: 0 - 0.70 mg/L Concentration: 0.04 ppm

Program/Module: 610nm 93 Analysis Time: 1315 Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.000 ppm

Equipment: DR-850 DR-8 50 Range: 0 - 0.350 mg/L Analysis Time: 1225 Filtered: ☐

Program/Module: 62

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 1.3 ppm

Equipment: DR-850 DR-8 50 Range: 0 - 20.0 mg/L Analysis Time: 1322 Filtered: ☐

Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1ST page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13 GWT 3001
Sample Location: SWMU 13
Sampled By: S. GRIER
C.O.C. No.: 4827
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/24/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1615	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristoltic pump	Clear	3.34	0.568	9.18	7.0	0.88	396.6	--

PURGE DATA:

Date: 11/24/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristoltic pump								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.65								
Static Water Level (WL): 12.11								
One Casing Volume(gal/L):								
Start Purge (hrs): 1415								
End Purge (hrs): 1605								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 2.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13 MWT 30
DATE: 11/24/03
WEATHER: Cloudy, Snow Flurries, 30°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1415	12.11	0	100	3.26	0.555	33	3.08	8.15	413.2	Clear, No odor
1425	12.65	.20	90	3.22	0.556	29	2.45	7.50	418.9	
1435	13.24	.40	90	3.22	0.560	25	2.16	7.47	420.6	Pumping as
1445	13.60	—	80	3.22	0.564	21	1.96	7.53	421.8	Slow as pump allows.
1455	13.62	.90	80	3.22	0.567	17	1.40	7.67	418.4	
1505	13.68	1.10	80	3.25	0.566	13	1.00	7.89	412.0	
1515	13.70	—	—	3.22	0.554	10	1.06	7.43	409.4	
1525	13.72	—	—	3.29	0.558	8.0	0.99	8.02	403.3	
1535	13.72	1.60	—	3.30	0.558	7.9	0.82	8.13	398.6	
1545	13.73	—	—	3.32	0.564	7.6	0.85	9.08	396.0	
1555	13.73	—	—	3.34	0.567	7.3	0.88	9.20	396.1	
1605	13.73	2.0	—	3.34	0.568	7.0	0.89	9.18	396.6	

Water Quality Meter (S/N) 0280141
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth ~21.65'

SIGNATURE(S): Scott Sin

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT3101
Sample Location: 13GWT31
Sampled By: Goard
C.O.C. No.: 4825

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-24-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1118								
Method: Peristaltic	Clear	5.67	0.793	10.09	4.69	5.66	246.7	--

PURGE DATA:

Date: 11-24-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.50								
Static Water Level (WL): 10.91								
One Casing Volume(gal/L): 7.15								
Start Purge (hrs): 0903								
End Purge (hrs): 1113								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 12.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

22.50
10.91
11.59 (.163) = 1.89 gal = 7.15L

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT31
DATE: 11-24-03
WEATHER: Cloudy 30°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0903	10.91	—	—	—	—	—	—	—	—	Start purge
0913	12.25	1.3	1300	5.99	0.845	670	4.10	11.75	223.4	Cloudy
0923	12.69	2.5	1200	5.89	0.797	381	6.00	11.13	223.4	"
0933	12.75	3.7	1200	5.88	0.773	363	6.40	10.05	225.2	"
0943	12.81	4.6	900	5.86	0.800	273	6.47	9.74	228.0	"
0953	12.85	5.5	900	5.84	0.824	181	6.52	9.60	231.7	"
1003	12.87	6.4	900	5.82	0.835	132	6.54	9.95	234.7	"
1013	13.00	7.3	900	5.80	0.838	62.9	6.70	9.70	237.9	"
1023	13.05	8.2	900	5.79	0.839	36.7	6.52	10.26	240.1	Clearer
1033	13.10	9.1	900	5.76	0.834	25.7	6.40	10.02	243.2	Clear
1043	13.15	10.0	900	5.74	0.818	17.4	6.22	9.86	245.3	"
1053	13.19	10.9	900	5.72	0.804	12.4	5.83	10.01	244.7	"
1103	13.23	11.8	900	5.70	0.800	10.71	5.70	10.10	245.2	"
1113	13.35	12.7	900	5.67	0.793	4.69	5.66	10.09	246.7	Stop purge

Water Quality Meter (S/N) 98F0478AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth 17.5'

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 136WT3201
Sample Location: 136WT32
Sampled By: Goerdt
C.O.C. No.: 1821
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-19-01 03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1543								
Method: Peristaltic	Clear	6.26	0.386	14.73	3.45	8.98	223.6	---

PURGE DATA:

Date: 11-19-01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.90								
Static Water Level (WL): 9.91								
One Casing Volume(gal): 6.78								
Start Purge (hrs): 1409								
End Purge (hrs): 1539								
Total Purge Time (min): 90								
Total Vol. Purged (gal): 8.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

20.90
9.91
10.99 (.163) = 1.79 gal = 6.78

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT3201
DATE: 11-19-03
WEATHER: Sun 60° F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1409	9.91	-	-	-	-	-	-	-	-	Start purge
1419	10.49	1.0	1000	6.14	0.271	2.98	79.1	15.08	156.1	Clear
1429	10.59	2.0	1000	6.21	0.341	3.40	7.23	15.03	192.0	"
1439	10.62	3.0	1000	6.23	0.357	2.88	7.63	14.98	209.3	"
1449	10.58	4.0	1000	6.24	0.369	3.83	8.07	14.77	222.4	"
1459	10.54	4.85	850	6.26	0.375	2.88	8.41	14.65	228.7	"
1509	10.54	5.7	850	6.26	0.378	2.67	8.69	14.72	216.0	"
1519	10.53	6.55	850	6.26	0.381	3.08	8.92	14.61	219.3	"
1529	10.54	7.40	850	6.26	0.382	3.31	8.93	14.66	220.5	"
1539	10.52	8.25	850	6.26	0.386	3.45	8.98	14.73	223.6	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) N/A
Turbidity Meter (S/N) 0920-4298

Pump Intake Depth 15.9'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3301
Sample Location: 13GWT33
Sampled By: Goeckt
C.O.C. No.: 4827
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-24-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1732								
Method: Peristaltic	Clear							---

PURGE DATA:

Date: 11-24-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" Ø PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 22.5								
Static Water Level (WL): 14.32								
One Casing Volume(gal/L): 5.06								
Start Purge (hrs): 1330								
End Purge (hrs): 1730								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 21.7								

22.5

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes) 11/24/03
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes) 11/25/03
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes) 11/25/03
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes 11/25/03
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes) 11/25/03 0845
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] Filtered Metals sample taken.

22.50
14.32
8.18 (.163) = 1.33 gal = 5.05L

Stopped sampling after collecting (2) explosive samples due to well dry.

11/25/03 started sampling again at 0845. Turbidity 223.8

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT3301
DATE: 11-24-03
WEATHER: Cloudy 30°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal(L))	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1330	14.32	—	—	—	—	—	—	—	—	Start purge
1340	14.82	1.0	1000	5.45	.096	500	6.29	11.16	221.5	Cloudy
1350	15.29	1.9	900	5.40	.089	700	6.23	11.40	226.8	"
1400	15.82	2.8	900	5.41	.091	900	5.84	11.47	219.7	"
1410	16.29	3.7	900	5.51	.107	>1000	4.97	11.66	166.0	Silt + brown
1420	16.63	4.6	900	5.49	.109	>1000	4.52	11.58	168.3	"
1430	17.35	5.5	900	5.50	.113	>1000	4.07	11.43	169.8	"
1440	17.73	6.4	900	5.50	.119	>1000	3.32	11.48	162.1	"
1450	18.09	7.3	900	5.52	.125	>1000	2.97	11.93	163.0	"
1500	18.41	8.2	900	5.57	.131	>1000	2.75	11.29	151.9	"
1510	18.90	9.1	900	5.61	.139	>1000	2.81	10.82	142.1	"
1520	19.51	10.0	900	5.66	.153	>1000	2.48	10.63	139.3	"
1530	19.31	10.9	900	5.67	.156	>1000	3.54	10.37	134.2	"
1540	20.05	11.8	900	5.69	.173	1100	3.21	10.39	128.3	"
1550	20.48	12.7	900	5.71	.191	1090	2.79	10.42	121.7	"
1600	20.65	13.6	900	5.75	.209	1080	1.38	11.25	111.6	"
1610	20.78	14.5	900	5.81	.234	350	1.73	10.43	104.2	Cloudy
1620	20.79	15.4	900	5.84	.236	160	2.36	9.99	98.5	less cloudy
1630	20.79	16.3	900	5.86	.236	110	2.77	9.60	94.3	"
1640	20.79	17.2	900	5.87	.234	110	3.03	9.29	93.0	"
1650	20.79	18.1	900	5.87	.228	110	3.26	9.19	94.0	"
1700	20.79	19.0	900	5.87	.229	100	3.41	9.12	94.0	Clear

Water Quality Meter (S/N) 98F0978AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth ~21.5

1' OCC Bottom
Well dries out

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 13GWT 3301
DATE: 11-24-03
WEATHER: Cloudy 30°

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1710	20.79	19.9	900	5.88	.230	98	3.58	9.07	93.6	clear
1720	20.79	20.8	900	5.88	.231	90	3.63	8.89	92.7	"
1730	20.79	21.7	900	5.88	.234	80	3.75	8.83	91.7	Stop purge

Water Quality Meter (S/N) 98F047818
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth ~~20~~ 25' 1' off Bottom

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 136WT3401
Sample Location: 13MWT34
Sampled By: T. ROJAHN
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

SAMPLING DATA:

Date: 12/4/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1150	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAME	CLEAR	4.97	0.312	10.94	6.07	2.35	+276	—

PURGE DATA:

Date: 12/4/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" Ø PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 22.90								
Static Water Level (WL): 5.65								
One Casing Volume(gal/L): 10.6								
Start Purge (hrs): 0955								
End Purge (hrs): 1145								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 10.5+								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

22.9 - 5.65 = 17.25 X 0.163 = 2.8 gal or 10.6 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	Tey Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT34
DATE: 12/04/03
WEATHER: OVERCAST & 38°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (ml/min.)	pH (S.U.)	Cond. (ms/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0955	5.65	—	—	—	—	—	—	—	—	Start Purge
1005	6.57	1.200	120	5.15	0.319	51.1	2.09	11.20	+212	V. SI. Cloudy
1015	6.80	2.400	120	5.10	0.319	51.5	2.20	11.53	+232	" " "
1025	6.71	3.400	100	5.04	0.311	34.7	2.30	10.63	+246	CLEAR
1035	6.63	4.300	90	5.03	0.309	21.1	2.37	10.64	+254	"
1045	6.56	5.100	80	5.02	0.308	18.7	2.23	10.48	+259	"
1055	6.61	6.000	90	5.01	0.311	14.0	2.24	10.90	+264	"
1105	6.65	6.900	90	4.99	0.311	10.91	2.28	10.94	+268	"
1115	6.65	7.800	90	4.98	0.312	9.21	2.26	11.01	+272	"
1125	6.67	8.700	90	4.98	0.312	9.34	2.26	10.96	+273	"
1135	6.68	9.600	90	4.97	0.312	6.79	2.33	10.98	+275	"
1145	6.69	10.500	90	4.97	0.312	6.07	2.35	10.94	+276	"
1150	—	—	—	—	—	—	—	—	—	Start Sampling

Water Quality Meter (S/N) 998 1412 AA
Control Box Type (S/N) NA
Turbidity Meter (S/N) 0920 4298

Pump Intake Depth ~ 18'

SIGNATURE(S): Terry Lapka

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: T. ROJAHN
Field Analyst: T.R.
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT3401
Sample Location: 13MWT34
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Date: 12/4/03								
Time: 1150	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: peristaltic	CLEAR	4.97	0.312	10.94	6.07	2.35	—	+ 276

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	1
☑	1 to 12 ppm	K-7512	1

Analysis Time: 1157

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10
☑	50 to 500 ppm	K-9815	—
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1205

Filtered: ☐

Notes: No change from pink

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 32 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	32
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1214

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-890) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.18 ppm

Analysis Time: 1220

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: (HS-C) Other:

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1224

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT3401
Project No.:	N9060	Sample Location:	13MWT34
Sampled By:	TROJACHN	Duplicate:	☐
Field Analyst:	TR	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 DR-890 Range: 0 - 0.70 mg/L Concentration: 0.00 ppm

Program/Module: 610nm ~~93~~ Analysis Time: 1232 Filtered: ☐

Notes:

Nitrite (NO_2^--N):

Concentration: 0.005 ppm

Equipment: DR-850 DR-890 Range: 0 - 0.350 mg/L Analysis Time: 12:07 Filtered: ☐

Program/Module: ~~62~~

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.8 ppm

Equipment: DR-850 DR-890 Range: 0 - 20.0 mg/L Analysis Time: 1239 Filtered: ☐

Program/Module: 525nm ~~41~~

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3501
Sample Location: 13MWT35
Sampled By: JG/TL
C.O.C. No.: 4836
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-10-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1145								
Method: Dis. Bailer	GREY	9.08	0.781	13.60	>1000	5.28	105.2	--

PURGE DATA:

Date: 12-09-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Dis. Bailer								
Monitor Reading (ppm): --								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs): 1443								
End Purge (hrs): 1530								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L): 12								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	1 (2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes) -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Ty Appl

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT35 ~~01~~ 02
DATE: 12-9-03
WEATHER: Clouds 57° lt. rain

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (ml/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP (mV)	Comments
1443	64.63	–	–	–	–	–	–	–	–	Start purge
–	–	1.0	–	–	–	–	–	–	–	
–	–	2.0	–	–	–	–	–	–	–	
1500	66.04	3.0	–	9.47	0.711	–	3.39	13.78	81.5	Grey
–	–	4.0	–	–	–	–	–	–	–	
–	–	5.0	–	–	–	–	–	–	–	
1515	67.49	6.0	–	9.41	0.718	>1000	1.68	13.72	88.1	Grey
–	–	7.0	–	–	–	–	–	–	–	
–	–	8.0	–	–	–	–	–	–	–	
1525	–	9.0	–	9.25	0.783	>1000	5.17	13.86	96.3	Grey
1530	DRY	12.0	–	9.08	0.781	>1000	5.28	13.60	105.2	Well dry

Water Quality Meter (S/N) 98FOY79 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) NA

Pump Intake Depth NA

SIGNATURE(S):

TD 70.20
SWL 64.63
5.57(1/63) = .908 gal = 3.4 L

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060
Sampled By: JG / TK
Field Analyst: JG / TK
Field Form Checked as per QA/QC Checklist (initials): TK

Sample ID No.: 13GMWT3501
Sample Location: 13MWT35
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 12-09-03 / Time: 1530 / Method: Dis Bailer	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
	Grey	9.08	0.781	13.60	>1000	5.28	—	+105.2

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 5.5 ppm JG

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	5.5

Analysis Time: 1214

Notes: —

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: 200 ppm

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☑	50 to 500 ppm	K-9815	200
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1216

Filtered: ☑

Notes: — —

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: <10 ppm TK

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	<10
☑	100 to 1000 ppm	K-1920	—
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1214

Notes: — —

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 (DR-850) Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.02 ppm

Analysis Time: 1225

Filtered: ☑

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.0 ppm

Analysis Time: 1233

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT3501
Project No.: N9060
Sample Location: 13MWT35
Sampled By: JG/TK
Duplicate: ☐
Field Analyst: JG/TK
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-850 Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.01 ppm
Analysis Time: 1242 Filtered: ☑

Notes:

Nitrite (NO_2^--N):
Concentration: 0.000 ppm
Equipment: DR-850 DR-850 Range: 0 - 0.350 mg/L
Analysis Time: 1219 Filtered: ☑
Program/Module: 62
Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):
Concentration: 0.0 ppm
Equipment: DR-850 DR-850 Range: 0 - 20.0 mg/L
Analysis Time: 1247 Filtered: ☑
Program/Module: 525nm 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3601
Sample Location: 13GWT36
Sampled By: Gorecki
C.O.C. No.: 4834
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-8-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1050	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristaltic	Clear	5.68	0.721	12.24	9.06	4.91	252.1	—

PURGE DATA:

Date: 12-8-03	Volume L	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic	13.0	5.68	6.721	12.24	9.06	4.91	—	—
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.40								
Static Water Level (WL): 19.02								
One Casing Volume(gal/L): 5.17								
Start Purge (hrs): 0840								
End Purge (hrs): 1040								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 13.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]

Pump shut down 1230-1330. Resumed sampling at 1330. Turbidity at 1345 was 1.66.

27.40
19.02
8.38 (.163) = 1.37 gal = 5.17 L

Circle If Applicable:

MS/MSD

Duplicate ID No.: 13GWT3602 12080303

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13GWT3601
DATE: 12-5-03
WEATHER: P.Cloudy 38° F

Time (Hrs)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (ml/min)	pH	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0840	19.02	1.0	1000	—	—	—	—	—	—	start purge
0850	19.60	2.0	1000	5.67	0.714	22.4	6.86	11.45	221.9	clear
0900	19.83	3.0	1000	5.70	0.720	21.8	5.75	11.46	230.9	"
0910	20.00	4.0	1000	5.73	0.719	20.1	5.57	11.49	230.7	"
0920	20.01	5.0	1000	5.76	0.717	24.4	5.33	11.52	230.1	"
0930	20.42	6.0	1000	5.76	0.717	24.9	5.24	11.54	232.6	"
0940	20.61	7.0	1000	5.76	0.719	26.8	5.16	11.67	236.3	"
0950	20.73	8.0	1000	5.74	0.720	22.4	5.11	11.78	238.5	"
1000	20.82	9.0	1000	5.72	0.722	20.8	4.96	11.90	240.2	"
1010	20.89	10.0	1000	5.71	0.722	18.5	4.92	11.97	243.3	"
1020	20.97	11.0	1000	5.68	0.722	16.0	4.82	12.08	248.5	"
1030	21.08	12.0	1000	5.68	0.721	10.8	4.83	12.11	251.4	"
1040	21.15	13.0	1000	5.68	0.721	9.06	4.91	12.24	252.1	Stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth 22'

SIGNATURE(S):

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 CTO 279
Sampled By: Gerat
Field Analyst: Gerat
Field Form Checked as per QA/QC Checklist (initials): TR

Sample ID No.: 13GWT3601
Sample Location: 13GWT36
Duplicate: ☑ M (TR)
Blank: ☐

SAMPLING DATA:

Date: 12-5-03 / Time:	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (Eh) (+/- mv)
Method: Peristaltic	Clear	5.68	0.721	12.24	6.06	4.91	—	252.1

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)

Electrode Make & Model: YSI

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 5.5/5.5 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	5.5 / 5.5

Analysis Time: 1125/1129

Notes:

Alkalinity:

Equipment: Chemetrics Test Kit

Concentration: <10/<10 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-9810	<10/<10
☐	50 to 500 ppm	K-9815	
☐	100 to 1000 ppm	K-9820	

Analysis Time: 1136/1139

Filtered: ☐

Notes:

Carbon Dioxide:

Equipment: Chemetrics Test Kit

Concentration: 40/40 ppm

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	40/40
☐	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 1143/1145

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: (DR-850) DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.03/0.05 ppm

Analysis Time: 1152/1154

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: (HS-C) Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: ~~0.01~~ ppm 0.00/0.00

Analysis Time: ~~1212~~/920 1158/1201

Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Project No.: N9060 <TO 279
Sampled By: Goeydt
Field Analyst: Goeydt

Sample ID No.: 13GWT3601
Sample Location: 13GWT36
Duplicate: ☑ M (FE)
Blank: ☐

Sulfide (S^{2-}):
Equipment: DR-850 DR-8 __ Range: 0 - 0.70 mg/L
Program/Module: 610nm 93
Concentration: 0.01/0.01 ppm
Analysis Time: 1212/1214 Filtered: ☐
Notes:

Nitrite (NO_2^--N):
Equipment: DR-850 DR-8 __ Range: 0 - 0.350 mg/L
Program/Module: 62
Standard Solution: ☐ Results: 0.003
Concentration: 0.003/.000 ppm
Analysis Time: 1117/1119 Filtered: ☐
Reagent Blank Correction: ☐
Notes:

Manganese (Mn^{2+}):
Equipment: DR-850 DR-8 __ Range: 0 - 20.0 mg/L
Program/Module: 525nm 41
Concentration: 0.3/0.2 ppm
Analysis Time: 1221/1225 Filtered: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☑
Final calulated concentration is within the appropriate *Range Used* block: ☑
Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑
Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA
Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT3701
Sample Location: 13MWT37
Sampled By: FCW
C.O.C. No.: 4817

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-6-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1550	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: PERISTALTIC	CLEAR	5.75	0.309	13.32	3.2	4.82	-144.9	--

PURGE DATA:

Date: 11-6-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): --								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.15								
Static Water Level (WL): 14.29								
One Casing Volume(gal/L): 2.1								
Start Purge (hrs): 1400								
End Purge (hrs): 1550								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 2.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE.	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]
Intake no screen

Circle If Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

FCW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT37
DATE: 11-6-03

Time (Hrs.)	Water Level (Ft below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celcius	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1400	14.29									START
1410	14.63	80	5.96	0.351	29.5	4.70	13.35	-	-217.3	
1420	14.79		5.87	0.349	18.8	4.59	13.19	-	-195.6	
1430	14.89		5.82	0.333	11.9	4.70	13.24	-	-171.3	
1440	14.97		5.80	0.327	9.2	4.74	13.25	-	-169.2	
1450	15.02		5.79	0.317	6.7	4.72	13.27	-	-165.6	
1500	15.07		5.77	0.316	6.22	4.76	13.46	-	-159.7	
1510	15.10		5.77	0.311	5.9	4.78	13.41	-	-156.0	
1520	15.07		5.75	0.304	3.8	4.87	13.21	-	-148.3	
1530	15.07		5.75	0.308	3.7	4.80	13.30	-	-147.3	
1540	15.10		5.75	0.308	3.2	4.81	13.36	-	-144.7	
1550	15.10	↓	5.75	0.307	3.2	4.82	13.30	-	-144.9	SAMPLE
1705										END

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3801
Sample Location: 13MWT38
Sampled By: FCW
C.O.C. No.: 4818
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-10-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 0915								
Method: BLADDER	GREY	4.39	0.332	13.18	>999	4.70	10.3	—

PURGE DATA:

Date: 11-9-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: BLADDER								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.7								
Static Water Level (WL): 62.26								
One Casing Volume(gal/L): 67.7 - 62.26 = 5.44								
Start Purge (hrs): 1005								
End Purge (hrs): 1213								
Total Purge Time (min): 128								
Total Vol. Purged (gal/L): 2.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	✓ -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

WL = 6.23 on 11-10-03
Low yield well intake a little off bottom

Circle If Applicable:

MS/MSD	Duplicate ID No.:
( )	

Signature(s): FCW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT38
DATE: 11-9-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. Celsius	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1005	62.26									START
1015	62.72	70	11.59	0.302	999	6.44	8.97	-	26.0	
1025	63.03		11.57	0.316	999	4.45	10.56	-	13.8	
1035	63.36		11.55	0.325	999	4.09	11.42	-	6.7	-CLEAN OUT CELL
1045	63.84		11.52	0.330	999	4.23	11.72	-	5.0	
1055	64.29		11.53	0.327	999	4.46	11.49	-	8.2	
1105	64.74		11.53	0.328	999	6.27	11.56	-	11.8	
1115	65.13		11.52	0.327	999	6.95	11.49	-	10.7	-CLEAN OUT CELL
1125	65.57		11.44	0.315	999	7.95	11.48	-	23.8	
1135	65.90		11.39	0.316	999	7.36	12.04	-	14.6	
1145	66.30		11.35	0.315	999	6.78	12.40	-	11.3	
1155	>66.40 *		11.37	0.320	999	5.90	12.55	-	10.3	* WATER LEVEL BELOW
1205	-		11.39	0.332	999	4.70	13.18	-	10.3	PUMP
1208	DRY									
0915	6.25									SAMPLE - 11-10-03
										70 PSI
										CPM-2 20, 10

SIGNATURE(S): [signature]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NSWC CRANE
Sample ID No.: 13GWT38O1
Project No.: N9060
Sample Location: 13MWT38
Sampled By: F.W
Duplicate: ☐
Field Analyst: T. Rosano / FW
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials): TR

SAMPLING DATA:

Date: 11-10-03	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP (Eh)
Time: 0915	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: BLADDER	Grey	11.39	0.332	13.18	7999	4.70	~	10.3

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv)
Electrode Make & Model: YSI
Reference Electrode (circle one): (Silver-Silver Chloride) / Calomel / Hydrogen

Dissolved Oxygen:
Equipment: Chemetrics Test Kit
Concentration: 3.5 ppm TR

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	3.5

Analysis Time: 0824

Notes:

Alkalinity:
Equipment: Chemetrics Test Kit
Concentration: 108 ppm FW

Range Used:	Range	Method	Concentration ppm
☐	10 to 100 ppm	K-9810	
☐	50 to 500 ppm	K-9815	
☑	100 to 1000 ppm	K-9820	108

Analysis Time: 0846
Filtered: ☑

Notes: pH was high

Carbon Dioxide:
Equipment: Chemetrics Test Kit
Concentration: <10 ppm FW

Range Used:	Range	Method	Concentration ppm
☑	10 to 100 ppm	K-1910	<10
☑	100 to 1000 ppm	K-1920	
☐	250 to 2500 ppm	K-1925	

Analysis Time: 0832

Notes: Sample turned Pink w/ Activator solution

Ferrous Iron (Fe^{2+}):
Equipment: DR-850 (DR-890) Range: 0 - 3.00 mg/L
Program/Module: 500nm 33
Concentration: 0.00 ppm
Analysis Time: 0851
Notes:
Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L
Equipment: (HS-C) Other:
Exceeded 5.0 mg/L range on color chart: ☐
Concentration: 0.0 ppm FW
Analysis Time: 0950
Notes:

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NSWC CRANE	Sample ID No.:	13GWT3801
Project No.:	9060	Sample Location:	13MWT38
Sampled By:	F. W.	Duplicate:	☐
Field Analyst:	T. ROJAHN / FW	Blank:	☐

Sulfide (S^{2-}):

Equipment: DR-850 | DR-8 90 | Range: 0 - 0.70 mg/L | Concentration: 0.00 ppm

Program/Module: 610nm | 93 | Analysis Time: 0859 | Filtered: ☑

Notes:

Nitrite (NO_2^--N):

Concentration: 0.000 ppm

Equipment: DR-850 | DR-8 50 | Range: 0 - 0.350 mg/L | Analysis Time: 0958 | Filtered: ☑

Program/Module: | 62

Standard Solution: ☐ | Results: _____ | Reagent Blank Correction: ☐

Notes:

Manganese (Mn^{2+}):

Concentration: 0.1 ppm

Equipment: DR-850 | DR-8 5 | Range: 0 - 20.0 mg/L | Analysis Time: 0908 | Filtered: ☑

Program/Module: 525nm | 41

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐ NA

Title block on ~~each~~ 1st page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT3901
Sample Location: 13MWT39
Sampled By: FCW
C.O.C. No.: 4817

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-7-03 / Time: 1400 / Method: PERISTALTIC	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	6.40	0.391	13.29	17.9	5.35	135.1	--

PURGE DATA:

Date: 11-7-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.7								
Static Water Level (WL): 17.03								
One Casing Volume(gal/L): 1.6								
Start Purge (hrs): 0913								
End Purge (hrs): 1400								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 5.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	✓ -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]
INTAKE @ MID SCREEN

Circle If Applicable:

MS/MSD —

Duplicate ID No.:

Signature(s):

FCW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279
WELL ID.: 13MWT39
DATE: 11-7-03

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
0713	17.03									START
0923	17.32	95	6.50	0.370	28.3	5.18	11.61	—	174.0	
0933	17.64	↓	6.54	0.383	28.1	3.38	12.61	—	148.6	
0943	17.93	↓	6.43	0.387	52.3	2.47	12.95	—	144.9	
0953	18.07	80	6.42	0.387	69.8	2.35	12.47	—	142.8	
1003	18.21		6.41	0.374	86.5	2.53	12.09	—	138.4	
1013	18.32		6.41	0.375	68.3	2.62	12.24	—	134.6	
1023	18.41		6.41	0.379	57.4	2.84	12.49		133.9	
1033	18.53		6.42	0.382	45.7	3.11	12.56	—	132.3	
1043	18.64		6.42	0.384	38.4	3.33	12.76	—	132.0	
1053	18.72		6.41	0.384	43.1	3.50	12.66	—	131.7	
1103	18.82		6.41	0.388	42.0	3.58	13.19	—	132.0	
1113	18.90		6.40	0.388	42.2	3.67	13.12	—	132.2	
1123	18.96		6.39	0.387	35.6	3.80	12.97	—	131.9	
1133	19.04		6.38	0.386	36.4	3.91	13.03	—	130.5	
1143	19.11		6.37	0.387	34.5	3.91	13.33	—	130.8	
1153	19.17		6.37	0.390	32.3	4.18	13.59	—	131.9	
1203	19.23		6.37	0.389	35.1	4.31	13.65	—	133.5	
1212	19.29	↓	6.36	0.387	30.0	4.37	13.38		133.2	STOP
1300	18.36		6.38	0.382	22.9	5.02	13.21	—	131.5	START RECIRCING
1310	↓	90	↓	↓	↓	↓	↓	—	↓	
1320	18.56		6.41	0.386	14.0	5.37	13.27	—	132.9	
1330	18.71		6.41	0.388	19.9	5.50	13.27	—	134.5	
1340	18.83		6.41	0.390	23.2	5.44	13.36	—	135.7	
1350	18.94		6.41	0.392	22.5	5.40	13.34	—	135.4	
1400	19.02	↓	6.40	0.391	17.9	5.35	13.29	—	135.1	SAMPLE
1535										END

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 136WT4001
Sample Location: 13MWT40
Sampled By: FCW
C.O.C. No.: 4816

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-5-03 / Time: 1630 / Method: PERISTALTIC	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	CLEAR	5.53	0.273	13.28	6.2	6.28	100.3	--

PURGE DATA:

Date: 11-5-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.70								
Static Water Level (WL): 18.37								
One Casing Volume(gal/L): 1.5								
Start Purge (hrs): 1455								
End Purge (hrs): 1630								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 2.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	—
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	—

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X]
INTAKE MID SCREEN

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 13MWT40
DATE: 11-5-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mv)	Comments (Volume & Color)
1455	18.37									START
1505	18.61	100	5.60	0.273	83	7.22	13.52	-	102.5	
1515	18.65	↓	5.60	0.272	39	7.01	13.55	-	82.1	
1523	18.69	90	5.56	0.269	27.7	6.64	13.44	-	76.0	
1535	18.70	|	5.53	0.270	24	6.45	13.41	-	79.3	
1545	18.72	|	5.53	0.271	18.4	6.36	13.41	-	84.5	
1555	18.70	|	5.54	0.271	15.4	6.23	13.27	-	91.6	
1605	18.70	|	5.54	0.272	13.3	6.25	13.23	-	91.7	
1615	18.70	|	5.54	0.272	10.6	6.29	13.28	-	91.9	
1625	18.70	↓	5.54	0.272	7.1	6.26	13.31	-	95.1	
1630	18.71	↓	5.53	0.273	6.2	6.28	13.28	-	100.3	SAMPLE
1750										END

SIGNATURE(S): FM Lw

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4101
Sample Location: 13MWT41
Sampled By: T. ROUGHAN
C.O.C. No.: 4825
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11-23-03 / Time: 1530 / Method: Dis. Bailer	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
	Greyish	8.36	0.394	14.01	>1000	3.72	+170	—

PURGE DATA:

Date: 11-23-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other ORP
Method: Bailer	INT.	8.48	0.430	15.89	>1000	1.71	~~>1000~~ (2)	163
Monitor Reading (ppm): 23	1	8.36	0.394	14.01	>1000	3.72	—	170
Well Casing Diameter & Material Type: 2" & PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.8								
Static Water Level (WL): 66.29								
One Casing Volume(gal/L):								
Start Purge (hrs): 1025								
End Purge (hrs): 1030								
Total Purge Time (min): 5								
Total Vol. Purged (gal/L): 1.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	11/23 2 (2) L Glass Amber @1530	Yes
Micellaneous Explosives SW-846 8330	4°C	11/24 1 (2) L Glass Amber @1000	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/24 (1) L HDPE @ 1000	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/24 (1) L HDPE @ 1000	YES -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	11/24 (1) L HDPE @ 1000	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

VERY LOW YIELDING WELL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4201
Sample Location: 13MWT42
Sampled By: T. ROJAHN
C.O.C. No.: 4816 & 4817
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/6/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1500	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: SAME	TANISH	6.39	0.190	14.03	71000	4.86	105	—

PURGE DATA:

Date: 11-05-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 23.45								
Static Water Level (WL): 20.80								
One Casing Volume(gal/L) 1.6								
Start Purge (hrs): 1535								
End Purge (hrs): 1614								
Total Purge Time (min): 39								
Total Vol. Purged (gal/L) 3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	11/6/03 1 (2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	11/6/03 1 (2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/7/03 (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	11/7/03 (1) L HDPE	YES -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	11/6/03 (1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

SLOW RECHARGE
23.45 - 20.80 = 2.65 X 0.163 = 0.43 gal or 1.6 L
INTAKE NEAR BOTTOM OF WELL

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N9060, CTO 0279

WELL ID.: 13MWT42
DATE: 11-05-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Volume & Color)
1535	20.80	—	—	—	—	—	—	NA	T	GREY
1545	21.65	100	6.46	0.185	>1000	3.41	14.03	NA	115	1000ml BRN
1555	22.11	100	6.38	0.188	>1000	1.79	13.93	NA	115	2000ml TAN
1605	22.75	100	6.39	0.190	>1000	1.46	14.03	NA	105	3000ml TAN
1614	23.45	—	—	—	—	—	—	—	—	DRY
1626	23.30	—	—	—	—	—	—	—	—	RECHARGE
1636	22.77	—	—	—	—	—	—	—	—	"
1646	22.50	—	—	—	—	—	—	—	—	"
—	—	—	—	—	—	—	—	—	—	WELL SAMPLED 11/6

SIGNATURE(S): Taylor

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4301
Sample Location: 13MWT43
Sampled By: S GRIER
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12/4/03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1050	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Peristoltic	Clear	4.47	0.303	12.83	1.9	4.37	298.5	--

PURGE DATA:

Date: 12/4/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristoltic pump								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.50								
Static Water Level (WL): 9.20								
One Casing Volume (gal/L): 2.17								
Start Purge (hrs): 0900								
End Purge (hrs): 1040								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 3.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

S Grier

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT43
DATE: 12/4/03
WEATHER: Cloudy, Rain -33°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0900	9.20	0	100	4.45	0.372	55	1.68	12.69	239.1	Slightly Cloudy -
0910	10.75	↓	100	4.25	0.368	20	1.48	12.75	257.7	No odor
0920	11.85		100	4.20	0.345	13	1.73	12.71	303.4	Clear
0930	12.84		100	4.37	0.319	6.4	4.40	12.61	307.3	"
0940	13.12	↓	100	4.42	0.313	6.5	4.76	12.48	305.9	"
0950	13.55	1.5	100	4.44	0.308	3.9	4.76	12.53	301.9	"
1000	13.78	↓	100	4.45	0.304	3.5	4.69	12.18	299.4	"
1010	13.91		100	4.46	0.303	3.1	4.59	12.11	299.1	"
1020	14.50		100	4.47	0.305	2.7	4.30	12.87	298.0	"
1030	14.80	↓	100	4.47	0.304	2.3	4.36	12.71	298.3	"
1040	15.20	3.0	100	4.47	0.303	1.9	4.39	12.83	298.5	"
										Sampled 13MWT43 @ 1050

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) Peristaltic pump #400
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 18.0'

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4401
Sample Location: 13MWT44
Sampled By: S GRIER
C.O.C. No.: 4828
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12/4/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1700								
Method: Bladder pump	Clear	7.77	0.595	11.37	4.6	0.79	-70.0	---

PURGE DATA:

Date: 12/4/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder pump								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 85.81								
Static Water Level (WL): 64.49								
One Casing Volume (gal/L): 3.5								
Start Purge (hrs): 1430								
End Purge (hrs): 1650								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 4.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	Na

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT 44
DATE: 12/4/03
WEATHER: Cloudy, Rain, 33°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1430	64.49	0	160	7.16	0.489	60	4.18	10.94	119.8	~~Clear~~, no odor
1440	65.70		100	7.28	0.587	37	3.86	11.11	130.5	Slightly Cloudy,
1450	66.20		100	7.56	0.597	21	3.12	11.51	133.5	Clear
1500	66.50		100	7.73	0.595	24	2.16	11.44	52.0	"
1510	66.80		80	7.79	0.593	19	1.94	11.39	8.7	"
1520	66.90		80	7.81	0.593	14	1.84	11.35	-15.7	"
1530	66.69		80	7.83	0.594	9.6	1.72	11.36	-34.7	"
1540	66.72		80	7.82	0.597	7.5	1.46	11.43	-50.4	"
1550	66.74		80	7.81	0.597	6.9	1.24	11.45	-56.4	"
1600	66.75		80	7.79	0.597	5.3	1.11	11.39	-61.1	"
1610	66.77		80	7.78	0.596	4.9	0.99	11.30	-63.7	"
1620	66.80		80	7.79	0.595	4.6	0.92	11.35	-67.0	"
1630	66.83		80	7.77	0.596	3.1	0.85	11.37	-68.1	"
1640	66.87	↓	80	7.77	0.596	5.2	0.83	11.35	-69.0	"
1650	66.90	4 gal	80	7.77	0.595	4.6	0.79	11.37	-70.0	"
										13 MWT 44
										Sampled @ 1700

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) NA
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 79.0'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4501
Sample Location: SWMU 13
Sampled By: SGTler
C.O.C. No.: 4836
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

TR →

Date: 12/8/03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1558								
Method: BLADDER PUMP	V.Sl.Cloudy	8.19	0.357	13.36	75	0.55	+55.5	--

PURGE DATA:

SG →

Date: 12/7/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder pump								
Monitor Reading (ppm): -								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 83.00								
Static Water Level (WL): 73.84								
One Casing Volume (gal/L): 1.5								
Start Purge (hrs): 1615								
End Purge (hrs): 1755								
Total Purge Time (min): 160								
Total Vol. Purged (gal/L): 4.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	12/8(1) (2) L Glass Amber	Yes
Micellaneous Explosives SW-846 8330	4°C	12/8(1) (2) L Glass Amber	Yes
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/9 @ 1645 (1) L HDPE	Yes
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	12/10 @ 1300 (1) L HDPE	Yes -F
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	12/10 @ 1300 (1) L HDPE	Yes
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[]

BLADDER PUMP ON BOTTOM OF WELL.
WELL WAS PUMP DRY TO INTAKE - WILL SAMPLE TOMORROW.
WELL WAS SAMPLED OVER A PERIOD OF 3 DAYS.

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Ty Light

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT45
DATE: 12/7/03
WEATHER:

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1515	73.95	—	—	—	—	—	—	—	—	START PURGE
1525	74.23	1.0	100	8.23	0.383	250	1.92	14.04	72.9	GREY, CLOUDY,
1535	74.58		60	7.94	0.373	260	1.19	13.26	77.2	NO ODOR
1545	74.94	2.2	60	7.87	0.372	310	1.50	13.05	82.3	
1555	75.15		60	7.83	0.374	370	1.42	13.16	85.6	
1605	74.45	3.6	60	7.78	0.378	420	1.74	13.22	90.1	
1615	75.75		60	7.74	0.381	450	2.00	13.28	95.5	
1625	76.10	4.3	70	7.68	0.387	450	2.19	13.18	100.9	
1635	76.39	5.0	70	7.63	0.393	450	2.32	12.92	106.7	
1645	—	—	—	—	—	—	—	—	→	Draw down will not stabilize will dry well out Increased Flow Rate
1655	77.15		110	7.55	0.395	290	1.35	13.27	111.6	
1705	77.66		110	7.58	0.389	190	0.88	13.37	109.0	
1715	78.36		110	7.65	0.380	100	0.65	13.35	104.7	
1725	78.97		110	7.80	0.371	85	0.58	13.28	95.0	
1735	79.58		110	7.95	0.358	80	0.42	13.15	76.5	
1745	80.00	↓	140	8.09	0.350	60	0.49	12.98	65.3	
1755	dry to pump intake	15 L	150+	8.19	0.357	75	0.55	13.36	55.5	Dry to pump Intake

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) MP10-1551
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 82'

SIGNATURE(S): Scott Jno

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4601
Sample Location: 13GWT46
Sampled By: GDG-DT
C.O.C. No.: 4036
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 12-9-03	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1124	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(mV)	NA
Method: Bladder	Clear	6.60	1.021	12.45	8.72	0.99	-32.5	—

PURGE DATA:

Date: 12-9-03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder	11.2	6.60	1.021	12.45	8.72	0.99	—	—
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.60								
Static Water Level (WL): 58.19								
One Casing Volume(gal/L): 5.81								
Start Purge (hrs): 0902								
End Purge (hrs): 1122								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 11.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	No
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] Turbidity prior to metals sample was 7.11.

67.60
58.19
9.41 (.163) = 1.53 gal = 5.81 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: Swmu 13

WELL ID.: 13GWT4601
DATE: 12-9-03
WEATHER: 53° cloudy

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (+/- mV)	Comments
0902	58.19	—	—	—	—	—	—	—	—	Start purge
0912	58.24	0.8	800	6.77	1.022	229	1.49	12.32	18.8	cloudy
0922	58.22	1.6	800	6.78	1.021	163	1.52	12.27	5.5	"
0932	58.20	2.4	800	6.78	1.019	103	1.29	12.31	-17.1	slight cloudy
0942	58.21	3.2	800	6.77	1.018	93.2	1.25	12.35	-27.9	"
0952	58.22	4.0	800	6.75	1.017	85.3	1.11	12.36	-35.8	"
1002	58.23	4.8	800	6.74	1.016	61.8	1.17	12.37	-37.3	"
1012	58.24	5.6	800	6.73	1.017	55.2	1.11	12.42	-31.9	clearer
1022	58.24	6.4	800	6.72	1.017	36.4	1.11	12.41	-31.0	"
1032	58.24	7.2	800	6.70	1.018	30.8	1.04	12.42	-35.4	"
1042	58.24	8.0	800	6.66	1.018	25.3	1.00	12.41	-38.2	"
1052	58.24	8.8	800	6.64	1.020	18.6	1.03	12.43	-36.2	clear
1102	58.24	9.6	800	6.62	1.021	13.3	0.91	12.43	-34.1	"
1107	58.24	10.0	800	6.61	1.021	12.1	0.97	12.42	-33.2	"
1112	58.24	10.4	400	6.60	1.021	11.3	0.96	12.42	-32.5	"
1117	58.24	10.8	400	6.60	1.021	10.44	0.96	12.44	-32.8	"
1122	58.24	11.2	400	6.60	1.021	8.72	0.99	12.45	-32.5	stop purge

Water Quality Meter (S/N) 98F0478 AB
Control Box Type (S/N) MP101550
Turbidity Meter (S/N) 3317 2402

Pump Intake Depth 62'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N9060 CTO 0279

Sample ID No.: 13GWT4701
Sample Location: SWMU 13
Sampled By: S. GRIER
C.O.C. No.: 4836
Type of Sample:
[X] Low Concentration
[] High Concentration

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

SAMPLING DATA:

Date: 12-9-03	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	ORP (mV)	Other NA
Time: 1110								
Method: Peristaltic	Clear	3.46	1634	12.42	5.4	1.50	409.9	—

PURGE DATA:

Date: 12/9/03	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.20								
Static Water Level (WL): 6.68								
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 0930								
End Purge (hrs): 1100								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 9.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Micellaneous Explosives SW-846 8330	4°C	(2) L Glass Amber	(Yes)
Total Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)
Diss. Metals SW846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	NO
Nitrate + Nitrite (asN) EPA 353.2 & Ammonia (asN) EPA 350.1	4°C/H_2SO_4	(1) L HDPE	(Yes)
Total Organic Carbon	4°C/H_3PO_4	(2) 40ml Vails	NO

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[]

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Scott Grier

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT : NSWC CRANE
PROJECT NUMBER: N9060
PROJECT SITE NAME: SWMU 13

WELL ID.: 13MWT47
DATE: 12/9/03
WEATHER: Cloudy, Lt. Breeze, 51°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal.)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0930	7.18	0.3	125	3.53	1555	13.9	548	12.55	356.6	Clear, No odor
0940	7.41	0.6	125	3.36	1607	14.0	1.95	12.46	402.3	
0950	7.46	1.7	110	3.39	1624	6.1	1.78	12.42	409.4	
1000	7.51	2.8	110	3.40	1626	6.9	1.65	12.46	409.9	
1010	7.56	3.9	110+	3.41	1628	7.3	1.60	12.50	409.3	
1020	7.63	5.0	110	3.42	1630	7.8	1.54	12.54	409.5	
1030	7.61	6.1	110	3.44	1637	6.0	1.65	12.53	410.4	
1040	7.59	7.2	120	3.44	1636	4.3	1.54	12.47	410.6	
1050	7.60	8.3	110	3.45	1635	4.9	1.52	12.45	410.1	
1100	7.61	9.4	110	3.46	1634	5.4	1.50	12.42	409.9	
										Samples 13GWT47 taken @ 1110

Water Quality Meter (S/N) 02B0141
Control Box Type (S/N) Peristaltic pump #400
Turbidity Meter (S/N) 3106-1402

Pump Intake Depth 15.0

SIGNATURE(S): Scott Grim

APPENDIX C.4.3
SWMU 13
GROUND WATER SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0102
Sample Location: 13MWT 01
Sampled By: Gerdt
C.O.C. No.: 0055
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1821	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: Del. Bladder	Clear	3.57	.255	18.75	9.5	4.2	461.2	---

PURGE DATA:

Date: 8-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Del. bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 7.91								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 1618								
End Purge (hrs): 1818								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 13								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 12'

17.95
7.91
10.04 (.163) = 1.64 gal
= 6.1 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT01
DATE: 8-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1615	7.91	—	—	—	—	—	—	—	—	Start Purge
1628	9.42	1.9	190	3.57	.223	15	3.88	19.31	388.7	Clear
1638	9.23	3.2	130	3.62	.252	9.4	6.01	19.96	416.1	"
1648	9.35	4.2	100	3.46	.249	9.1	5.54	19.33	434.6	
1658	—	Adjusting flow rate								
1708	9.21	5.1	90	3.77	.245	9.3	5.08	20.11	436.3	Clear
1718	9.26	6.0	90	3.58	.258	9.2	4.33	19.41	444.2	
1728	9.43	7.4	140	3.57	.247	9.0	4.48	18.79	453.6	Unable to maintain
1738	9.24	8.4	100	3.70	.263	9.1	4.82	20.37	450.1	Flowrate ~<100
1748	9.19	9.1	70	3.61	.275	8.1	4.27	19.92	452.8	Clear
1758	9.25	10.4	130	3.55	.261	8.4	4.31	19.22	459.2	"
1808	9.32	11.7	130	3.57	.253	—	4.29	19.05	458.7	
1818	9.44	13.0	130	3.57	.255	9.5	4.20	18.75	461.2	End purge

Water Quality Meter (SN): 99K 0055
Control Box type (SN): rnP10 1231
Turbidity Meter (SN): 4650 4300

Pump Intake: 12'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0203
Sample Location: 13MWT 02
Sampled By: Gossett
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-24-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1435								
Method: Peristaltic	Clear	3.39	1501	19.59	2.3	2.19	616.2	---

PURGE DATA:

Date: 7-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 29.50								
Static Water Level (WL): 16.48								
One Casing Volume(gal/L): 7.9								
Start Purge (hrs): 1318								
End Purge (hrs): 1428								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 7.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 24.5'

29.50
16.48
13.02 (.163) = 2.120 gal
= 7.9 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13GWT02
DATE: 7-24-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~ L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1318	16.48	—	—	—	—	—	—	—	—	~~Start~~ purge
1328	18.39	1.2	120	4.05	1440	6.0	1.10	18.78	305.5	clear
1338	19.08	2.2	100	3.88	1480	5.9	.88	19.50	410.7	"
1348	20.17	3.2	100	3.81	1504	5.6	.82	20.48	540.8	"
1358	20.63	4.8	100	3.41	1490	3.7	.96	19.87	592.4	"
1408	21.11	5.2	100	3.34	1484	2.8	1.41	19.50	601.7	"
1418	21.63	6.2	100	3.34	1493	2.5	2.03	19.69	608.6	"
1423	—	6.7	50	3.32	1495	—	2.10	19.68	614.1	
1428	22.15	7.2	50	3.39	1501	2.3	2.19	19.59	616.2	end purge

Water Quality Meter (SN) 01C0979
Control Box type (SN) N/A
Turbidity Meter (SN) 4560 4300

Pump Intake 24.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0303
Sample Location: 13MWT 03
Sampled By: Goerdt
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-24-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1825	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	clear	5.52	528	19.98	9.2	3.66	107.4	---

PURGE DATA:

Date: 7-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" pvc			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 18.05								
Static Water Level (WL): 11.31								
One Casing Volume(gal/L): 4.1								
Start Purge (hrs): 1605								
End Purge (hrs): 1818								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 11.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 14.5'

18.05
11.31
6.74 (.163) = 1.10 gal
= 4.0 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT03
DATE: 7-24-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1605	11.31	—	—	—	—	—	—	—	—	YSI meter not
1615	—	0.9	90	—	—	—	—	—	—	connecting.
1625	—	1.8	90	—	—	—	—	—	—	Using T. Rigonis
1635	—	2.7	90	—	—	—	—	—	—	meter
1645	12.96	3.6	90	6.25	496	65	5.13	22.29	97.6	clear
1655	13.69	4.5	90	6.20	501	25	4.55	21.89	97.8	"
1705	13.82	5.4	90	6.33	546	55	5.72	24.30	102.5	lowered pump intake
1715	—	6.3	90	6.01	542	—	5.69	24.41	103.2	—
1725	14.46	7.2	90	5.97	538	38	5.10	22.75	103.9	clear
1735	14.64	8.1	90	5.89	547	32	4.48	21.80	105.2	"
1745	14.88	9.0	90	5.65	539	27	4.26	21.42	106.4	"
1755	15.13	9.9	90	5.61	535	21	3.87	20.38	107.9	"
1805	15.28	10.8	90	5.60	535	12	3.80	20.46	107.7	"
1815	15.68	11.7	90	5.52	528	9.2	3.66	19.98	107.4	stop purge

Water Quality Meter (SN) —
Control Box type (SN) NA
Turbidity Meter (SN) 4560 4300
Pump Intake 14.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0403
Sample Location: 13MWT 04
Sampled By: Goerdt
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-24-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1205	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Peristaltic	clear	5.03	201	18.86	7.9	1.62	455.2	---

PURGE DATA:

Date: 7-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.80								
Static Water Level (WL): 15.10								
One Casing Volume(gal/L): 1.7								
Start Purge (hrs): 1102								
End Purge (hrs): 1202								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 6.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 17'

17.80
15.10
2.70 (.163) = 0.44
= 1.7 L

Circle if Applicable:

MS/MSD	Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT04
DATE: 7-24-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1102	15.10	—	—	—	—	—	—	—	—	Start purge
1112	15.43	1.0	100	6.31	3	23	8.10	21.81	442.4	Clear
1122	15.48	2.0	100	5.92	123	18	2.58	18.75	410.6	"
1132	15.55	3.0	100	6.31	191	11	2.79	18.73	398.7	"
1142	15.59	4.0	100	5.14	193	9.2	1.98	18.88	409.1	"
1147	—	4.5	50	5.12	195	—	1.90	18.92	421.3	"
1152	—	5.0	50	5.09	197	—	1.71	18.86	446.5	
1157	—	5.5	50	5.05	200	—	1.65	18.83	451.8	
1202	15.60	6.0	50	5.03	201	7.9	1.62	18.86	455.2	Stop purge

Water Quality Meter (SN) 01C0979
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300

Pump Intake 17'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0503
Sample Location: 13MWT 05
Sampled By: TERRY ROJAHN
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/24/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1635	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	6.60	0.468	20.05	75	0.87	97	---

PURGE DATA: Tr SL cloudy

Date: 7/24/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 19.15								
Static Water Level (WL): 6.56								
One Casing Volume(gal/L): 7.8								
Start Purge (hrs): 1230								
End Purge (hrs): 1630								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 16.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] 13GWT 0503 -F

Pump intake @ 14.15'

12.59' x 0.163 = 2.1 gal or 7.8 L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.: —	Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT05
DATE: 7/24/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1230	6.56	—	—	—	—	—	—	—	—	
1240	7.16	1200	120	5.75	0.232	280	3.11	20.73	142	CLOUDY
1250	7.43	2200	100	6.51	0.429	180	2.47	20.10	96	CLOUDY
1300	7.94	3200	100	6.15	0.453	40	1.71	22.23	112	CLEAR
1310	8.28	3800	60	6.00	0.469	27	1.49	23.20	110	CLEAR
1320	8.66	4400	60	6.08	0.461	23	1.53	22.49	107	CLEAR
1330	9.05	5000	60	6.16	0.457	20	1.58	22.67	105	CLEAR
1340	9.51	5600	60	6.17	0.448	22	1.75	22.81	105	CLEAR
1350	9.92	6500	90	6.21	0.439	25	2.09	22.64	105	CLEAR
1400	10.18	7100	60	6.11	0.465	27	2.11	23.86	108	CLEAR
1410	10.43	7700	60	6.13	0.485	34	2.01	23.40	106	CLEAR
1420	10.69	8300	60	6.26	0.491	39	1.87	23.26	108	CLEAR
1430	10.94	8900	60	6.29	0.490	37	1.74	23.09	107	CLEAR
1440	11.21	9500	60	6.31	0.486	39	1.61	22.75	106	CLEAR
1450	11.45	10100	60	6.33	0.483	37	1.49	22.43	105	CLEAR
1500	11.64	10700	60	6.28	0.482	50	1.45	22.40	105	CLEAR
1510	11.75	11300	60	6.36	0.478	48	1.40	21.82	101	CLEAR
1520	11.98	11950	65	6.43	0.479	45	1.29	21.43	100	CLEAR
1530	12.17	12600	65	6.45	0.493	50	1.24	21.39	98	CLEAR
1540	12.34	13250	65	6.48	0.502	55	1.19	21.07	96	V. SI Cloudy
1550	12.50	13900	65	6.48	0.510	33	1.17	21.00	95	CLEAR
1600	12.64	14550	65	6.43	0.519	29	1.18	21.27	95	CLEAR
1610	12.78	15200	65	6.20	0.545	25	1.21	22.84	99	CLEAR
1620	12.97	15850	65	6.59	0.471	75	0.99	20.44	95	SI. Cloudy
1630	13.18	16500	65	6.60	0.468	75	0.87	20.05	97	SI. Cloudy
1635	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) 419
Turbidity Meter (SN) 1760-1800

Pump Intake 14.15'

SIGNATURE(S): Tony Royal

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0603
Sample Location: 13MWT 06
Sampled By: Gerdt
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/25/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1405	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU) 26	(mg/L)	(mV)	NA
Method: Peristaltic	clear	6.08	399	18.85	44 99	6.73	441.2	---

7/24/04

PURGE DATA:

Date: 7-24-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.55'								
Static Water Level (WL): 13.10'								
One Casing Volume(gal/L): 2.7								
Start Purge (hrs): 0915								
End Purge (hrs): 1033								
Total Purge Time (min): 78								
Total Vol. Purged (gal/L): 7.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	1 (2) L Glass Amber (TR)	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

7/25/04 1405 - Water level at 16.98'. Collected approx. 1/2 L. Well Dried out
7/26/04 - 1735 - Water level 17.25'. Collected 1/4 bottle (L).
7/27/04 - 1720 - Filled EXP. Container

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 17'

Well historically dries out. Dry on 7-24-04.

17.55
13.10
4.45 (.163) = .725 gal
= 2.7 L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448 CTO 343

WELL ID.: 136MW0603
DATE: 7-29-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~ L	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0915	13.10	—	—	—	—	—	—	—	—	Start purge
0925	13.90	1.0	100	6.16	368	—	7.46	18.82	340.1	~~clear~~ 25°
0935	14.52	2.0	100	6.22	363	9.9	8.51	19.72	352.8	clear
0945	15.02	3.0	100	6.08	364	10.5	8.00	19.46	370.1	"
0955	15.62	4.0	100	6.08	378	13.	7.17	19.32	400.5	"
1005	16.01	5.0	100	6.20	400	14	7.45	20.90	416.4	"
1015	16.53	6.0	100	6.07	397	12	6.89	18.70	432.9	"
1025	16.99	7.0	100	6.08	399	26	6.73	18.85	441.2	"
1033	17.45	Dry	0							Dry well

Water Quality Meter (SN) 01C0979
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300

Pump Intake 17'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0703
Sample Location: 13MWT07
Sampled By: T. RUAHN
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/25/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1122								
Method: SAME	CLEAR	4.12	1.078	19.80	1.5	2.28	151	---

PURGE DATA:

Date: 7/25/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 3.16								
One Casing Volume(gal/L): 9.1								
Start Purge (hrs): 920								
End Purge (hrs): 1120								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 9.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 12.95'

14.71 x 0.163 = 2.4941 or 9.1 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	13FD072504 01

Signature(s):

Terry Ruahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT07
DATE: 7-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0920	3.16	—	—	—	—	—	—	—	—	START PURGE
0930	3.85	1000	100	4.25	1.114	35	3.98	19.66	165	CLEAR
0940	4.43	1800	80	4.18	1.097	5.2	3.51	20.50	161	CLEAR
0950	4.85	2600	80	4.18	1.079	4.2	3.13	20.41	160	CLEAR
1000	5.15	3400	80	4.16	1.072	3.7	3.18	20.34	160	CLEAR
1010	5.49	4200	80	4.16	1.070	3.3	3.01	20.36	160	CLEAR
1020	5.69	5000	80	4.16	1.067	2.9	2.86	20.20	160	CLEAR
1030	5.88	5800	80	4.19	1.071	2.9	2.65	19.92	159	CLEAR
1040	6.01	6600	80	4.19	1.072	2.6	2.52	19.93	158	CLEAR
1050	6.18	7400	80	4.18	1.074	2.6	2.43	19.86	158	CLEAR
1100	6.28	8200	80	4.17	1.076	2.9	2.38	19.72	158	CLEAR
1110	6.35	9000	80	4.15	1.078	1.9	2.30	19.69	158	CLEAR
1120	6.38	9700	70	4.12	1.078	1.5	2.28	19.80	159	CLEAR

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): 419
Turbidity Meter (SN): 1760 - 1800

Pump Intake: 12.95'

SIGNATURE(S): Tony Royal

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0803
Sample Location: 13MWT 08
Sampled By: T. ROJAHN
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/24/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1045	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	6.11	0.085	20.69	16	3.48	121	---

PURGE DATA:

Date: 7/24/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 16.60								
Static Water Level (WL): 6.19								
One Casing Volume(gal/L): 6.4								
Start Purge (hrs): 0923								
End Purge (hrs): 1043								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT _____-F

Pump intake @ 11.6'

10.4' x 0.163 = 1.7gal or 6.4L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT08
DATE: 7/24/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
923	6.19	—	—	—	—	—	—	—	—	START PURGE
933	6.43	1300	130	6.27	0.087	14	3.63	20.73	120	CLEAR
943	6.62	2400	120	6.22	0.083	14	4.18	20.27	118	CLEAR
953	6.74	3400	100	6.19	0.084	14	3.59	19.95	121	CLEAR
1003	6.86	4400	100	6.19	0.083	15	3.54	19.92	122	CLEAR
1013	6.92	5400	100	6.15	0.084	14	3.55	20.31	121	CLEAR
1023	6.98	6400	100	6.13	0084	15	3.55	20.52	120	CLEAR
1033	7.03	7300	90	6.12	0.085	16	3.50	20.70	121	CLEAR
1043	7.07	8200	90	6.11	0.085	16	3.48	20.69	121	CLEAR
1045	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) 419
Turbidity Meter (SN) 1760 - 1800

Pump Intake 11.6

SIGNATURE(S): Ty Nyk

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT0904
Sample Location: 13MWT09
Sampled By: CCL
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1710	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Clear	6.27	0.773	18.15	3.8	0.20	88.1	---

PURGE DATA:

Date: 7/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2"			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.96'								
Static Water Level (WL): 9.13'								
One Casing Volume(gal/L): 8.5								
Start Purge (hrs): 1540								
End Purge (hrs): 1710								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 7.89								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT-----F~~

Pump intake @ 17.5' bTOC

22.96
- 9.13
13.83 x 0.163 = 2.25 gallons
OR
8.5 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Mark C. Ly III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE , SWMU 13
PROJECT NUMBER: N7448 CTO 0343
WELL ID.: 13MWT09
DATE: 7/31/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1540	9.13'	-	-	-	-	-	-	-	-	START PURGE
1550	9.38'	940	94	6.87	0.729	2.5	0.29	18.47	99.2	Clear WATER
1600	9.43'	1,790	85	6.67	0.758	1.6	0.30	18.51	93.3	Clear WATER
1610	9.43'	2,690	90	6.51	0.766	1.2	0.26	18.65	94.7	Clear WATER
1620	9.45'	3,560	87	6.44	0.767	1.6	0.20	18.61	92.8	Clear WATER
1630	9.50'	4,430	87	6.32	0.767	2.4	0.20	18.59	94.3	Clear WATER
1640	9.50'	5,300	87	6.23	0.768	3.0	0.20	18.53	93.7	Clear WATER
1650	9.50'	6,170	87	6.35	0.767	3.3	0.20	18.39	87.0	Clear WATER
1700	9.50'	7,020	85	6.33	0.774	3.5	0.20	18.43	87.5	Clear WATER
1710	9.50'	7,890	87	6.27	0.773	3.8	0.20	18.15	88.1	Clear WATER
←			WELL Parameters			Stabilize				→
←			SAMPLING Begins							→

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10-1588
Turbidity Meter (SN): 1760-1800
Pump Intake: 17.5' bTOC Dedicated Bladder Pump

SIGNATURE(S): Linda C. Gray III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1003
Sample Location: 13MWT 10
Sampled By: Gerdt
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 7-28-04	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Time: 1604								
Method: Peristaltic	Clear	4.23	629	21.36	9.0	7.80	402.8	---

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 7-28-04								
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.13								
Static Water Level (WL): 14.18								
One Casing Volume(gal/L): 8.4								
Start Purge (hrs): 1354								
End Purge (hrs): 1559								
Total Purge Time (min): 125								
Total Vol. Purged (gal/L): 9.38								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 23'

28.13
14.18
13.95(.163) = 2.27 gal
= 8.4 L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW10
DATE: 7-28-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1354	14.18	—	—	—	—	—	—	—	—	Start purge
1404	15.44	0.75	~~75~~ 75	4.15	620	4.1	7.74	20.84	388.1	clear
1414	16.49	1.50	75	4.08	612	1.6	7.50	20.23	396.5	"
1424	17.48	2.25	75	3.81	602	1.9	8.11	20.01	416.6	"
1434	18.18	3.00	75	3.80	608	1.7	7.92	20.16	418.6	"
1444	18.65	3.75	75	3.80	609	1.4	8.26	20.20	423.1	"
1454	18.89	4.50	75	3.91	611	3.2	8.45	20.41	421.7	"
1504	19.27	5.25	75	3.97	616	7.1	8.42	20.69	418.6	"
1514	19.50	6.00	75	4.06	620	10.0	8.19	20.88	414.7	"
1524	19.62	6.75	75	4.14	624	9.0	8.19	20.97	411.3	"
1534	19.86	7.50	75	4.15	624	9.0	8.18	21.03	409.6	"
1544	20.05	8.25	75	4.20	623	8.7	8.47	21.01	405.7	"
1554	20.25	9.00	75	4.20	623	11.0	8.34	21.04	405.2	"
1559	20.31	9.38	38	4.23	629	9.0	7.80	21.36	402.8	end purge

Water Quality Meter (SN): 99X00055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300
Pump Intake: 23'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1103
Sample Location: 13MWT 11
Sampled By: T. ROJAHN
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-23-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1652	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	3.85	0.262	21.20	25	4.95	127	---

PURGE DATA:

Date: 7-23-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. Bladder								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.75								
Static Water Level (WL): 8.90								
One Casing Volume(gal/L): 5.5								
Start Purge (hrs): 1545								
End Purge (hrs): 1650								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 5.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 13.5' OF DEDICATED Bladder Pump

8.85 X 0.163 = 1.44 gal or 5.5 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT11
DATE: 7-23-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1545	8.90	1200	120	—	—	—	—	—	—	START PURGE
1555	9.24	"	"	4.24	0.257	80	5.93	20.25	123	V.SL. Cloudy
1605	9.36	1900	70	3.89	0.263	50	5.44	20.92	132	CLEAR
1615	9.49	2800	90	3.82	0.261	40	5.09	21.06	133	CLEAR
1625	9.54	3600	80	3.89	0.261	35	5.01	20.82	136	CLEAR
1635	9.56	4400	80	3.85	0.262	26	4.87	21.07	131	CLEAR
1645	9.59	5200	80	3.92	0.260	24	4.80	21.05	124	CLEAR
1650	9.62	5700	80	3.85	0.262	25	4.95	21.20	127	CLEAR
1652	—	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10 - 1231
Turbidity Meter (SN): 1760 - 1800

Pump Intake: 13.5' dedicated PUMP

SIGNATURE(S): Terry Royster

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1203
Sample Location: 13MWT 12
Sampled By: Goerdt
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-25-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1218	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Peristaltic	Clear	4.66	132	16.7	9.8	3.86	444.5	---

PURGE DATA:

Date: 7-25-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.40								
Static Water Level (WL): 10.71								
One Casing Volume(gal/L): 7.1								
Start Purge (hrs): 0856								
End Purge (hrs): 1211								
Total Purge Time (min): 195								
Total Vol. Purged (gal/L): 17.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 18'

22.40
10.71
11.69 (.163) = 1.91 gal
7.1 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW12
DATE: 7-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0856	10.71	—	—	—	—	—	—	—	—	Start Purge
0906	12.50	0.9	90	4.79	130	12	1.34	16.32	302.1	Clear
0916	12.86	1.8	90	4.75	130	8.7	1.29	16.56	315.5	"
0926	13.29	2.7	90	4.74	130	5.3	1.29	16.70	326.7	"
0936	13.65	3.6	90	4.74	128	4.9	2.17	16.65	340.7	"
0946	13.96	4.5	90	4.71	129	11.0	2.05	16.69	354.9	"
0956	14.19	5.4	90	4.68	130	13.0	1.72	16.72	357.8	"
1006	14.49	6.3	90	4.59	136	14.0	1.60	16.84	382.4	"
1016	14.87	7.2	90	4.53	142	12.0	1.48	16.75	397.1	"
1026	15.05	8.1	90	4.52	144	14.0	1.50	16.77	401.8	"
1036	15.39	9.0	90	4.53	145	13.0	1.49	16.71	411.1	"
1046	15.72	9.9	90	4.51	148	16.0	1.55	16.69	413.6	"
1056	15.79	10.8	90	4.51	151	13.0	1.70	16.65	419.5	"
1106	15.91	11.7	90	4.53	153	14.0	1.76	16.64	427.5	"
1116	16.07	12.6	90	4.52	154	13.0	1.77	16.65	427.0	"
1126	16.21	13.5	90	4.56	146	15.0	2.11	16.65	432.1	"
1136	16.44	14.4	90	4.62	135	15.0	2.81	16.56	434.2	"
1146	16.63	15.3	90	4.63	135	12.0	2.76	16.57	438.4	"
1156	16.86	16.2	90	4.65	133	10.0	3.68	16.60	440.6	"
1206	17.09	17.1	90	4.65	132	9.4	3.83	16.66	443.1	"
1211	17.16	17.55	45	4.66	132	9.8	3.86	16.70	444.5	End Purge

Water Quality Meter (SN): 01<0979
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300

Pump Intake: 18'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT13Ø3
Sample Location: 13MWT13
Sampled By: ccl
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/1/Ø4	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1547								
Method: Bladder Pump	Clear	4.31	Ø.131	2Ø.61	Ø.7Ø	Ø.73	132.Ø	---

PURGE DATA:

Date: 8/1/Ø4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.44								
Static Water Level (WL): 4.9Ø								
One Casing Volume(gal/L): 1Ø.16								
Start Purge (hrs): 14Ø7								
End Purge (hrs): 1547								
Total Purge Time (min): 1ØØ								
Total Vol. Purged (gal/L): 11.54								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT F~~

Pump intake @ 16.Ø' bTOC

21.44
−4.9Ø
16.54 x Ø.163 = 2.69 gallons
OR L
10.16 ~~gallons~~

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Mark C. Ho III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE, SWMU 13 **WELL ID.:** 13MWT13
PROJECT NUMBER: N7448, CTO 0343 **DATE:** 8/1/04
Partly cloudy, Humid, 85°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1407	4.90'	—	—	—	—	—	—	—	—	INITIAL Reading; Begin Purge
1417	5.15'	1,120	112	4.69	0.154	37	0.52	20.26	163.7	Slightly cloudy water
1427	5.16'	2,320	120	4.21	0.111	8.8	0.67	20.04	160.9	Clear water
1437	5.16'	3,520	120	4.39	0.117	4.2	0.76	20.23	147.0	Clear water
1447	5.16'	4,720	120	4.26	0.120	2.9	0.80	20.40	150.0	Clear water
1457	5.16'	5,920	120	4.42	0.122	2.1	0.81	20.00	143.3	Clear water
1507	5.16'	7,120	120	4.58	0.124	1.4	0.78	19.83	136.9	Clear water
1517	5.17'	8,320	120	4.46	0.127	1.2*	0.75	20.13	137.3	Clear water
1527	5.17'	9,520	120	4.22	0.130	0.85	0.73	20.40	142.0	Clear water
1537	5.17'	10,540	102	4.27	0.131	0.60	0.73	20.69	135.0	Clear water
1547	5.17'	11,540	100	4.31	0.131	0.70	0.73	20.61	132.0	Clear water
←				Well Parameters	Stabilize					→
←				Sampling Begins						→

Water Quality Meter (SN) 01C 0134AB
Control Box type (SN) MP 10 - 1588
Turbidity Meter (SN) 1769 - 1800

Pump Intake 16.0' bTOC, Dedicated Bladder Pump

SIGNATURE(S): Mark C. Tritt

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1403
Sample Location: 13MWT 14
Sampled By: T. ROJAHN
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-27-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1628								
Method: SAMS	CLEAR	6.86	0.714	17.41	3.0	6.74	71	---

PURGE DATA:

Date: 7-27-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): -								
Well Casing Diameter & Material.								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 25.60								
Static Water Level (WL): 19.49								
One Casing Volume(gal/L): 6.9								
Start Purge (hrs): 1435								
End Purge (hrs): 1625								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 12.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 20'

11.11 x 0.163 = 1.8 gal/ac 6.9

Circle if Applicable:

MS/MSD | Duplicate ID No.: ———

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13 MWT 14
DATE: 7/27/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1435	14.49	—	—	—	—	—	—	—	—	START PURGE
1445	14.80	1400	140	7.23	0.992	25	10.17	17.03	71	CLEAR
1455	14.82	2600	120	7.00	0.888	16	10.22	17.15	70	CLEAR
1505	14.80	3700	110	6.91	0.861	11	9.88	18.05	71	CLEAR
1515	14.80	4800	110	6.84	0.814	6.8	9.06	18.27	72	CLEAR
1525	14.80	5900	110	6.88	0.800	5.2	8.46	17.81	70	CLEAR
1535	14.80	7000	110	6.84	0.794	4.5	8.27	18.32	71	CLEAR
1545	14.80	8100	110	6.78	0.774	4.0	8.01	18.63	72	CLEAR
1555	14.80	9200	110	6.73	0.750	3.7	7.41	18.62	73	CLEAR
1605	14.80	10300	110	6.84	0.736	3.4	7.37	17.73	71	CLEAR
1615	14.80	11400	110	6.84	0.730	3.1	6.92	17.93	71	CLEAR
1625	14.80	12500	110	6.86	0.714	3.0	6.74	17.41	71	CLEAR
1628	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10 - 1231
Turbidity Meter (SN): 1760 - 1800

Pump Intake: 20' DEDICATED PUMP

SIGNATURE(S): Terry Royal

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1503
Sample Location: 13MWT15
Sampled By: T. ROJAHN
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 7/29/04								
Time: 1704								
Method: SAME	CLEAR	3.26	0.352	15.66	10	0.53	685	---

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 7/29/04								
Method: Bladder Pump								
Monitor Reading (ppm): --								
Well Casing Diameter & Material								
Type: 2" ϕ PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.87								
Static Water Level (WL): 14.61								
One Casing Volume(gal/L): 8.20								
Start Purge (hrs): 1340								
End Purge (hrs): 1700								
Total Purge Time (min): 200								
Total Vol. Purged (gal/L): 15.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 22'

13.26' x 0.163 = 2.2 gal or 8.2 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW15
DATE: 7/29/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1340	14.61	—	—	—	—	—	—	—	—	START PURGE
1350	15.51	1300	130	3.05	0.438	25	2.25	16.04	531	CLEAR
1400	15.42	2000	70	3.20	0.427	27	1.22	16.63	563	CLEAR
1410	15.45	2700	70	3.05	0419	27	1.11	16.94	593	CLEAR
1420	15.48	3400	70	2.78	0.410	26	0.99	17.20	631	CLEAR
1430	15.51	4100	70	2.96	0.401	28	0.87	17.21	657	CLEAR
1440	15.31	4650	55	2.73	0.401	28	0.65	17.33	663	CLEAR
1450	15.65	5600	95	2.64	0.374	28	0.49	15.70	674	CLEAR
1500	15.65	6400	80	2.88	0.373	26	0.53	15.93	671	CLEAR
1510	15.67	7200	80	2.96	0.371	25	0.57	15.85	672	CLEAR
1520	15.70	8000	80	3.02	0.368	26	0.54	15.86	673	CLEAR
1530	15.85	8800	80	2.97	0.362	25	0.58	15.61	678	CLEAR
1540	15.85	9600	80	3.00	0.362	23	0.56	15.85	682	CLEAR
1550	15.88	10400	80	3.10	0.362	20	0.52	15.96	681	CLEAR
1600	15.88	11200	80	3.10	0.357	19	0.59	15.41	684	CLEAR
1610	15.92	12000	80	3.10	0.356	19	0.60	15.42	685	CLEAR
1620	16.01	12800	80	3.16	0.353	18	0.62	15.30	684	CLEAR
1630	16.04	13600	80	3.19	0.351	14	0.62	15.31	685	CLEAR
1640	16.06	14400	80	3.22	0.351	14	0.55	15.28	685	CLEAR
1650	16.08	15200	80	3.24	0.350	14	0.53	15.26	684	CLEAR
1700	15.99	15900	70	3.26	0.352	10	0.53	15.66	685	CLEAR
1704	—	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN): 01C0979 AA
Control Box type (SN): MP10-1231
Turbidity Meter (SN): 3592-3502

Pump Intake: 22' DEDICATED PUMP

SIGNATURE(S): Tony Lyle

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1603
Sample Location: 13MWT 16
Sampled By: GOEXA
C.O.C. No.: 0051
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-25-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1547	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	clear	6.05	290	18.21	1.2	3.85	386.4	---

PURGE DATA:

Date: 7-25-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" pvc			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.31								
Static Water Level (WL): 11.07								
One Casing Volume(gal/L) 4.26 3.8								
Start Purge (hrs): 1440								
End Purge (hrs): 1540								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	3x (2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 14.5'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
Yes	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MW716
DATE: 7-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1440	11.07	-	-	-	-	-	-	-	-	Start purge
1450	11.89	0.90	90	6.10	312	-	4.55	17.74	279.0	
1500	11.87	1.8	90	6.09	297	11	4.44	17.87	337.0	clear
1510	12.04	2.7	90	6.07	292	8.9	4.28	17.92	365.0	"
1520	12.48	3.6	90	6.08	297	3.7	4.11	17.92	377.2	"
1530	12.62	4.5	90	6.08	295	2.2	4.11	17.99	384.2	"
1540	12.95	5.4	90	6.05	290	1.2	3.85	18.21	386.4	end purge

Water Quality Meter (SN) 01<0979
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300

Pump Intake 14.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 17Φ3
Sample Location: 13MWT 17
Sampled By: CCL
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/29/Φ4	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 151Φ	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Clear	5.28	Φ.159	18.57	4.1	2.Φ1	129.4	---

PURGE DATA:

Date: 7/29/Φ4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 2Φ.3Φ'								
Static Water Level (WL): 9.1Φ'								
One Casing Volume(gal/L): 6.8								
Start Purge (hrs): 124Φ								
End Purge (hrs): 151Φ								
Total Purge Time (min): 15Φ								
Total Vol. Purged (gal/L): 15.Φ								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT F~~

Pump intake @ 15' btoc; Dedicated Bladder Pump

2Φ.3Φ
- 9.1Φ
11.2Φ x Φ.163 = 1.82 gallons
OR
6.8 Liters

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Charles C. Ley III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE , SWMU 13 WELL ID.: 13MWT17
PROJECT NUMBER: N9060 CTO 0279 DATE: 7/29/04
Partly cloudy, 80°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1240	9.10'	-	-	-	-	-	-	-	-	START PURGE
1250	9.13'	930	93	5.19	0.167	10.0	4.12	19.47	150.9	Clear WATER
1300	9.13'	1,910	98	5.19	0.168	7.7	3.66	19.11	142.2	clear WATER
1310	9.15'	2,910	100	4.99	0.167	6.8	3.00	19.11	147.5	clear WATER
1320	9.15'	3,910	100	5.08	0.167	5.7	4.10	18.94	141.7	clear WATER
1330	9.15'	4,910	100	5.02	0.167	5.4	3.05	19.14	141.8	clear WATER
1340	9.15'	5,910	100	5.07	0.166	4.8	3.03	18.90	138.2	clear WATER
1350	9.15'	7,010	110	5.26	0.165	5.2	3.06	18.66	130.0	clear WATER
1400	9.15'	8,110	110	5.26	0.164	4.6	3.10	18.61	129.3	clear WATER. DRIZZLE BEGINS
1410	9.15'	9,210	110	5.01	0.164	4.6	3.28	18.97	136.9	clear WATER.
1420	9.15'	10,160	95	4.91	0.164	4.1	2.46	19.16	140.2	clear WATER. DRIZZLE STOPS
1430	9.15'	11,100	94	5.01	0.163	4.3	2.25	18.95	136.2	clear WATER.
1440	9.15'	12,100	100	5.19	0.162	4.1	2.13	18.86	131.6	clear WATER.
1450	9.15'	13,080	98	5.35	0.161	4.0	2.09	18.72	129.5	clear WATER. EXPLOSIONS VERY CLOSE
1500	9.15'	14,060	98	5.32	0.160	4.2	1.98	18.60	128.7	clear WATER. Explosions END
1510	9.15'	15,040	98	5.28	0.159	4.1	2.01	18.57	129.4	clear WATER
←				Well Parameters stabilize						→
←				Sampling Begins						→

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 15' bTOC Dedicated Bladder Pump

SIGNATURE(S): Chuck C. Fay III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1803
Sample Location: 13MWT 18
Sampled By: Goerdt
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-29-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0850								
Method: Peristaltic	clear	4.44	293	16.27	6.6	5.67	361.6	---

PURGE DATA:

Date: 7-28-04 / 7/29/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 33.27								
Static Water Level (WL): 19.52								
One Casing Volume(gal/L): 8.3	7/29							
Start Purge (hrs): 0901	0815							
End Purge (hrs): 1231	0845							
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 20.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 28'

Purging of well occurred 7/28 & 7/29/04.

33.27
19.52
13.75 (.163) = 2.24 gal
= 8.3L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW18
DATE: 7-28-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~ L	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0901	19.52	—	—	—	—	—	—	—	—	Start purge
0911	21.40	1.10	110	4.57	311	5.5	3.12	15.77	365.3	Clear
0921	22.66	2.20	110	4.54	297	2.5	3.01	14.89	362.7	"
0931	24.23	3.30	110	4.66	289	1.7	3.01	15.28	355.7	"
0941	24.88	4.30	100	4.70	302	4.3	3.06	15.78	354.6	"
0951	25.31	5.30	100	4.65	294	32	3.40	15.94	361.0	"
1001	25.71	6.15	0.85	4.62	304	75	3.60	16.32	364.8	"
1011	25.92	7.00	0.85	4.47	335	92	3.82	17.03	373.0	Slightly cloudy
1021	26.40	8.85	0.85	4.39	367	110	3.66	17.11	376.1	"
1031	27.00	8.70	0.85	4.36	362	116	3.94	~~17.88~~	379.3	"
1041	27.15	9.55	0.85	4.29	378	120	4.14	17.03	382.6	"
1055	27.32	10.30	0.75	4.21	390	120	4.28	17.13	387.5	"
1101	27.73	11.05	0.75	4.17	417	110	4.87	17.72	394.0	"
1111	27.94	11.80	0.75	4.16	421	85	4.85	17.67	395.0	lowered intake
1121	28.10	12.55	0.75	4.16	423	75	5.02	17.79	394.6	to 29'.
1131	28.40	13.30	0.75	4.16	430	55	5.12	17.88	394.8	Clearing up
1141	28.62	14.05	0.75	4.20	432	50	5.17	17.80	392.3	clear
1151	28.85	14.80	0.75	4.25	431	45	5.04	18.03	391.1	lowered to 30'.
1201	29.03	15.55	0.75	4.27	432	27	5.21	18.22	392.2	clear
1206	29.13	~~15.93 16.30~~	~~0.38~~ 0.38	4.30	430	19	5.00	18.12	392.7	"
1211	29.22	16.30	0.38	4.31	428	19	5.08	18.13	392.2	"
1221	29.42	17.05	0.75	4.37	429	22	4.95	18.52	390.1	"
1231	29.58	17.80	0.75	4.56	423	21	5.12	18.41	381.0	"
~~1241~~		~~16.55~~	~~0.75~~							lowered to 31'
~~1251~~										unable to draw
~~1301~~		Continued on	page	2.	(7-29-04)					any more water.
										Wait for well
										to re-hydrate

Water Quality Meter (SN) 99K0055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300
Pump Intake 28'

SIGNATURE(S):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT18
DATE: 7-29-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~ L	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0815	19.98	—	—	—	—	—	—	—	—	Start purge
0825	21.44	0.80	80	4.44	317	31	6.78	16.60	349.5	clear
0835	22.56	1.60	80	4.40	307	8.2	6.26	16.54	358.4	"
0845	23.44	2.4	80	4.44	293	6.6	5.67	16.27	361.6	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300
Pump Intake -28'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1903
Sample Location: 13MWT 19
Sampled By: Gorski
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-27-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0954	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	Clear	4.57	1397	18.49	0.4	27.18	484.2	---

PURGE DATA:

Date: 7-27-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.05								
Static Water Level (WL): 10.71								
One Casing Volume(gal/L): 6.84								
Start Purge (hrs): 0815								
End Purge (hrs): 0950								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 8.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 18'

22.05
10.71
11.34 (.163) = 1.85 gal
= 6.84 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT19
DATE: 7-27-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0815	10.71	–	–	–	–	–	–	–	–	Start purge
0825	11.39	0.75	75	5.06	1330	28	21.37	16.78	380.5	particulates
0835	11.44	1.50	75	5.03	1337	17	23.42	17.12	394.9	"
0845	11.50	2.25	75	4.73	1356	12	25.39	17.92	420.1	clear
0855	11.57	3.00	75	4.60	1362	6.3	24.50	18.35	445.8	"
0905	11.59	3.75	75	4.60	1353	5.0	25.50	18.07	457.3	"
0915	11.72	4.85	100	4.70	1357	4.0	25.92	18.17	458.1	"
0925	11.85	5.75	100	4.64	1369	2.2	25.85	18.22	464.6	"
0935	11.91	6.75	100	4.52	1391	1.5	25.98	18.50	475.1	"
0945	11.96	7.75	100	4.57	1392	0.6	27.01	18.70	481.5	"
0950	11.99	8.25	50	4.57	1397	0.4	27.18	18.49	484.2	end purge

Water Quality Meter (SN) 99X0053
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4360
Pump Intake 18'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13GWT 2004
Sample Location: 13MWT 20
Sampled By: Gorski
C.O.C. No.: 0054

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-30-04 / Time: 1749 / Method: Peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clear	3.47	1288	20.04	3.5	15.56	337.2	---

PURGE DATA:

Date: 7-30-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.85								
Static Water Level (WL): 4.28								
One Casing Volume(gal): 11.2								
Start Purge (hrs): 1546								
End Purge (hrs): 1746								
Total Purge Time (min): 120								
Total Vol. Purged (gal): 12.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes) No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 18.5'

22.85
4.28
18.57 (.163) = 3.03 gal
11.2 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT20
DATE: 7-30-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1546	5.28	-	-	-	-	-	-	-	-	Start purge
1556	5.72	1.0	100	4.60	1268	6.7	4.54	19.05	310.2	clear
1606	6.20	2.0	100	3.63	1256	4.4	~~4.6~~	19.88	299.7	"
1616	6.51	3.0	100	3.60	1248	3.5	10.13	20.34	280.6	"
1626	6.76	4.0	100	3.57	1245	2.7	11.10	20.15	275.0	"
1636	6.87	5.0	100	3.57	1253	2.4	12.31	20.28	278.7	"
1646	7.18	6.0	100	3.54	1261	2.0	13.75	20.15	286.0	"
1656	7.27	7.0	100	3.49	1270	2.2	14.08	20.11	311.1	"
1706	7.42	8.0	100	3.51	1274	2.3	14.60	20.10	310.9	"
1716	7.51	9.0	100	3.49	1280	2.8	14.77	20.28	320.8	"
1726	7.60	10.0	100	3.48	1290	3.0	15.33	20.44	333.9	"
1736	7.66	11.0	100	3.48	1287	3.2	15.77	20.16	339.0	"
1746	7.73	12.0	100	3.47	1288	3.8	15.56	20.04	337.2	Stop purge

Water Quality Meter (SN) 99X0055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300
Pump Intake 18.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 21Ø3
Sample Location: 13MWT 21
Sampled By: C. Lacy / T. Nojahn
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/28/Ø4	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 13ØØ	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	clear	7.32	Ø.298	2Ø.Ø7	4.Ø	2.94	1Ø7.3	---

PURGE DATA:

Date: 7/28/Ø4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.76'								
Static Water Level (WL): 8.65'								
One Casing Volume(gal/L): 5.6								
Start Purge (hrs): 112Ø								
End Purge (hrs): 13ØØ								
Total Purge Time (min): 1ØØ								
Total Vol. Purged (gal/L): 8.87								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 13' bTOC

9.11' X 0.163 = 1.5gal or 5.6 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Chuck C. TT

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE SWMU 13 **WELL ID.:** 13MWT21
PROJECT NUMBER: N7448 CTO 0343 **DATE:** 7/28/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1120	8.65'	—	—	—	—	—	—	—	—	START PURGE
1130	8.93'	1,000	100	6.87	0.368	3.6	4.88	20.89	128.2	Clear water
1140	9.01'	2,000	100	6.90	0.364	2.4	4.60	20.89	120.7	Clear water
1150	9.06'	2,750	75	6.86	0.356	2.7	4.39	20.94	120.7	Clear water
1200	9.17'	3,850	110	6.91	0.347	2.1	4.23	20.09	116.3	Clear water
1210	9.22'	4,850	100	6.96	0.339	2.3	3.77	20.07	111.9	Clear water
1220	9.27'	5,670	82	7.12	0.321	2.5	3.78	20.09	112.4	Clear water
1230	9.15'	6,170	50	7.09	0.334	2.4	3.34	21.51	113.2	Clear water
1240	9.33'	7,270	110	7.27	0.314	3.2	3.23	19.80	110.4	Clear water
1250	9.36'	8,270	100	7.33	0.312	2.1	3.25	20.04	108.0	Clear water
1300	9.35'	8,870	60	7.32	0.298	4.0	2.94	20.07	107.3	Clear water
←				Well Parameters Stabilize						→
←				Sampling Begins						→

Water Quality Meter (SN) 0K04134 A/B
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 13' [redacted] bTOC Dedicated Bladder Pump

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2203
Sample Location: 13MWT 20
Sampled By: Gould
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-27-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1554	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	Clear	3.81	294	19.61	1.5	2.51	448.2	---

PURGE DATA:

Date: 7-27-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 15.00								
Static Water Level (WL): 8.49								
One Casing Volume(gal/L): 4								
Start Purge (hrs): 14.40								
End Purge (hrs): 1550								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 6.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 12'

15.00
8.49
6.51(.163) = 1.06 gal
= 3.93 L

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW22
DATE: 7-27-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1440	8.49	—	—	—	—	—	—	—	—	Start purge
1450	8.70	0.75	75	4.17	283	6.7	2.73	20.79	410.4	clear
1500	8.79	1.50	75	4.00	296	7.1	2.50	21.09	422.0	"
1510	8.82	2.25	75	3.95	303	5.3	2.56	21.19	424.8	"
1520	8.84	3.00	75	3.93	308	4.8	2.58	21.19	431.2	"
1530	8.89	3.75	75	3.91	300	2.5	2.45	20.06	438.7	"
1540	9.05	4.95	120	3.85	293	1.8	2.33	19.19	442.1	"
1550	9.15	6.15	120	3.81	294	1.5	2.51	19.61	448.2	end purge

Water Quality Meter (SN) 99K00055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300

Pump Intake ~~46~~ 121

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2303
Sample Location: 13MWT 23
Sampled By: T. ROJAHN
C.O.C. No.: 0051
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/25/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1642								
Method: SAME	CLEAR	5.48	0.315	17.26	2.1	3.37	141	---

PURGE DATA:

Date: 7/25/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: PERISTALTIC								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 24.50								
Static Water Level (WL): 8.54								
One Casing Volume(gal/(L)): 9.8								
Start Purge (hrs): 1420								
End Purge (hrs): 1640								
Total Purge Time (min): 140								
Total Vol. Purged (gal/(L)): 10.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 19.5'

15.96' x 0.163 = 2.6 gal or 9.8 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT23
DATE: 7-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1420	8.54	—	—	—	—	—	—	—	-	START PURGE
1430	9.48	1000	100	5.38	0.360	45	4.51	17.17	142	CLEAR
1440	9.92	1800	80	5.38	0.340	14	3.81	16.89	142	CLEAR
1450	10.19	2500	70	5.37	0.331	7.5	3.68	16.79	142	CLEAR
1500	10.38	3200	70	5.38	0.328	7.0	3.63	16.79	142	CLEAR
1510	10.50	3900	70	5.39	0.326	6.4	3.61	16.83	142	CLEAR
1520	10.64	4600	70	5.40	0.325	5.5	3.57	16.87	142	CLEAR
1530	10.78	5300	70	5.41	0.326	4.3	3.52	16.95	142	CLEAR
1540	10.89	6000	70	5.43	0.325	4.2	3.48	17.08	142	CLEAR
1550	10.99	6700	70	5.43	0.324	4.1	3.44	17.15	142	CLEAR
1600	11.07	7400	70	5.43	0.322	3.2	3.40	17.04	142	CLEAR
1610	11.16	8100	70	5.45	0.320	2.5	3.38	17.04	141	CLEAR
1620	11.19	8800	70	5.47	0.320	2.2	3.34	17.29	141	CLEAR
1630	11.20	9500	70	5.47	0.318	2.1	3.36	17.31	141	CLEAR
1635	11.21	9850	70	5.48	0.316	2.0	3.36	17.18	140	CLEAR
1640	11.18	10150	60	5.48	0.315	2.1	3.37	17.26	141	CLEAR
1642	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): 419
Turbidity Meter (SN): 1760 - 1800

Pump Intake: 19.5'

SIGNATURE(S): Tony Rojek

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2403
Sample Location: 13MWT 24
Sampled By: Gerdt
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-23-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1128	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Peristaltic	clear	5.41	.669	20.16	5.82	1.07	*395	---

PURGE DATA:

Date: 7-23-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 25.19								
Static Water Level (WL): 9.35								
One Casing Volume(gal/L): 9.6								
Start Purge (hrs): 0948								
End Purge (hrs): 1123								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 10.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 20'

*ORP spiked at end of purge.

25.19
9.35
15.84 (.163) = 2.58 gal
= 9.55 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT24
DATE: 7-23-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~ L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0948	9.35	—	~~250~~	—	—	~~40.3~~	—	—	—	Start purge
0958	10.93	1.0	170	5.73	.786	~~.786~~	1.81	18.79	94.3	clear
1008	11.90	2.4	170	5.51	.743	25.6	1.88	18.12	110.1	"
1018	12.23	3.9	150	5.48	.736	22.4	1.89	18.07	113.3	"
1028	12.61	5.4	150	5.27	.684	12.0	1.58	18.79	131.9	"
1038	12.97	6.9	150	5.47	.662	11.1	1.32	17.93	140.4	"
1048	12.76	7.4	150	5.53	.659	10.5	1.19	18.26	159.8	"
1058	12.36	8.4	100	5.67	.686	7.06	1.21	20.13	163.9	"
1108	12.14	9.4	100	5.41	.680	6.54	1.17	20.40	310.0	"
1113	11.98	9.9	50	5.42	.679	6.31	1.12	20.17	383.1	"
1118	11.95	10.4	50	5.44	.673	6.14	1.10	20.09	390.0	"
1123	11.97	10.9	50	5.41	.669	5.82	1.07	20.16	395.2	end purge Begin Sampling

Water Quality Meter (SN) 0150979
Control Box type (SN) NA
Turbidity Meter (SN) 4560-4300

Pump Intake 20'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2503
Sample Location: 13MWT 25
Sampled By: Goerdt
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-24-04 / Time: 1510 / Method: peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clear	4.58	382	21.80	40	1.87	717	---

PURGE DATA:

Date: 7-23-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.95								
Static Water Level (WL): 8.02								
One Casing Volume(gal/L) 6.0								
Start Purge (hrs): 1250								
End Purge (hrs): 1425								
Total Purge Time (min):								
Total Vol. Purged (gal/L)								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] 13GWT 2503 -F

Pump intake @ 13.00'

WL on 7/24/04 15.43

Turbidity prior to metals - 40 NTU

17.95
8.02
9.93(.163) = 1.62 gal
= 6.0 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 136WT2503
DATE: 7-23-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1250	8.02	—	—	—	—	—	—	—	—	Start purge
1300	9.43	1.5	150	4.73	.363	11.4	0.91	20.34	358.3	Clear
1310	10:09	3.0	150	4.77	.359	9.7	1.63		473	"
1320	11.34	4.5	150	4.78	.350	1.4	1.90	21.36	644	"
1330	11.84	6.0	150	4.88	.359	1.2	1.82	22.33	649	"
1340	12.61	7.5	150	4.67	.353	7.4	1.65	22.06	675	"
1350	13.80	9.0	150	4.53	.356	12.0	1.37	22.23	693	"
1400	14.19	10.5	150	4.38	.357	10.5	1.20	21.92	707	"
1410	15.33	12.0	150	4.30	.363	9.1	0.98	21.73	718	"
1415	15.75	12.75	75	4.24	.369	8.7	1.41	21.64	730	"
1420	15.83	13.50	75	4.58	.382	7.6	1.87	21.80	717	"
1425	DRY	~~14.25~~ 4th	~~25~~ 2							Well dried out

Water Quality Meter (SN) 01C0979
Control Box type (SN) NA
Turbidity Meter (SN) 4560 4300
SIGNATURE(S)

Pump Intake 13'

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2603
Sample Location: 13MWT 26
Sampled By: Gorski
C.O.C. No.: 0050
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-23-04 / Time: 1745 * / Method: peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clear	5.27	.430	19.77	22	~~0.89~~ 0.89	752	---

PURGE DATA:

Date: 7-23-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.18								
Static Water Level (WL): 10.01								
One Casing Volume(gal/L): 7.34								
Start Purge (hrs): 1448								
End Purge (hrs): 1738								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 21.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 17'

* All parameters were continually stable for nearly one hour.

22.18
10.01
12.17 (.163) = 1.98 gal
= 7.34 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW26
DATE: 7-23-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1448	10.01	-	-	-	-	-	-	-	-	Start purge
1458	11.95	1.1	110	5.09	.267	63	0.89	22.28	601	Clear
1508	12.81	2.2	110	5.11	.257	37	0.75	21.53	640	"
1518	13.19	3.2	110	5.13	.263	32	0.74	21.84	603	"
1528	13.66	4.4	110	5.13	.249	27	1.25	21.85	680	"
1538	14.10	5.7	130	5.08	.251	29	1.80	21.18	697	"
1548	14.61	7.0	130	5.14	.277	26	1.22	20.94	711	"
1558	14.99	8.3	130	5.16	.279	31	1.23	21.01	712	"
1608	15.36	9.6	130	5.13	.295	27	1.12	20.96	717	"
1618	15.75	10.9	130	5.14	.329	25	0.97	20.75	723	"
1628	16.90	12.2	130	5.15	.376	35	0.91	20.62	728	"
1638	16.78	13.5	130	5.16	.377	28	0.93	20.77	729	"
1648	16.86	14.8	130	5.20	.412	34	0.95	21.48	730	"
1658	17.03	16.2	140	5.27	.423	29	6.93	19.86	733	"
1708	17.50	17.6	140	5.29	.426	24	0.93	20.13	729	"
1718	17.92	19.0	140	5.28	.429	23	0.91	19.79	732	"
1728	18.30	20.4	140	5.25	.432	18	0.88	19.83	746	"
1738	18.79	21.8	140	5.27	.430	22	0.89	19.78	752	stop purge

Water Quality Meter (SN) 0160979
Control Box type (SN) NA
Turbidity Meter (SN) 4560 - 4300

Pump Intake 17'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2702
Sample Location: 13MWT 27
Sampled By: Gossett
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-30-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1608	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	clear	3.36	29.4	20.10	3.3	4.96	423.5	---

PURGE DATA:

Date: 7-30-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.40								
Static Water Level (WL): 9.80								
One Casing Volume(gal/L): 7.6								
Start Purge (hrs): 1314								
End Purge (hrs): 1604								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 8.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 17.5

22.40
9.80
12.60 (.163) = 2.05 gal
= 7.6L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): J. Gossett

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW27
DATE: 7-30-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~ 90	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1314	9.80	-	-	-	-	-	-	-	-	Start purge
1324	11.21	0.90	90	3.24	308	35	5.72	19.17	421.3	Clear
1334	12.00	1.80	90	3.23	300	7.8	5.90	19.38	423.9	"
1344	12.51	2.55	75	3.20	289	4.1	5.48	19.75	423.6	"
1354	12.66	3.30	75	3.30	285	3.8	5.37	19.84	422.8	"
1404	12.73	4.05	75	3.33	274	3.9	5.21	19.96	422.5	"
1414	12.87	4.80	75	3.34	274	3.7	4.79	20.05	423.1	"
1424	13.26	5.55	75	3.35	272	5.1	4.67	20.14	422.8	"
1434	13.41	6.30	75	3.34	273	4.2	5.02	20.32	423.5	"
1444	13.54	7.05	75	3.37	277	3.9	5.08	20.17	425.3	"
1554	13.75	7.80	75	3.35	290	5.7	5.39	19.66	424.7	"
1559	14.18	8.18	38	3.36	290	5.3	5.30	19.73	423.8	"
1604	14.65	8.55	38	3.36	294	3.3	4.96	20.10	423.5	Stop purge.

Water Quality Meter (SN): 99K0055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300

Pump Intake: 17.5'

SIGNATURE(S):

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 28 Ø2
Sample Location: 13MWT 28
Sampled By: CCL
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1234	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	cloudy	8.Ø8	1.217	17.98	65	Ø.26	73.5	---

PURGE DATA:

Date: 7/31/Ø4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 91.7Ø								
Static Water Level (WL): 77.85								
One Casing Volume(gal/L): 8.5								
Start Purge (hrs): Ø834								
End Purge (hrs): 1234								
Total Purge Time (min): 24Ø								
Total Vol. Purged (gal/L): 11.34								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT F~~

Pump intake @ 88' bTOC

91.7Ø
-77.85
13.85 x Ø.163 = 2.25 gallons
OR
8.5 L

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Clark C. Ly III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE, SWMU 13 **WELL ID.:** 13GWT28
PROJECT NUMBER: N7448 CTO 0343 **DATE:** 7/31/04
Overcast, Foggy, 75°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0834	77.85'	—	—	—	—	—	—	—	—	INITIAL Reading; Begin Pump
0844	79.79'	960	96	7.98	1.215	3.4	0.65	16.04	88.8	clear water
0854	80.20'	1,500	54	8.00	1.256	2.0	0.57	17.14	83.9	Clear water. Drizzle Begins
0904	80.62'	1,860	36	8.06	1.261	1.4	0.56	17.31	80.2	Clear water. Drizzle.
0914	80.81'	2,240	38	8.10	1.259	1.0	0.54	17.29	79.3	Clear water. Drizzle.
0924	81.05'	2,650	41	8.13	1.256	1.1	0.46	17.21	77.9	Clear water. Drizzle stops.
0934	81.24'	3,060	41	8.14	1.255	0.95	0.45	17.28	77.8	Clear water.
0944	81.43'	3,460	40	8.15	1.228	1.3	0.45	17.27	76.4	Clear water.
0954	81.68'	3,890	43	8.14	1.190	2.4	0.48	17.39	77.0	Clear water.
1004	81.90'	4,330	44	8.14	1.168	3.7	0.53	17.40	76.5	Clear water.
1014	82.12'	4,780	45	8.14	1.161	5.0	0.51	17.53	76.4	Clear water.
1024	82.36'	5,230	45	8.14	1.151	7.5	0.47	17.34	75.8	clear water,
1034	82.58'	5,680	45	8.16	1.148	12	0.47	17.20	74.9	Clear water,
1044	82.82'	6,140	46	8.16	1.155	19	0.46	17.34	74.4	Clear water.
1054	83.05'	6,610	47	8.16	1.167	37	0.43	17.53	74.2	Slightly cloudy water
1104	83.25'	7,080	47	8.17	1.177	50	0.41	17.60	73.8	Slightly cloudy water
1114	83.50'	7,560	48	8.16	1.190	65	0.39	17.77	73.1	Cloudy water
1124	83.72'	8,020	46	8.13	1.204	75	0.40	18.01	74.3	Cloudy water
1134	83.94'	8,460	44	8.11	1.215	80	0.36	18.11	74.6	Cloudy water
1144	84.16'	8,940	48	8.03	1.231	85	0.34	18.59	77.2	Cloudy water
1154	84.39'	9,400	46	7.97	1.236	85	0.34	18.57	78.0	Cloudy water
1204	84.61'	9,860	46	7.94	1.232	80	0.32	18.40	77.9	Cloudy water
1214	84.84'	10,360	50	7.99	1.223	80	0.28	18.06	75.7	Cloudy water
1224	85.05'	10,860	50	8.03	1.221	75	0.27	18.11	74.6	Cloudy water
1234	85.27	11,340	48	8.08	1.217	65	0.26	17.98	73.5	Cloudy water
←			4 Hour	Purge	Limit	Reached				→
←				Sampling	Begins					→

Water Quality Meter (SN) 01C0131 AB
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 88' bTOC. Dedicated Bladder Pump

SIGNATURE(S): Mark C. Byrne III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13GWT 2902
Sample Location: 13MWT 29
Sampled By: Gorski
C.O.C. No.: 0052

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/27/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1152	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	Clear	5.62	662	19.73	4.2	8.40	2.8	---

PURGE DATA:

Date: 7/27/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.20								
Static Water Level (WL): 5.11								
One Casing Volume(gal/L) 9.7								
Start Purge (hrs): 1029								
End Purge (hrs): ~~1159~~ 1149								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L) 10								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 16'

21.20
5.11
16.09 (.163) = 2.62 gal
= 9.7 L

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW29
DATE: 7-27-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1029	5.11	—	—	—	—	—	—	—	—	Start purge
1039	5.70	1.25	125	5.95	699	34	8.42	19.36	14.5	Clear w/ particulates
1049	5.79	2.50	125	5.87	678	14	8.35	19.25	14.6	"
1059	5.83	3.75	125	5.73	657	8.8	8.48	19.30	19.4	Clear
1109	5.85	5.00	125	5.70	659	6.2	8.74	19.22	19.6	"
1119	5.85	6.25	125	5.67	655	5.4	8.87	19.20	16.6	"
1129	5.86	7.50	125	5.65	661	4.7	8.29	19.55	10.4	"
1139	5.85	8.75	125	5.64	655	3.8	8.22	19.16	6.6	"
1149	5.85	10.00	125	5.62	662	4.2	8.40	19.73	2.8	end purge

Water Quality Meter (SN) 99K0055
Control Box type (SN) NA
Turbidity Meter (SN) 4650-4300

Pump Intake 16'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3002
Sample Location: 13MWT 30
Sampled By: T. ROJAHN
C.O.C. No.: 0051
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/26/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1042	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	5.20	0.795	15.40	0.60	7.03	142	---

PURGE DATA:

Date: 7/26/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" Ø, PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.65								
Static Water Level (WL): 12.10								
One Casing Volume(gal): 9.0								
Start Purge (hrs): 0850								
End Purge (hrs): 1040								
Total Purge Time (min): 110								
Total Vol. Purged (gal): 9.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 21.65

14.55' x 0.163 = 2.4 gal or 9.0 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT30
DATE: 7/26/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
850	12.10	—	—	—	—	—	—	—	—	START PURGE
900	12.45	800	80	4.91	0.891	2.8	11.53	16.55	185	CLEAR
910	12.96	1800	100	5.20	0.845	1.9	10.41	15.60	167	CLEAR
920	13.40	2800	100	5.30	0.816	0.75	9.29	15.37	152	CLEAR
930	13.55	3600	80	5.29	0.814	0.40	8.77	15.43	148	CLEAR
940	13.66	4400	80	5.30	0.812	0.45	8.23	15.30	146	CLEAR
950	13.80	5200	80	5.28	0.811	0.40	8.06	15.32	145	CLEAR
1000	13.88	6000	80	5.25	0.810	0.45	7.73	15.34	144	CLEAR
1010	13.98	6900	90	5.25	0.804	0.55	7.32	15.25	143	CLEAR
1020	14.05	7800	90	5.24	0.800	0.75	7.07	15.22	143	CLEAR
1030	13.98	8600	80	5.20	0.798	0.80	7.17	15.40	142	CLEAR
1040	13.96	9400	80	5.20	0.795	0.60	7.03	15.40	142	CLEAR
1042	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): 419
Turbidity Meter (SN): 1760-1800

Pump Intake: 21.65'

SIGNATURE(S): Tony Rojek

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 33 01 02 (FD)
Sample Location: 13MWT 33 31
Sampled By: GOLDER
C.O.C. No.: 0051
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA: 7-26-04

Date: 7-25-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1043								
Method: peristaltic	Clear	5.39	1444	15.98	6.1	23.40	518.6	---

PURGE DATA:

Date: 7-25-04 7/26/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.5								
Static Water Level (WL): 11.73								
One Casing Volume(gal/L): ~~6.5~~ 5L								
Start Purge (hrs): 0858								
End Purge (hrs): 1038								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 8.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ ~~17.5'~~ 15.5' bgs

bgs ~~22.50~~ 20.00
11.73
~~10.77~~ 8.27 (.163) = ~~1.76~~ 1.35 gal
= ~~6.5~~ L
5.0 L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

7-26-04 gs

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MW31 ~~33~~ gs
DATE: 7-25-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0858	11.73	-	-	-	-	-	-	-	-	Start purge
0903	12.53	0.8	~~80~~ 80	5.34	1711	50	18.22	15.97	498.8	clear
0908	12.65	1.6	80	5.37	1714	45	19.89	16.02	501.6	"
0913	12.75	2.4	80	5.38	1695	38	19.65	15.98	511.1	"
0918	12.83	3.2	80	5.39	1669	32	22.34	15.93	511.9	"
0923	12.91	4.0	80	5.41	1673	26	23.21	15.95	512.8	"
0928	12.98	4.8	80	5.42	1634	23	24.05	16.00	514.1	"
1003	13.07	5.6	80	5.42	1579	22	22.89	16.03	514.7	"
1018	13.12	6.4	80	5.39	1542	18	23.63	15.96	517.0	"
1028	13.19	7.2	80	5.40	1480	9.0	23.46	15.98	518.6	"
1033	13.22	7.6	40	5.40	1472	-	23.76	15.98	518.1	"
1038	13.24	8.0	40	5.39	1444	6.1	23.40	15.98	518.6	end purge

Water Quality Meter (SN): 98X00055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4308

Pump Intake: ~~17.5~~ 15.5 ft bls

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3202
Sample Location: 13MWT 32
Sampled By: T. ROJAHN
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/27/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0954	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	6.99	0.519	12.79	2.6	10.90	71	---

PURGE DATA:

Date: 7/27/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.90								
Static Water Level (WL): 9.02								
One Casing Volume(gal/L): 7.3								
Start Purge (hrs): 0830								
End Purge (hrs): 0950								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 7.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	3 X (2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] ~~13GWT 15 -F~~ (FC)

Pump intake @ 15.9'

11.88 x 0.163' 1.9 gal or 7.3 L

Circle if Applicable:

MS/MSD: YES

Duplicate ID No.:

Signature(s):

Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER:

WELL ID.: 13 NWT 32
DATE: 7-27-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0830	9.02	—								
0840	9.43	1100	110	7.25	0.508	23	8.91	17.63	70	CLEAR
0850	9.54	2100	100	7.23	0.507	6.8	8.33	17.59	71	"
0900	9.65	3100	100	7.15	0.508	5.9	8.42	17.69	72	"
0910	9.68	4100	100	7.07	0.510	5.0	9.82	17.87	73	"
0920	9.53	5000	90	7.05	0.517	4.2	10.15	18.80	72	"
0930	9.51	5900	90	7.03	0.517	3.3	10.47	18.51	72	"
0940	9.51	6800	90	7.00	0.520	2.5	10.97	18.71	72	"
0950	9.53	7700	90	6.99	0.519	2.8	10.90	18.79	71	"
0954	—	—	—	—	—	—	—	—	—	SAMPLE TIME

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) 419
Turbidity Meter (SN) 1760-1800

Pump Intake 15.9'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3302
Sample Location: 13MWT 33
Sampled By: Gerdt
C.O.C. No.: 0052
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-26-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1650	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	Clear	4.96	91	16.12	94	5.56	559.8	---

PURGE DATA:

Date: 7-26-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.5								
Static Water Level (WL): 12.48								
One Casing Volume(gal/L): 6.04								
Start Purge (hrs): 1245								
End Purge (hrs): 1645								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 18.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] 13GWT 3302 -F

Pump intake @ 17.5'

22.50
12.48
10.02(.163) = 1.63 gal
= 6.04 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW33
DATE: 7-26-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1245	12.48	–	–	–	–	–	–	–	–	Start purge
1255	12.88	0.8	80	5.04	114	55	6.94	16.26	528.7	Clear
1305	13.04	1.6	80	5.03	106	26	6.88	16.32	532.1	"
1315	13.40	2.4	80	4.99	93	14	6.72	15.78	540.1	"
1325	13.03	~~3.2~~ 3.0	~~80~~ 60	4.98	95	12	6.76	15.95	538.3	pump stopped due
1335	13.15	~~3.24~~ 3.0	80	4.98	95	5.3	6.87	16.42	539.0	to low battery.
1345	13.50	~~4.84~~ 4.0	80	4.95	92	11	6.98	15.79	542.3	Clear
1355	13.78	5.0	80	4.95	92	15	6.97	16.02	546.2	"
1405	14.00	6.4	80	4.94	92	21	6.84	16.18	547.9	"
1415	14.18	7.2	80	4.91	90	23	6.69	16.05	548.9	"
1425	14.32	8.0	80	4.92	90	25	6.57	16.03	549.7	"
1435	14.59	8.8	80	4.91	89	29	6.27	16.05	550.1	"
1445	14.81	9.6	80	4.91	89	32	5.82	16.08	551.9	"
1455	14.93	10.4	80	4.94	90	35	5.80	16.08	553.3	"
1505	15.02	11.2	80	4.94	88	35	5.71	16.10	554.2	"
1515	15.13	12.0	80	4.96	89	37	5.72	16.14	553.1	"
1525	15.41	12.8	80	4.97	89	55	5.72	16.10	554.6	"
1535	15.56	13.0	80	5.01	91	61	5.74	16.38	553.6	"
1545	15.71	13.8	80	5.01	92	64	5.70	16.40	553.7	"
1555	15.80	14.6	80	5.00	92	68	5.62	16.48	553.9	"
1605	15.96	15.4	80	4.98	92	70	5.45	16.34	556.8	"
1615	16.18	16.2	80	4.99	92	73	5.44	16.36	556.5	"
1625	16.24	17.0	80	4.98	93	80	5.47	16.46	556.3	"
1635	16.31	17.8	80	4.95	91	86	5.55	16.17	559.0	"
1645	16.45	18.6	80	4.96	91	94	5.56	16.12	559.8	End Purge

Water Quality Meter (SN)
Control Box type (SN) NA
Turbidity Meter (SN) 4650-4300

Pump Intake 17.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13GWT 3402
Sample Location: 13MWT 34
Sampled By: CCL
C.O.C. No.: 0053

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/29/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1047								
Method: Bladder Pump	Clear	5.06	0.347	18.58	21	13.42	149.6	---

PURGE DATA:

Date: 7/29/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.90'								
Static Water Level (WL): 5.15'								
One Casing Volume(gal/L): 10.9								
Start Purge (hrs): 0827								
End Purge (hrs): 1047								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 12.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT-----F~~

Pump intake @ 17.5' bToc Dedicated Bladder Pump

22.90'
- 5.15'
17.75' x 0.163 = 2.89gal
OR
10.9 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Clark C. Tyler III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE SWMU 13 | WELL ID.: 13MWT34
PROJECT NUMBER: N9060 CTO Φ279 | DATE: 7/29/04
OVERCAST & 70°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
Φ827	5.15'	-	-	-	-	-	-	-	-	Begin Purge
Φ837	5.63'	162Φ	162	5.38	Φ.354	35	13.19	17.84	153.Φ	Slightly Cloudy water
Φ847	5.6Φ'	255Φ	93	5.37	Φ.351	65	15.88	17.73	148.6	Slightly cloudy water
Φ857	5.6Φ'	345Φ	9Φ	5.37	Φ.351	75	17.62	17.9Φ	147.3	Slightly cloudy water
Φ9Φ7	5.6Φ'	437Φ	92	5.36	Φ.351	75	1875	18.15	148.1	Slightly cloudy water
Φ917	5.61'	525Φ	88	5.36	Φ.347	7Φ	17.6Φ	17.66	147.3	Slightly cloudy water
Φ927	5.62'	616Φ	91	5.35	Φ.345	5Φ	11.83	17.74	146.2	Slightly cloudy water
Φ937	5.62'	7ΦΦΦ	84	5.29	Φ.348	95	17.74	18.39	147.1	Slightly cloudy water ← HORIBA FELL OVER
Φ947	5.62'	785Φ	85	5.24	Φ.353	5Φ	16.54	18.35	148.2	Slightly cloudy water,
Φ957	5.61'	867Φ	82	5.Φ3	Φ.351	35	16.33	18.31	153.9	Slightly cloudy water,
1Φ07	5.61'	953Φ	86	5.Φ5	Φ.35Φ	25	15.72	18.26	152.1	clear water
1Φ17	5.6Φ'	1Φ,35Φ	82	5.Φ3	Φ.351	22	15.11	18.69	152.3	clear water
1Φ27	5.6Φ'	11,17Φ	82	4.97	Φ.35Φ	21	14.61	18.9Φ	153.6	clear water
1Φ37	5.6Φ	11,97Φ	8Φ	5.ΦΦ	Φ.349	21	14.12	18.82	151.8	clear water
1Φ47	5.6Φ	12,77Φ	8Φ	5.Φ6	Φ.347	21	13.42	18.58	149.6	clear water
←				Well	Parameters	STA	BILIZE			→
←					SAMPLING	BEGINS				→

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10-1588
Turbidity Meter (SN): 1760-1800
Pump Intake: 17.5' bTOC Dedicated Bladder Pump

SIGNATURE(S): Charles C. Fry III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3502
Sample Location: 13MWT 35
Sampled By: Gorski
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/1/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0825								
Method: Dis. Bailer	Grey	7.58	.718	15.91	>1000	0.98	—	---

PURGE DATA:

Date: 7/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	~~Other~~ ORP	Time
Method: Dis. Bailer	1	7.24	0.733	17.75	71000	0.47	—	135	1501
Monitor Reading (ppm): —	2	6.85	0.716	15.91	71000	0.57	—	231	1508
Well Casing Diameter & Material	3	7.58	0.718	15.91	71000	0.98	—	203	1515
Type: 2" Ø PVC			See Low Flow Purge Data Sheets						
Total Well Depth (TD): 70.2	Dry	—						→	1519
Static Water Level (WL): 63.9									
One Casing Volume(gal/L): 3.7									
Start Purge (hrs): 1455									
End Purge (hrs): 1519									
Total Purge Time (min): 24									
Total Vol. Purged (gal/L): 13									

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ NA

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3602
Sample Location: 13MWT 36
Sampled By: J. GOEDT
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-29-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1048								
Method: Peristaltic	Clear	5.51	680	15.66	9.9	16.14	350.1	---

PURGE DATA:

Date: 7-29-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.40								
Static Water Level (WL): 18.70								
One Casing Volume(gal/L): 5.3								
Start Purge (hrs): 0934								
End Purge (hrs): 1044								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 5.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ ~~4.5~~ 4.95 / 231

27.40
18.70
8.70 (.163) = 1.42 gal
= 5.3 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT36
DATE: 7-29-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0934	18.70	—	—	—	—	—	—	—	—	Start purge
0944	19.09	0.80	80	5.49	691	28	16.18	16.14	341.2	clear
0954	19.14	1.60	80	5.52	693	21	16.04	16.24	341.8	"
1004	19.23	2.40	80	5.54	694	15	15.47	15.90	341.5	"
1014	19.43	3.20	80	5.53	684	12	16.18	15.80	344.4	"
1024	19.61	4.00	80	5.53	682	9.7	16.53	15.75	346.7	"
1034	19.69	4.80	80	5.52	681	9.6	16.34	15.71	348.4	"
1044	19.85	5.60	80	5.51	680	9.9	16.14	15.66	350.1	end purge

Water Quality Meter (SN) 99K000.55
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300
Pump Intake 23'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 37Φ2
Sample Location: 13MWT 37
Sampled By: CCL
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/3Φ/Φ4	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 11Φ2	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	clear	6.26	Φ.174	17.35	5.Φ	2.9Φ	133.5	---

PURGE DATA:

Date: 7/3Φ/Φ4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.15'								
Static Water Level (WL): 13.36'								
One Casing Volume(gal/L): 9								
Start Purge (hrs): ΦΦ53								
End Purge (hrs): 11Φ2								
Total Purge Time (min): 129								
Total Vol. Purged (gal): 9.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT F~~

Pump intake @ _____

27.15'
- 13.36'
13.79'

Duplicate Sample Taken @ This Location

Circle if Applicable:

MS/MSD

Duplicate ID No.: 13FDΦ73ΦΦ4Φ1

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N7448 CTO 0343

WELL ID.: 136WT37
DATE: 7/30/04
Overcast, Humid, 75°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0853	13.36'	—	—	—	—	—	—	—	—	Begin Pumping
0902	14.13'	1,170	130	6.23	0.145	50	4.74	15.38	147.0	Slightly cloudy water
0912	14.15'	2,270	110	6.22	0.146	27	4.12	15.65	140.6	clear w/small particles
0922	14.21'	3,370	110	6.28	0.146	20	3.99	15.50	136.7	clear w/small particles
0932	14.03'	4,000	63	6.28	0.150	14	3.86	16.58	135.6	clear water
0942	14.02'	4,620	62	6.31	0.152	11	3.85	16.74	133.8	clear water
0952	14.02'	5,220	60	6.29	0.154	10	3.71	16.93	134.1	clear water
1002	14.02'	5,810	59	6.26	0.156	8.8	3.52	17.08	134.8	clear water
1012	14.02'	6,410	60	6.28	0.159	8.1	3.44	17.02	133.5	clear water
1022	14.02'	7,000	59	6.27	0.163	7.1	3.26	17.21	133.6	clear water
1032	14.02'	7,600	60	6.29	0.165	6.4	3.16	17.10	132.5	clear water
1042	14.02'	8,200	60	6.26	0.169	6.2	3.05	17.17	132.9	clear water
1052	14.02'	8,800	60	6.27	0.173	4.9	2.97	17.34	132.6	clear water
1102	14.02'	9,400	60	6.26	0.174	5.0	2.90	17.35	133.5	clear water
←				Well	Parameters		Stabilized	→		
←					Sampling	Begins	→			

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10-1588
Turbidity Meter (SN): 1760-1800

Pump Intake: _____

SIGNATURE(S): _____

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 38 Ø2
Sample Location: 13MWT 38
Sampled By: CCL
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/31/Ø4	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1442	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Clear	8.44	Ø.665	21.72	18	1.7Ø	72.9	---

PURGE DATA:

Date: 7/3Ø/Ø4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.7Ø'								
Static Water Level (WL): 61.64'								
One Casing Volume(gal/L): 3.69								
Start Purge (hrs): 1538								
End Purge (hrs): 1713								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 7.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT F~~

Pump intake @ ≈ 66' From TOC

67.7Ø
-61.64
6.Ø6 x Ø.163 = Ø.98 Gallons
OR
3.69 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE SWMU 13 | WELL ID.: 13MW38
PROJECT NUMBER: N7448 CTO 0343 | DATE: 7/30/04
RAIN, HUMID, 80°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1354	61.64'	—	—	—	—	—	—	—	—	INITAL Reading
1405	61.64'	150	15	8.47	0.588	UNK	0.07	22.26	85.5	Cloudy water
1407		PUMPING STOPPED TO CHECK PUMP								
1414		BEGIN PUMPING								
1420		STOP PUMPING - TERRY COMES OVER & HELPS ME. PUMP NEEDS A								
		SPECIAL O-RING @ OFFICE.								
1538	61.64'	—	—	—	—	—	—	—	—	INITAL Reading
1548	62.88'	1,350	140	7.86	0.595	370	1.10	17.06	111.5	Cloudy, Gray water. HEAVY RAIN
1558	63.36'	2,450	90	7.84	0.604	390	1.28	17.42	105.2	Cloudy water. HEAVY RAIN
1608	63.95'	3,350	90	7.85	0.604	330	1.35	17.49	102.3	Cloudy water. Heavy Rain
1618	64.35'	4,040	69	7.84	0.620	280	1.49	18.62	101.0	Cloudy water. Heavy Rain
1628	64.72'	4,710	67	7.85	0.624	120	1.33	18.57	99.3	Slightly cloudy water. Rain.
1638	65.12'	5,400	69	7.83	0.627	60	1.06	18.41	102.1	Slightly cloudy water. Rain.
1648	65.52'	6,100	70	8.00	0.627	27	0.89	18.22	88.2	Slightly cloudy water. Rain.
1658	65.90'	6,800	70	8.16	0.628	18	0.81	18.37	78.8	Slightly cloudy water. Rain.
1708	66.25'	7,500	70	8.23	0.611	14	0.76	18.33	77.8	Clear water. Rain
1713	>66.40'	←		DRY	WELL - TOP OF			PUMP →		
7/31→ 1442	61.81'	—	—	—	—	—	—	—	—	Reading on 7/31/04

Water Quality Meter (SN): 01C0134 AB
Control Box type (SN): MP10-1588
Turbidity Meter (SN): 1760 - 1800
Pump Intake: 66' From TOC

SIGNATURE(S): Clarke C. Cay III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 3902
Sample Location: 13MWT 39
Sampled By: Goerdt
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-29-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1359								
Method: Peristaltic	clear	5.85	352	16.31	2.2	6.07	391.0	---

PURGE DATA:

Date: 7-29-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 26.70								
Static Water Level (WL): 14.85								
One Casing Volume(gal/L): 7.1								
Start Purge (hrs): 1235								
End Purge (hrs): 1355								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 22'

26.70
14.85
11.85 (.163) = 1.93 gal
= 7.1 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW07 39
DATE: 7-29-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1235	14.85	—	—	—	—	—	—	—	—	start purge
1245	15.56	1.0	100	5.83	363	12	5.28	16.41	321.2	slow w/ particulate
1255	15.67	2.0	100	5.83	343	7.7	5.23	16.56	321.3	"
1305	15.79	3.0	100	5.81	341	5.1	5.47	16.61	321.9	"
1315	15.84	4.0	100	5.82	346	5.1	5.41	16.42	321.1	"
1325	15.92	5.0	100	5.82	359	5.3	5.36	16.25	321.3	"
1335	15.97	6.0	100	5.84	355	4.1	5.61	16.87	320.6	clear
1345	16.03	7.0	100	5.84	353	2.7	5.61	16.42	321.5	"
1355	16.08	8.0	100	5.85	352	2.2	6.07	16.31	321.0	end purge

Water Quality Meter (SN): 99X00055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300
Pump Intake: 22'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4002
Sample Location: 13MWT 40
Sampled By: T Rojahn
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/30/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1124	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	5.04	0.329	15.02	1.28	0.39	538	---

PURGE DATA:

Date: 7/30/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Dedicated Bladder								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.70								
Static Water Level (WL): 17.87								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 0940								
End Purge (hrs): 1120								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 8.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 23'

9.83' x 0.163 = 1.6 gal or 6.1 L

Circle if Applicable:

MS/MSD | Duplicate ID No.: ---

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT40
DATE: 7/30/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0940	17.87	–	–	–	–	–	–	–	–	START PURGE
0950	18.15	800	80	5.40	0.333	4.02	1.07	15.40	291	CLEAR
1000	18.22	1800	100	5.20	0.331	3.48	0.75	14.98	430	CLEAR
1010	18.28	2800	100	5.15	0.329	3.02	0.67	14.87	466	CLEAR
1020	18.28	3800	100	5.14	0.328	2.80	0.48	14.83	423	CLEAR
1030	18.29	4800	100	5.11	0.326	2.32	0.46	14.55	507	CLEAR
1040	18.28	5800	100	5.09	0.327	1.78	0.42	14.66	509	CLEAR
1050	18.30	6800	100	5.09	0.328	1.67	0.41	14.85	529	CLEAR
1100	18.29	7800	100	5.07	0.328	1.59	0.41	14.86	530	CLEAR
1110	18.29	8300	100	5.06	0.328	1.39	0.41	14.88	535	CLEAR
1120	18.29	8800	100	5.04	0.329	1.28	0.39	15.02	538	CLEAR
1124	–	–	–	–	–	–	–	–	–	SAMPLE TIME

Water Quality Meter (SN): OIC0979 AA
Control Box type (SN): MP10 - 1231
Turbidity Meter (SN): 3592 - 3502

Pump Intake: 23' Dedicated BLADDER PUMP

SIGNATURE(S): Tony Lyle

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4102
Sample Location: 13MWT 41
Sampled By: T.L. / S.C.
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/1/04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0916								
Method: SAMP	CLOUDY	6.85	1.001	14.73	110	0.53	149	---

PURGE DATA:

Date: 7/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	~~Other~~ ORP
Method: D.S. BAILER	I	6.85	1.001	14.73	110	0.53	—	149
Monitor Reading (ppm): —	1	—					→	DRY
Well Casing Diameter & Material								
Type: 2" Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.8								
Static Water Level (WL): 66.25								
One Casing Volume(gal/L):								
Start Purge (hrs): 0820								
End Purge (hrs): 0825								
Total Purge Time (min): 5								
Total Vol. Purged (gal/L): 1.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ NA

1.55 x .163 = 0.25 gal or 0.95L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4202
Sample Location: 13MWT 42
Sampled By: Gover
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-31-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0822								
Method: peristaltic	tan	5.66	101	16.71	>1000	2.12	132.1	---

PURGE DATA:

Date: 7-30-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 23.45								
Static Water Level (WL): 20.34								
One Casing Volume(gal/L): 0.5 / 1.9								
Start Purge (hrs): 0904								
End Purge (hrs): 1016								
Total Purge Time (min): 72								
Total Vol. Purged (gal/L): 4.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 23'

7/31/04 water level 20.40

23.45
20.34
3.11 (.163) = 0.51 gal
= 1.9 L

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MW74
DATE: 7-30-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0904	20.34	—	—	—	—	—	—	—	—	Start purge
0914	21.35	0.70	70	5.80	140	160	1.96	16.61	64.0	turbid
0924	21.61	1.40	70	5.76	133	180	2.10	16.43	81.6	"
0934	21.95	2.10	70	5.75	129	320	1.99	16.33	82.6	"
0944	22.25	2.80	70	5.78	129	550	2.12	16.49	86.8	Darker tan
0954	22.60	3.50	70	5.78	127	650	2.13	16.66	94.3	"
1004	22.96	4.20	70	5.72	116	>1000	2.18	16.66	108.7	"
1014	23.39	4.9	70	5.66	101	>1000	2.12	16.71	132.1	"
1016	— Well	Dry								Stop purge

Water Quality Meter (SN): 99X00055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300
Pump Intake: 23'

SIGNATURE(S): Jim Davis

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4302
Sample Location: 13MWT 43
Sampled By: Goedt
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0850	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	clear	4.19	.263	14.50	8.9	3.43	364.8	---

PURGE DATA: 8/1/04

Date: 7-31-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.5								
Static Water Level (WL): 9.18								
One Casing Volume(gal): 8.1								
Start Purge (hrs): 1450								
End Purge (hrs): 1756								
Total Purge Time (min): 186								
Total Vol. Purged (gal): 27.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 17.5'

8/1/04 water level 9.35'

22.50
9.18
13.32(.163) = 2.17 gal = 8.1 L

*well pumped dry

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: BMWT43
DATE: 9-31-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1450	9.18	—	—	—	—	—	—	—	—	Start purge
1500	10.15	1.0	100	4.08	.238	8.0	2.22	17.60	340.4	Clear
1510	10.25	1.85	85	4.09	.201	8.7	1.93	17.69	341.9	"
1520	12.05	2.7	85	4.11	.182	12	1.84	17.56	347.8	"
1530	12.91	3.55	85	4.13	.178	10	1.95	17.46	352.9	"
1540	13.28	4.4	85	4.14	.178	7.1	1.96	17.26	354.7	"
1550	13.46	5.25	85	4.16	.185	14	2.13	17.74	355.5	"
1600	13.65	6.1	85	4.15	.187	11	2.13	17.95	357.9	"
1610	13.90	6.95	85	4.14	.191	9.2	3.00	16.94	359.8	"
1620	14.35	8.15	120	4.14	.173	6.0	2.57	16.82	361.4	increased pump
1630	14.63	9.95	120	4.15	.170	—	2.24	16.70	366.1	rate.
1640	15.15	10.55	120	4.16	.166	—	2.19	16.25	367.3	
1650	15.95	12.15	160	4.08	.242	—	2.91	15.51	373.1	
1700	17.04	14.25	210	4.16	.289	—	3.46	14.92	368.3	Attempting to
1710	18.15	16.85	260	4.11	.181	11	2.04	15.20	372.1	dry well out
1720	19.20	19.45	260	4.05	.188	—	2.11	15.10	375.7	
1730	19.98	22.05	260	3.98	.215	—	2.90	14.98	377.9	
1740	21.20	24.65	260	4.02	.234	—	2.84	14.62	372.8	
1750	22.12	27.25	260	4.19	.263	>1000	3.43	14.50	364.8	Brown - well nearly dry
1756	—	Well Dry								
										End purge

Water Quality Meter (SN) 99K00055
Control Box type (SN) ~~4640~~ NA
Turbidity Meter (SN) 4650 4300

Pump Intake 17.5'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 44Ø2
Sample Location: 13MWT 44
Sampled By: CCL
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/1/Ø4	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1143	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Cloudy	7.74	Ø.853	23.1Ø	11Ø	Ø.56	76.3	---

PURGE DATA:

Date: 8/1/Ø4	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 85.81'								
Static Water Level (WL): 64.4Ø'								
One Casing Volume(gal/L): 13.15								
Start Purge (hrs): Ø913								
End Purge (hrs): 1143								
Total Purge Time (min): 15Ø								
Total Vol. Purged (gal/L) 7.56								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT~~ ~~E~~

Pump intake @ 79' bTOC

85.81
- 64.40
21.41 x Ø.163 = 3.48 Gallons
OR
13.15 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE, SWMU13 **WELL ID.:** 13MWT44
PROJECT NUMBER: N7448 CTO Ø343 **DATE:** 8/1/Ø4
Sunny, Humid, 80°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
Ø913	64.4Ø'	–	–	–	–	–	–	–	–	Initial Reading. Begin Purge.
Ø923	64.91'	3ØØ	3Ø	9.39	Ø.75Ø	9Ø	3.7Ø	18.3Ø	-47.6	Slightly cloudy water.
Ø933	65.67'	1,5ØØ	12Ø	8.89	Ø.762	6Ø	1.37	17.26	-1Ø.8	Slightly cloudy water.
Ø943	65.5Ø'	1,99Ø	49	8.54	Ø.82Ø	7Ø	1.28	2Ø.Ø4	5.Ø	Slightly cloudy water.
Ø953	65.46'	2,44Ø	45	8.18	Ø.848	8S	1.15	2Ø.84	35.6	Slightly cloudy water.
1ØØ3	65.45'	2,94Ø	5Ø	8.ØS	Ø.85Ø	11Ø	Ø.98	2Ø.2Ø	51.S	Slightly cloudy water
1Ø13	65.5Ø'	3,42Ø	48	8.16	Ø.839	11Ø	Ø.86	19.59	51.3	Slightly cloudy water
1Ø23	65.55'	3,9ØØ	48	8.23	Ø.831	9S	Ø.74	19.38	49.Ø	Slightly cloudy water
1Ø33	65.61'	4,4ØØ	5Ø	8.33	Ø.819	11Ø	Ø.68	18.84	47.Ø	Slightly cloudy water
1Ø43	65.66'	4,92Ø	52	8.3Ø	Ø.817	16Ø	Ø.63	19.25	5Ø.Ø	Cloudy water
1Ø53	65.71'	5,45Ø	53	8.Ø2	Ø.834	16Ø	Ø.58	2Ø.72	62.6	Cloudy water
1ØØ3	65.75'	5,98Ø	53	7.87	Ø.834	15Ø	Ø.55	2Ø.91	69.Ø	Cloudy water
11 13	65.65'	6,39Ø	41	7.74	Ø.845	13Ø	Ø.53	22.14	75.1	Cloudy water
11 23	65.61'	6,78Ø	39	7.66	Ø.86Ø	12Ø	Ø.56	23.Ø9	79.6	Cloudy water
1133	65.61'	7,17Ø	39	7.73	Ø.852	11Ø	Ø.57	22.93	77.1	Cloudy water
1143	65.61'	7,56Ø	39	7.74	Ø.853	11Ø	Ø.56	23.1Ø	76.3	Cloudy water
←				Well Parameters Stabilize						→
←				Sampling	Begins					→

Water Quality Meter (SN): ØIC Ø134 AB
Control Box type (SN): MP10-1588.
Turbidity Meter (SN): 176Ø-18ØØ

Pump Intake: 79' bTOC

SIGNATURE(S): Chuck C. Ly III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4502
Sample Location: 13MWT 45
Sampled By: CCL
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/29/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1602	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	Clear	6.78	0.703	25.29	19	7.97	116.5	---

PURGE DATA:

Date: 7/28/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 83.00'								
Static Water Level (WL): 69.34'								
One Casing Volume(gal/L): 8.37								
Start Purge (hrs): 1430								
End Purge (hrs): 1730								
Total Purge Time (min): 180								
Total Vol. Purged (gal/L): 13.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] (No[ ]) 13GWT ~~F~~

Pump intake @ 80' bTOC

7/29/04 - DTW = 77.44' from TOC @ 1549.
- Pump Rate @ 50 mL/min

$$\frac{83.00 - 69.34}{13.66 \times (2)^2 \times 0.0408} = 2.22 \text{ gals.}$$

or 8.37 L

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Mark C. Ly III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE SWMU 13 WELL ID.: 13MWT45
PROJECT NUMBER: N7448 CTO 0343 DATE: 7/28/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1430	69.34'	—	—	—	—	—	—	—	—	INITIAL Reading
1440	70.95'	930	93	8.05	0.633	15	9.94	17.62	69.0	Clear water
1450	72.23'	1,910	98	7.81	0.627	9.6	9.18	17.43	87.0	Clear water
1500	72.69'	2,720	81	7.75	0.643	5.9	10.53	18.58	89.1	Clear water
1510	73.08'	3,420	70	7.52	0.646	4.8	9.83	18.89	98.0	Clear water
1520	73.49'	4,080	66	7.40	0.649	4.4	8.80	19.44	100.0	Clear water
1530	73.87'	4,720	64	7.35	0.643	4.0	9.24	19.35	98.5	Clear water
1540	74.32'	5,360	64	7.46	0.637	6.1	11.89	19.41	87.8	Clear water
1550	74.67'	6,000	64	7.64	0.633	8.1	10.39	19.38	73.1	Clear water
1600	75.00'	6,590	59	7.66	0.637	8.0	11.46	19.69	69.4	Clear water
1610	75.33'	7,160	57	7.69	0.638	9.2	10.28	19.70	63.3	Clear water
1620	75.68'	7,770	61	7.83	0.630	13	11.07	19.03	55.5	Clear water
1630	76.08'	8,360	59	7.92	0.628	16	10.48	18.89	44.4	Clear water
1640	76.60'	9,200	84	8.07	0.617	20	9.80	17.99	35.5	Clear water
1650	77.10'	10,020	82	8.11	0.617	20	11.13	17.96	30.5	Clear water
1700	77.60'	10,960	94	8.25	0.615	24	11.57	17.85	29.7	Clear water
1710	78.10'	11,820	86	8.17	0.616	22	11.62	17.84	24.9	Clear water
1720	78.65'	12,680	86	8.27	0.616	18	11.96	17.83	18.3	Clear water
1730	79.05'	13,520	84	8.20	0.616	20	12.25	17.84	13.2	Clear water
←				END Pump/well DRY						→

Water Quality Meter (SN) 01C0134 AB
Control Box type (SN) MP10-1588
Turbidity Meter (SN) 1760-1800

Pump Intake 80' bTOC Dedicated Bladder Pump

SIGNATURE(S): Frank C. Tutt III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4602
Sample Location: 13MWT 46
Sampled By: T. ROSAHN
C.O.C. No.: 0053
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7/30/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1333	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: SAME	CLEAR	6.25	0.786	14.10	2.81	0.05	131	---

PURGE DATA:

Date: 7/30/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. Bladder Pump								
Monitor Reading (ppm): -								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 67.60								
Static Water Level (WL): 57.14								
One Casing Volume(gal/L): 6.5								
Start Purge (hrs): 1210								
End Purge (hrs): 1330								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 7.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(3x) (2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT_____-F

Pump intake @ 63'

10.46 x 0.163 = 1.7 gal or 6.5

Circle if Applicable:

MS/MSD (YES) (NO)

Duplicate ID No.: _____

Signature(s):

Terry Rosahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT 46
DATE: 7/30/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1210	57.14	—	—	—	—	—	—	—	-	START PURGE
1220	57.16	1300	130	6.42	0.798	10.6	0.08	14.49	103	CLEAR
1230	57.16	2900	90	6.20	0.805	7.32	0.07	14.57	131	CLEAR
1240	57.16	3100	90	6.26	0.802	463	0.06	1438	122	CLEAR
1250	57.16	4000	90	6.27	0.800	4.20	0.06	1432	121	CLEAR
1300	57.16	4900	90	6.27	0.798	3.85	0.06	1428	120	CLEAR
1310	57.17	5800	90	6.26	0.793	3.42	0.05	1422	123	CLEAR
1320	57.17	6700	90	6.26	6.790	3.02	0.05	1415	126	CLEAR
1330	57.18	7600	90	6.25	0.786	2.81	0.05	1410	131	CLEAR
1333	—	—	—	—	—	—	—	—	—	START SAMPLE

Water Quality Meter (SN): 01C0979 AA
Control Box type (SN): MP10-1231
Turbidity Meter (SN): 3592-3502

Pump Intake: 63' DEDICATED BLADDER PUMP

SIGNATURE(S): Terry Kopek

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4702
Sample Location: 13MWT 47
Sampled By: CCL
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/1/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1811	(Visual)	(S. U.)	(mS/cm)	(^{0}C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder Pump	clear	3.40	1.056	18.41	7.0	0.51	181.2	---

PURGE DATA:

Date: 8/1/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.20'								
Static Water Level (WL): 6.27'								
One Casing Volume(gal/L): 8.56								
Start Purge (hrs): 1641								
End Purge (hrs): 1811								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 7.76								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] ~~13GWT-F~~

Pump intake @ 15.0' bToC

20.20
− 6.27
13.93 × 0.163 = 2.27 Gallons
OR
8.56 L

Circle if Applicable:

MS/MSD ✓ | Duplicate ID No.:

Signature(s): Charles C. Tyler III

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE, SWMU13 **WELL ID.:** 13MWT47
PROJECT NUMBER: N7448 CTO ϕ343 **DATE:** 8/1/ϕ4
Partly cloudy, Humid, 85°F

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1641	6.27'	—	—	—	—	—	—	—	—	INITAL Readings; Begin Purge
1651	6.77'	87ϕ	87	1.86	1.ϕ64	2.5	ϕ.4ϕ	18.45	289.1	Clear WATER.
1ϕϕ1	6.95'	1,7ϕϕ	83	2.99	1.ϕ47	5.1	ϕ.31	18.18	218.ϕ	Clear WATER,
1711	7.ϕ9'	2,53ϕ	83	3.26	1.ϕ41	25	ϕ.25	18.2ϕ	194.9	Slightly cloudy water.
1721	7.19'	3,37ϕ	84	3.38	1.ϕ42	24	ϕ.39	18.14	187.9	Slightly cloudy WATER.
1731	7.26'	4,22ϕ	85	3.39	1.ϕ46	18	ϕ.46	18.17	182.3	Clear WATER.
1741	7.3ϕ'	5,12ϕ	9ϕ	3.43	1.ϕ49	15	ϕ.51	18.19	178.2	Clear WATER.
1751	7.38'	6,ϕϕϕ	88	3.43	1.ϕ5ϕ	1ϕ	ϕ.49	18.23	177.1	Clear WATER.
18ϕ1	7.37'	6,88ϕ	86	3.38	1.ϕ54	8.ϕ	ϕ.52	18.35	179.4	Clear WATER.
1811	7.36'	7,76ϕ	88	3.4ϕ	1.ϕ56	7.ϕ	ϕ.51	18.41	181.2	Clear WATER
←			well	Parameters Stabilize						→
←				Sampling	Begins					→

Water Quality Meter (SN) ϕ1Cϕ134 AB
Control Box type (SN) MP1ϕ - 1598
Turbidity Meter (SN) 176ϕ - 18ϕϕ

Pump Intake 15.ϕ' bTOC, Dedicated Bladder Pump

SIGNATURE(S): Mark C. Gy III

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4801
Sample Location: 13MWT 48
Sampled By: Goerdt
C.O.C. No.: 0072
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-14-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1722	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	Clear	6.93	.719	19.88	1.95	.15	113.7	---

PURGE DATA:

Date: 8-14-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 12.75								
Static Water Level (WL): 11.75								
One Casing Volume(gal/L): .6								
Start Purge (hrs): 1600								
End Purge (hrs): 1720								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 7.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes/(No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 12'

Turbidity checked prior to metal sampling and was 5.8 NTU

12.75
11.75
1.0 (.163) = .163 gal
= .62

Circle if Applicable:

(MS/MSD) Duplicate ID No.: 13FD081404 01

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N7448
WELL ID.: 13MWT48
DATE: 8-14-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1600	11.75	–	–	–	–	–	–	–	–	~~Start~~ purge
1610	11.75	1.30	130	6.84	.740	341	.06	20.74	31.7	Cloudy
1620	11.72	2.25	95	6.87	.746	449	.07	21.33	-7.6	"
1630	11.73	3.20	95	6.87	.737	70.2	.12	20.59	36.0	Clear
1640	11.73	4.15	95	6.91	.727	24.7	.14	20.30	66.2	"
1650	11.73	5.10	95	6.93	.725	12.0	.15	20.20	81.3	"
1700	11.73	6.05	95	6.93	.721	5.4	.14	20.00	94.5	"
1710	11.73	7.00	95	6.94	.720	4.29	.15	19.96	105.8	"
1715	11.73	7.48	47.5	6.93	.720	4.10	.14	19.90	110.1	"
1720	11.73	7.95	47.5	6.93	.719	1.95	.15	19.88	113.7	Stop purge

Water Quality Meter (SN) 99K00055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4300
SIGNATURE(S)

Pump Intake 12'

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4901
Sample Location: 13MWT 49
Sampled By: Goerdt
C.O.C. No.: 0072
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-14-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1521	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: peristaltic	clear	6.37	.450	20.31	1.54	0.30	104.4	---

PURGE DATA:

Date: 8-14-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 11.87								
Static Water Level (WL): 8.75								
One Casing Volume(gal/L) 1.9								
Start Purge (hrs): 1408								
End Purge (hrs): 1518								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 7.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes) No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 11'

11.87
8.75
3.12(.163) = .51 gal
= 1.9 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N7448
WELL ID.: 13MW49
DATE: 8-14-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (~~mL/Min.~~)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1408	8.76	–	–	–	–	–	–	–	–	Start purge
1418	8.80	1.1	110	6.45	.448	6.97	0.68	20.37	92.7	Clear
1428	8.85	2.2	110	6.43	.456	5.18	0.51	20.50	97.9	
1438	8.82	3.3	110	6.41	.450	3.20	0.41	20.19	92.5	
1448	8.82	4.4	110	6.39	.450	2.04	0.41	20.34	97.9	
1458	8.82	5.5	110	6.39	.449	1.66	0.36	20.17	99.5	
1508	8.82	6.6	110	6.37	.448	1.65	0.33	20.21	101.5	
1513	8.82	7.15	55	6.37	.450	1.60	0.31	20.33	103.0	
1518	8.82	7.7	55	6.37	.450	1.54	0.30	20.31	104.4	End purge

Water Quality Meter (SN) 99K00055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4308
Pump Intake 11'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 5001
Sample Location: 13MWT 50
Sampled By: Goerdt
C.O.C. No.: 0072
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-14-04 / Time: 1259 / Method: Peristaltic	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	clear	7.18	.881	16.11	8.34	2.42	244.1	---

PURGE DATA:

Date: 8-14-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 28.18								
Static Water Level (WL): 8.92								
One Casing Volume(gal/L): 11.62								
Start Purge (hrs): 0855								
End Purge (hrs): 1255								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 18.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes) No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	Yes (No)

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 23'

28.18
8.92
19.26(.163) = 3.14 gal
= 11.62 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N7448
WELL ID.: 13MWT50
DATE: 8-14-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume ~~(mL/Min.)~~	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0855	8.92	—	—	—	—	—	—	—	—	Start purge
0905	10.42	1.00	100	7.18	.824	3.42	4.84	15.16	236.2	Clear
0915	12.01	2.00	100	7.09	.820	2.48	3.96	15.13	237.6	"
0925	12.98	2.75	75	7.12	.819	10.93	3.81	15.51	235.2	"
0935	13.72	3.50	75	7.10	.823	2.99	3.75	15.30	234.8	"
0945	15.12	4.25	75	7.08	.826	2.40	3.71	15.35	234.4	"
0955	15.83	5.00	75	7.09	.836	2.87	3.67	15.78	233.9	"
1005	16.48	5.75	75	7.10	.830	5.44	3.66	15.43	233.4	"
1015	17.38	6.50	75	7.10	.831	4.27	3.54	15.48	234.1	"
1025	17.60	7.25	75	7.10	.835	3.10	3.43	15.71	233.2	
1035	17.89	8.00	75	7.09	.834	2.48	3.52	15.59	234.0	
1045	18.12	8.75	75	7.06	.849	2.70	3.37	15.67	235.5	
1055	18.32	9.50	75	6.94	.863	2.99	3.28	15.77	239.5	
1105	18.58	10.25	75	6.83	.886	3.10	3.04	15.61	246.8	
1115	18.81	11.00	75	6.81	.912	5.03	2.84	15.93	251.3	
1125	19.058	11.75	75	6.80	.919	7.47	2.78	15.99	252.4	
1135	19.31	12.50	75	6.80	.910	|	2.61	15.99	254.6	
1145	19.87	13.25	75	6.82	.911	|	2.60	16.02	254.8	
1155	20.23	14.00	75	6.83	.912	|	2.59	16.52	254.3	
1205	20.70	14.75	75	6.89	.882	7.96	2.46	16.19	253.8	
1215	21.14	15.50	75	6.97	.881	6.03	2.36	16.24	252.1	
1225	21.52	16.25	75	7.07	.869	5.45	2.39	15.76	249.3	
1235	21.87	17.00	75	7.12	.884	6.02	2.37	16.35	246.6	
1245	22.09	17.75	75	7.17	.884	7.12	2.41	16.05	243.7	
1255	22.45	18.50	75	7.18	.881	8.34	2.42	16.11	244.1	End purge

Water Quality Meter (SN) 99K 60055
Control Box type (SN) NA
Turbidity Meter (SN) 4650 4330

Pump Intake 23'

SIGNATURE(S)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 5101
Sample Location: 13MWT 51
Sampled By: Gorski
C.O.C. No.: 0054
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8-1-04	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1420								
Method: peristaltic	clear	5.94	.278	20.57	33	8.32	299	---

PURGE DATA:

Date: 8-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.72								
Static Water Level (WL): 7.72								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 1016								
End Purge (hrs): 1416								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 29.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)
Total Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No
Diss. Metals SW-846 6020/Mercury 7470A	4°C/HNO_3	(1) L HDPE	(Yes)/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[X] No[] 13GWT 5101 -F

Pump intake @ ~12.5'

17.72
7.72
10.00 (.163) = 1.63 gal
= 6.1 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448
WELL ID.: 13MWT51
DATE: 8-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1016	7.72	—	—	—	—	—	—	—	—	Start purge
1026	7.91	0.85	85	5.87	.270	550	7.64	19.30	252.9	cloudy
1036	8.02	1.7	85	5.81	.268	380	7.71	19.51	258.7	"
1046	8.11	2.55	85	5.82	.265	450	6.68	19.49	263.6	"
1056	8.20	3.4	85	5.78	.262	400	6.40	19.24	268.7	turn up pump to dry out well
1106	8.50	5.5	210	5.75	.260	—	6.27	18.53	279.0	- turbid pod
1116	8.80	7.6	210	5.74	.256	—	5.94	18.82	285.6	going down
1126	9.05	9.7	210	5.70	.253	650	6.04	17.92	291.8	
1136	9.74	11.9	280	5.74	.257	—	7.03	17.62	297.0	
1146	10.90	13.7	180		.261	—	8.21	17.71	299.7	
1156	~~bottom~~ .05	14.9	1x20	5.84	.268	—	8.95	17.96	301.9	
1206	—	16.1	Left well to pump purge water							
1216	—	17.3								
1226	—	18.3	100	—	—	—	—	—	—	
1236	11.52	19.3	100	6.02	.279	240	8.10	19.48	236.8	cloudy
1246	11.55	20.3	100	5.99	.284	—	8.00	19.47	258.9	
1256	11.61	21.3	100	5.96	.284	—	7.98	19.50	268.8	
1306	11.62	22.3	100	5.95	.275	85	8.00	19.41	275.2	sl. cloudy
1316	11.64	23.3	|	5.98	.274	—	8.12	19.40	280.2	
1326	11.69	|	|	5.98	.273	39	8.57	19.49	285.1	"
1336	11.71	|	|	5.96	.272	—	8.31	19.48	288.7	
1346	11.72	|	|	5.96	.273	34	8.30	19.88	291.3	"
1356	11.74	|	|	5.96	.276	—	8.37	20.27	294.7	
1406	11.75	|	|	5.97	.278	35	8.25	20.31	296.7	"
1416	11.72	29.3	100	5.94	.278	33	8.32	20.57	299.0	stop purge

Water Quality Meter (SN): 99K00055
Control Box type (SN): NA
Turbidity Meter (SN): 4650 4300

Pump Intake: 12.5'

SIGNATURE(S):

APPENDIX C.4.4
SWMU 13
GROUNDWATER SAMPLE LOG SHEETS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	John Wright	**Printed By**	James Goerdt
Created Date	2/14/06	**Modified Date**	2/18/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW001
TtNUS Project #	112GN6878	**Well ID**	13TW001
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/14/06	**Static Water Level (ft.)**	3.71	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	10	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	Y	**Well Volumes Req.**	1		
Duplicate Sample Collected?	Y	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/14/06	16:40	3.71	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/14/06	16:55	5.60	250	Highly Turbid	6.79	1.608	3.57	750	11.00	-59			3750
2/14/06	17:12	5.66	220	Slightly Turbid	6.95	1.602	3.09	80	10.35	-63			3740
2/14/06	17:18	5.67	170	Clear	6.88	1.589	2.35	55	10.03	-65			1020
2/14/06	17:24	5.70	170	Clear	6.87	1.583	0.91	39	9.80	-68			1020

Final Purge / Sample Data

One Casing Volume	0.97	**Method**	1	**Dissolved Oxygen (mg/L)**	0.91
Total Vo. Purge (L)	9.53	**Waterlevel (ft.)**	5.70	**Turbidity (NTUs)**	39
Start Purge (hrs.)	4:40:00 PM	**Flowrate (mL/min)**	170	**Temp (C)**	9.80
End Purge (hrs.)	5:24:00 PM	**Color**	Clear	**ORP (mV)**	-68
Total Purge Time (min.)	44	**pH (S.U.)**	6.87	**Salinity**	
		Conductivity (mS/cm)	1.583	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	17:25	SW-846-8330	Nitroaromatics and Nitramines	4°C	4	Glass	1L Amber		112GN6878-2152006-1

General Observations and Notes

Converted soil boring = 13SB50

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Anonymous	**Printed By**	James Goerdt
Created Date	2/14/06	**Modified Date**	2/20/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW002
TtNUS Project #	112GN6878	**Well ID**	13TW002
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/14/06	**Static Water Level (ft.)**	5.66	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	10	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/14/06	13:50	5.66	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/14/06	14:00	DRY	120	Highly Turbid	6.46	1.066	4.94	>1000	9.53	141			1200

Final Purge / Sample Data

One Casing Volume	0.67	**Method**	1	**Dissolved Oxygen (mg/L)**	4.94
Total Vo. Purge (L)	1.2	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	>1000
Start Purge (hrs.)	1:50:00 PM	**Flowrate (mL/min)**	120	**Temp (C)**	9.53
End Purge (hrs.)	2:00:00 PM	**Color**	Highly Turbid	**ORP (mV)**	141
Total Purge Time (min.)	10	**pH (S.U.)**	6.46	**Salinity**	
		Conductivity (mS/cm)	1.066	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/14/06	14:10	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2152006-1

General Observations and Notes

Converted soil boring = 13SB62

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/15/06	**Modified Date**	2/17/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW003
TtNUS Project #	112GN6878	**Well ID**	13TW003
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/15/06	**Static Water Level (ft.)**	4.02	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	5	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/15/06	09:05	4.02	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/15/06	09:08	DRY	133	Highly Turbid	NA	NA	NA	NA	NA	NA			399

Final Purge / Sample Data

One Casing Volume	0.15	**Method**	1	**Dissolved Oxygen (mg/L)**	NA
Total Vo. Purge (L)	0.399	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	NA
Start Purge (hrs.)	9:05:00 AM	**Flowrate (mL/min)**	133	**Temp (C)**	NA
End Purge (hrs.)	9:08:00 AM	**Color**	Highly Turbid	**ORP (mV)**	NA
Total Purge Time (min.)	3	**pH (S.U.)**	NA	**Salinity**	
		Conductivity (mS/cm)	NA	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✗	2/15/06	09:08	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	1L Amber		
✓	2/15/06	09:05	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring = 13SB68

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/15/06	**Modified Date**	2/18/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW004
TtNUS Project #	112GN6878	**Well ID**	13TW004
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/15/06	**Static Water Level (ft.)**	0.20	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	5	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/15/06	09:55	0.20	0	Cloudy	NA	NA	NA	400	NA	NA			0
2/15/06	10:05	0.85	150	Slightly Turbid	7.59	2.587	4.14	140	4.23	229			1500
2/15/06	10:15	0.85	150	Clear	7.69	2.515	7.47	120	3.67	200			1500
2/15/06	10:25	0.85	150	Clear	7.71	2.527	7.50	85	3.87	195			1500
2/15/06	10:35	0.85	150	Clear	7.74	2.477	9.12	65	3.83	197			1500
2/15/06	10:45	0.85	150	Clear	7.75	2.479	9.03	65	3.85	195			1500

Final Purge / Sample Data

One Casing Volume	0.74	**Method**	1	**Dissolved Oxygen (mg/L)**	9.03
Total Vo. Purge (L)	7.5	**Waterlevel (ft.)**	0.85	**Turbidity (NTUs)**	65
Start Purge (hrs.)	9:55:00 AM	**Flowrate (mL/min)**	150	**Temp (C)**	3.85
End Purge (hrs.)	10:45:00 AM	**Color**	Clear	**ORP (mV)**	195
Total Purge Time (min.)	50	**pH (S.U.)**	7.75	**Salinity**	
		Conductivity (mS/cm)	2.479	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/15/06	10:50	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2152006-1

General Observations and Notes

Converted soil boring = 13SB70

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	2/28/06	**Modified Date**	7/26/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW005
TtNUS Project #	112GN6878	**Well ID**	13TW005
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/28/06	**Static Water Level (ft.)**	4.40	**Water Quality Meter**	No Data
Purge Method	-Select-	**Total Well Depth (ft.)**	5	**Pump Control Box**	440
Sampling Method	-Select-	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	No Data
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/28/06	11:55	4.40	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0

Final Purge / Sample Data

One Casing Volume	0.09	**Method**	-Select-	**Dissolved Oxygen (mg/L)**	
Total Vo. Purge (L)		**Waterlevel (ft.)**		**Turbidity (NTUs)**	
Start Purge (hrs.)		**Flowrate (mL/min)**		**Temp (C)**	
End Purge (hrs.)		**Color**		**ORP (mV)**	
Total Purge Time (min.)		**pH (S.U.)**		**Salinity**	
		Conductivity (mS/cm)		**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/28/06	11:55	SW-846-8330	Nitroaromatics and Nitramines	4°C	1	Glass	1L Amber		112GN6878-322006-5

General Observations and Notes

Converted soil boring = 13SB59

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/16/06	**Modified Date**	2/17/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW006
TtNUS Project #	112GN6878	**Well ID**	13TW006
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/16/06	**Static Water Level (ft.)**	9.52	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	15	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/16/06	10:30	9.52	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/16/06	10:35	DRY	140	Highly Turbid	NA	NA	NA	NA	NA	NA			700

Final Purge / Sample Data

One Casing Volume	0.85	**Method**	1	**Dissolved Oxygen (mg/L)**	NA
Total Vo. Purge (L)	0.7	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	NA
Start Purge (hrs.)	10:30:00 AM	**Flowrate (mL/min)**	140	**Temp (C)**	NA
End Purge (hrs.)	10:35:00 AM	**Color**	Highly Turbid	**ORP (mV)**	NA
Total Purge Time (min.)	5	**pH (S.U.)**	NA	**Salinity**	
		Conductivity (mS/cm)	NA	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/16/06	10:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring = 13SB57

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/16/06	**Modified Date**	2/18/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW007
TtNUS Project #	112GN6878	**Well ID**	13TW007
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/16/06	**Static Water Level (ft.)**	1.61	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	5	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/16/06	10:50	1.61	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/16/06	10:55	DRY	200	Highly Turbid	NA	NA	NA	NA	NA	NA			1000

Final Purge / Sample Data

One Casing Volume	0.52	**Method**	1	**Dissolved Oxygen (mg/L)**	NA
Total Vo. Purge (L)	1	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	NA
Start Purge (hrs.)	10:50:00 AM	**Flowrate (mL/min)**	200	**Temp (C)**	NA
End Purge (hrs.)	10:55:00 AM	**Color**	Highly Turbid	**ORP (mV)**	NA
Total Purge Time (min.)	5	**pH (S.U.)**	NA	**Salinity**	
		Conductivity (mS/cm)	NA	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/16/06	10:50	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring = 13SB56

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/16/06	**Modified Date**	2/18/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW008
TtNUS Project #	112GN6878	**Well ID**	13TW008
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/16/06	**Static Water Level (ft.)**	4.42	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	10	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/16/06	14:55	4.42	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/16/06	15:05	6.70	100	Highly Turbid	6.32	0.211	1.41	>1000	8.46	-42			1000
2/16/06	15:15	DRY	100	Highly Turbid	6.38	0.215	3.89	>1000	9.66	-7			1000

Final Purge / Sample Data

One Casing Volume	0.86	**Method**	1	**Dissolved Oxygen (mg/L)**	3.89
Total Vo. Purge (L)	2	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	>1000
Start Purge (hrs.)	2:55:00 PM	**Flowrate (mL/min)**	100	**Temp (C)**	9.66
End Purge (hrs.)	3:15:00 PM	**Color**	Highly Turbid	**ORP (mV)**	-7
Total Purge Time (min.)	20	**pH (S.U.)**	6.38	**Salinity**	
		Conductivity (mS/cm)	0.215	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/16/06	15:25	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring = 13SB64

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	2/16/06	**Modified Date**	2/18/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW009
TtNUS Project #	112GN6878	**Well ID**	13TW009
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/16/06	**Static Water Level (ft.)**	7.45	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	10	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/16/06	13:30	7.45	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/16/06	13:35	DRY	160	Highly Turbid	NA	NA	NA	NA	NA	NA			800

Final Purge / Sample Data

One Casing Volume	0.39	**Method**	1	**Dissolved Oxygen (mg/L)**	NA
Total Vo. Purge (L)	0.8	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	NA
Start Purge (hrs.)	1:30:00 PM	**Flowrate (mL/min)**	160	**Temp (C)**	NA
End Purge (hrs.)	1:35:00 PM	**Color**	Highly Turbid	**ORP (mV)**	NA
Total Purge Time (min.)	5	**pH (S.U.)**	NA	**Salinity**	
		Conductivity (mS/cm)	NA	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/16/06	13:30	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring 13SB52

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	2/16/06	**Modified Date**	7/26/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW010
TtNUS Project #	112GN6878	**Well ID**	13TW010
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	2/16/06	**Static Water Level (ft.)**	5.25	**Water Quality Meter**	01J0851 AF
Purge Method	Low flow - Peristaltic	**Total Well Depth (ft.)**	10	**Pump Control Box**	440
Sampling Method	Low flow - Peristaltic	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
2/16/06	12:00	5.25	0	Highly Turbid	NA	NA	NA	NA	NA	NA			0
2/16/06	12:10	5.61	200	Cloudy	6.76	0.780	1.12	210	8.29	65			2000
2/16/06	12:20	5.77	100	Cloudy	6.75	0.767	0.34	170	7.96	35			1000
2/16/06	12:30	5.80	100	Clear	6.75	0.758	0.32	55	7.99	17			1000
2/16/06	12:40	5.85	100	Clear	6.75	0.740	0.29	39	7.96	28			1000

Final Purge / Sample Data

One Casing Volume	0.73	**Method**	Low flow - Peristaltic	**Dissolved Oxygen (mg/L)**	0.29
Total Vo. Purge (L)	5	**Waterlevel (ft.)**	5.85	**Turbidity (NTUs)**	39
Start Purge (hrs.)	12:00:00 PM	**Flowrate (mL/min)**	100	**Temp (C)**	7.96
End Purge (hrs.)	12:40:00 PM	**Color**	Clear	**ORP (mV)**	28
Total Purge Time (min.)	40	**pH (S.U.)**	6.75	**Salinity**	
		Conductivity (mS/cm)	0.740	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	2/16/06	12:45	SW-846-8330	Nitroaromatics and Nitramines	4°C	2	Glass	1L Amber		112GN6878-2172006-2

General Observations and Notes

Converted soil boring = 13SB54

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	Terry Rojahn	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	2/18/06	**Modified Date**	7/26/06	**Printed Date**	2/1/07

Project Information

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWTW011
TtNUS Project #	112GN6878	**Well ID**	13TW011
Task/Contract #	CTO 0357	**Well Type**	Temporary Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
Status	Archive	**Concentration**	Low concentration

Well and Sample Data

Date	3/1/06	**Static Water Level (ft.)**	7.33	**Water Quality Meter**	01J0851 AF
Purge Method	-Select-				
Sampling Method	-Select-	**Total Well Depth (ft.)**	15	**Pump Control Box**	440
MS/MSD Collected?	Y	**Well Riser Diameter (in.)**	1	**Turbidity Meter**	1136-1699
Duplicate Sample Collected?	N	**Well Volumes Req.**	1		
Corresponding Duplicate Sample ID		**Monitor Reading (ppm)**	NA		

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
3/1/06	16:30	7.33	0	Highly Turbid	NA	Na	NA	NA	NA	NA			0
3/1/06	16:40	7.50	200	Highly Turbid	6.57	0.612	1.79	650	12.98	-82			2000
3/1/06	16:50	7.36	150	Clear	6.80	0.570	1.04	50	11.02	-94			1500
3/1/06	17:00	7.36	150	Clear	6.85	0.562	0.92	25	10.77	-98			1500
3/1/06	17:10	7.36	150	Clear	6.87	0.559	0.91	6.9	10.73	-100			1500

Final Purge / Sample Data

One Casing Volume	1.18	**Method**	-Select-	**Dissolved Oxygen (mg/L)**	0.91
Total Vo. Purge (L)	6.5	**Waterlevel (ft.)**	7.36	**Turbidity (NTUs)**	6.9
Start Purge (hrs.)	4:30:00 PM	**Flowrate (mL/min)**	150	**Temp (C)**	10.73
End Purge (hrs.)	5:10:00 PM	**Color**	Clear	**ORP (mV)**	-100
Total Purge Time (min.)	40	**pH (S.U.)**	6.87	**Salinity**	
		Conductivity (mS/cm)	0.559	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	3/1/06	17:15	SW-846-8330	Nitroaromatics and Nitramines	4°C	4	Glass	1L Amber		112GN6878-322006-5

General Observations and Notes

Converted soil boring = 13SB60

- End of Report -

APPENDIX C.5
SWMU 13
PLANT TISSUE SAMPLE LOG SHEETS
ROUND 3

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG00101 0001
Sample Location: 13VEG~~001~~ 01
Sampled By: TR / JG
C.O.C. No.: 0095

[] Shrub
[x] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N	
Time: 1330						SPECIES # 01
Species: SUGAR MAPLE	21'	1.7	18		X	
Method: HAND PICK						

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OAK Hickory overstory
% understory: 45
Damp
Lower slope

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0990

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	—

Signature(s):

Tony Rank

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG002020001
Sample Location: 13 VEG ~~00~~ 01
Sampled By: JG / TK
C.O.C. No.: 0095

[] Shrub
[] Leaf
[] Acorn
[x] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N	
Time: 1340						SPECIES # 02
Species: White Snakeroot	NA		→		X	
Method: HAND PICK						

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SEE 13 VEG001.

WHITE SNAKEROOT
Eupatorium rugosum

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0991 & 0992

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Gale

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG00301 0001
Sample Location: 13VEG02
Sampled By: JG / TK
C.O.C. No.: 0095

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04 Time: 1400	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Species: Sugar Maple Method: Hand Pick	48'	10	50'		X

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	Zip Lock Bag (Gal.)	✓
MISC. EXPLOSIVES 8330 Mod.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OVERSTORY - MAPLE & TULIP POPLAR

DAMP

10% UNDERSTORY

BOTTOM LAND

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0993

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Taylor

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG004020001 (44)
Sample Location: 13VEG 02
Sampled By: JG / TR
C.O.C. No.: 0095

[] Shrub
[] Leaf
[] Acorn
[■] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1410					
Species: WH. SNAKEROOT	NA				X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SAME AS @ 13VEG02

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0994 & 0995

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Jeff Rogers

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: I3VEG005030001 (IN)
Sample Location: I3VEG04
Sampled By: TC/JG
C.O.C. No.: 0095

[] Shrub
[x] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1425					
Species: WHITE OAK	66	18.4	90		X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OVERSTORY - OAK HICKORY
15% UNDERSTORY
DAMP
MID to UPPER SLOPE

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0996

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG006010001
Sample Location: 13VEG 04
Sampled By: JR/JG
C.O.C. No.: 0095E0097

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1435					
Species: SUGAR MAPLE	30'	6	45'		X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SAME AS 13VEG04

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0097

Circle if Applicable:

MS/MSD

Duplicate ID No.: 13FD092108Q1

Signature(s):

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG007020001 (AV)
Sample Location: 13VEG04
Sampled By: TR / JG
C.O.C. No.: 0095

[] Shrub
[] Leaf
[] Acorn
[■] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1450					
Species: WH. Snakeroot	NA	———	→		X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SAME AS VEG. 13VEG04

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 0998 & 0999

Circle if Applicable:

MS/MSD | Duplicate ID No.: ———

Signature(s):

TR / JG

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG00803000 (QA)
Sample Location: 13VEG03
Sampled By: JG/TR
C.O.C. No.: 0095

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1500					
Species: WH. OAK	60	12	80		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OAK, HICKORY OVERSTORY
45% UNDERSTORY
DRY
MID SLOPE

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1000

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N7448

[] Shrub
[x] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Sample ID No.: 13VEG09010001 (N)
Sample Location: 13VEG03
Sampled By: JG/TR
C.O.C. No.: 0095

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1510					
Species: Sugar Maple	24	4	30		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SAME AS 13VEG03

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1001

Circle if Applicable:

MS/MSD Duplicate ID No.: ———

Signature(s):

TR

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Sample ID No.: 13VEG010030001
Sample Location: 13VEG05
Sampled By: JG/TK
C.O.C. No.: 0096

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1515					
Species: WH. OAK	40	18.7	85		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OVERSTORY OAK
25% UNDERSTORY
DAMP
MID-UPPER SLOPE

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1002

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Ty Boyle

Tetra Tech NUS, Inc. **PLANT TISSUE SAMPLE LOG SHEET**

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG011020001 (11)
Sample Location: 13VEG05
Sampled By: TK/JG
C.O.C. No.: 0095

[] Shrub
[] Leaf
[] Acorn
[x] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1520					
Species: WH. SNAKEROOT	NA	→	→	→	X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

13
SAME AS VEG05

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1003

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

TK JG

Tetra Tech NUS, Inc

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Sample ID No.: 13VEG01201000 1 (1A)
Sample Location: 13VEG06
Sampled By: JG/TR
C.O.C. No.: 0095

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1535					
Species: Sugar Maple	30	10.4	70		X
Method: Hand Auger					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	Zip Lock Bag (Gal.)	✓
MISC. EXPLOSIVES 8330 Mod.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

UPPER SLOPE
MAPLES, Tulip Poplar OVERSTORY
25% UNDERSTORY
DAMP

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1004

Circle if Applicable:

MS/MSD —
Duplicate ID No.: —

Signature(s):

Tony Rock

USED Rinse Water FOR 13RB09210401 @ 1540 HRS

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N7448

Sample ID No.: 13VEG013020001N
Sample Location: 13VEG06
Sampled By: JG/TK
C.O.C. No.: 0095

[] Shrub
[] Leaf
[] Acorn
[■] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1545					
Species: WH. Snakeroot	NA ←		→		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	Zip Lock Bag (Gal.)	
MISC. EXPLOSIVES 8330 Mod.	Dry ICE	↓	

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

SAME AS 13VEG06

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1005

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Terry Rogers

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG014030001 (TN)
Sample Location: 13VEG07
Sampled By: TR/JG
C.O.C. No.: 0097

[] Shrub
[■] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1605					
Species: WH. OAK	15	6.3	45		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	ZIP LOCK BAG (GAL.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OAK, MAPLE, tulip poplar
OVERSTORY
40% UNDERSTORY
DAMP
UPPER SLOPE

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1006

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Terry Rogers

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG01504(TH)0001
Sample Location: 13VEG08
Sampled By: JG/TK
C.O.C. No.: 0097

[] Shrub
[] Leaf
[■] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1615					
Species: WH OAK	65	19.5	95		X
Method: HAND PICK					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	DRY ICE	ZIP LOCK BAG (GAL.)	
MISC. EXPLOSIVES 8330 MOD.	DRY ICE	↓	

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

EDGE EFFECT TREE
DAMP
UPPER SLOPE
30% UNDERSTORY
OAK tulip POPLAR - OVERSTORY

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1007

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Ted Kozak

Tetra Tech NUS, Inc.

PLANT TISSUE SAMPLE LOG SHEET

Project Site Name: NSWC CRANE
Project No.: N 7448

Sample ID No.: 13VEG01603 0001 (N)
Sample Location: 13VEG09
Sampled By: JG/TR
C.O.C. No.: 0097

[] Shrub
[x] Leaf
[] Acorn
[] Other: HERBACEOUS
[] QA Sample Type:

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/21/04	Crown Diameter	DBH (inches)	Height (feet)	Seeps Observed Y	Seeps Observed N
Time: 1625					
Species: WH OAK	3	<1	8		X
Method: Hand Pick					

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
EXPLOSIVES SW-846 8330	Dry ICE	Zip Lock BAG (Gal.)	✓
MISC. EXPLOSIVES 8330 MOD.	Dry ICE	↓	✓

Site Description (surrounding vegetation, soil moisture, percent understory, stressed vegetation):

OVERSTORY OAK & TULIP POPLAR
DAMP
65% UNDERSTORY
UPPER SLOPE

MAP (Attach photos of vegetation and surrounding areas):

PHOTO #(S) 1008

Circle if Applicable:

MS/MSD | Duplicate ID No.: —

Signature(s):

Terry Rogers

APPENDIX C.6.1
SWMU 13
CHAIN OF CUSTODY RECORDS
ROUND 1

TETRA TECH NUS, INC. CTO - 0279 | CHAIN OF CUSTODY | NUMBER 0963 | PAGE 1 OF 1

PROJECT NO: N90160	FACILITY: NSWC CRANE	PROJECT MANAGER R BASINSKI	PHONE NUMBER 8308 412-921-7090	LABORATORY NAME AND CONTACT: LANCASTER / HUGH PRENTICE
SAMPLERS (SIGNATURE) Ty Rojan		FIELD OPERATIONS LEADER T ROJAN	PHONE NUMBER 8857 412-921-7090	ADDRESS 940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER FED EX # 8316 7332 7269		CITY, STATE SEATTLE, WA, 98108

STANDARD TAT ☒ RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P P G G

PRESERVATIVE USED: 4°C 4°C 4°C 4°C

TYPE OF ANALYSIS: VOC 8260B ENCORE; VOC 8015B ENCORE; SVOC (8270C SIM + PAH/LL); PCBS (8082); TOTAL METALS

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS										COMMENTS
3/25	1240	135S01 0002	135B01	0	2	SO	G	2			2							
	1245	135B01 02 04	135B01	2	4			2			2							
	1255	135S02 0002	135B02	0	2			2			2							
	1300	135B02 02 04	135B02	2	4			2			2							
	1310	135S03 0002	135B03	0	2			2			2							
	1315	135B03 02 04	135B03	2	4			2			2							
	1330	135S06 0002	135B06	0	2			7	3	2	2							
	1335	135B06 02 04	135B06	2	4			7	3	2	2							
	1350	135S05 0002	135B05	0	2			1			1							
	1355	135B05 02 04	135B05	2	4			1			1							
	1415	135S04 0002	135B04	0	2			4			4							MS/MSD
	1420	135B04 02 04	135B04	2	4			2			2							
	0000	FD032503 01	—	—	—			2			2							From 135S04 0002

1. RELINQUISHED BY Ty Rojan	DATE 3/25/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 3/25/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO-0279

CHAIN OF CUSTODY | NUMBER 0964 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	412-921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: T. ROTAHN	PHONE NUMBER: 412-921-8857	ADDRESS: 940 SOUTH HARVEY ST.
		CARRIER/WAYBILL NUMBER: FEDEX # 831673327269		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☑
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	NO. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C HCL	TYPE OF ANALYSIS: 40 ML VOL	COMMENTS
3/25	1900	TB03250301	QC	-	-	QC	G	3	3			TRIP BLANK

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	3/25/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	3/25/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. 270! 0279 | CHAIN OF CUSTODY | NUMBER 0970 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		T. ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. # 8316 7332 7258		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	G	G	Q	G	G	G		
									PRESERVATIVE USED					HCl 4°C	4°C	4°C	4°C	HNO3 4°C	4°C	4°C	4°C	
									TYPE OF ANALYSIS	VOCs 40ml Vials	SVOCs 8270C	SVOCs SIM	SVOC 8151A	METALS 6020	Hg 7470A	PCBs 8082	EXPLOSIVES 8330	EXPLOSIVES PICRATES	
3/26	0700	TB 03260301	QC	—	—	QC	G	3	3										TRIP BLANK
3/26	1415	SB 03260301	QC	—	—	QC	G	12	3	2	2	2	1	2					TAP SOURCE BLANK
3/26	1500	RB 03260301	QC	—	—	QC	G	16	3	2	2	2	1	2	2	2			CUC SLEEVE RINSATE
3/26	1525	SB 03260302	QC	—	—	QC	G	12	3	2	2	2	1	2					DI SOURCE BLANK

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Ty Rojahn	3/26/03	1830	1. RECEIVED BY Ty Rojahn	3/26/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0966 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	TRIANGLE LAB / NORM HOFFA
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Tony Royal		T. ROJAHN	(412) 921-8857	801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX # 8316 7332 7247		DURHAM, NC 27713

STANDARD TAT ☒ RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Dioxin / Furan 8290	COMMENTS
									G	4°C		
3/26	0750	135513 0002	135813	0	2	SO	G	1	1			
3/26	0755	135B130204	135813	2	4	SO	G	1	1			
3/26	0830	135612 0002	135812	0	2	SO	G	1	1			
3/26	0835	135B120204	135812	2	4	SO	G	1	1			
3/26	0915	135811 0002 (TR)	135811	0	2	SO	G	1	1			
3/26	0920	135B110204	135811	2	4	SO	G	1	1			
3/26	0930	135510 0002	135810	0	2	SO	G	1	1			
3/26	0935	135B10 0204	135810	2	4	SO	G	1	1			
3/26	0945	135509 0002	135809	0	2	SO	G	1	1			
3/26	0950	135B090204	135809	2	4	SO	G	1	1			
3/26	1500	RB03260301	QA	-	-	QC	G	2	2			RINSATE CURE SLEEVE
3/26	0000	FD03260301	—	—	—	SO	G	1	1			FD IN 135509 0002

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Tony Royal	3/26/03	1830	FEDERAL EXPRESS	3/26/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0968 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Tony Rojahn		T. ROJAHN	(412) 921 8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX # 8316 7332 7258		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: SVOC (8270C, SIM)	TYPE OF ANALYSIS: 8151A PCB (8082)	TYPE OF ANALYSIS: TOC (Lloyd KAHN)	TYPE OF ANALYSIS: CEC (9081)	TYPE OF ANALYSIS: PH (9045C)	COMMENTS
									G	4°C	▼					
3/26	0750	135513 0002	135B13	0	2	SO	G	2	2							
3/26	0755	135B13 0204	135B13	2	4	SO	G	2	2							
3/26	0830	135512 0002	135B12	0	2	SO	G	2	2							
3/26	0835	135B12 0204	135B12	2	4	SO	G	2	2							
3/26	0915	135511 0002	135B11	0	2	SO	G	2	2							
3/26	0920	135B11 0204	135B11	2	4	SO	G	2	2							
3/26	0930	135B10 0002 (FD)	135B10	0	2	SO	G	2	2							
3/26	0935	135B10 0204	135B10	2	4	SO	G	2	2							
3/26	0945	135509 0002	135B09	0	2	SO	G	2	2							
3/26	0950	135B09 0204	135B09	2	4	SO	G	1	1							
3/26	1320	135B07 0002 (FD)	135B07	0	2	SO	G	2	—	2	X	X				
3/26	1330	135B070810	135B07	8	10	SO	G	2	—	2	X	X				
3/26	0000	FD03260301	—	—	—	SO	G	2	2							DUP FROM 135509 0002

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Tony Rojahn	3/26/03	1830	1. RECEIVED BY: FEDERAL EXPRESS	3/26/03	1830
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS: X = Additional Parameters for Analysis!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO 279 | CHAIN OF CUSTODY | NUMBER 0965 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	R. BASINSKI	(412) 921-8308	TRIANGLE LAB / NORM HOFFA
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Tony Rojahn		T. ROJAHN	(412) 921-8857	801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX # 8316 7332 7247		DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: Dioxin/Furan (8290)	COMMENTS
3/25	1240	135501 0002	135B01	0	2	SO	G	1	1			
3/25	1245	135B01 0204	135B01	2	4	SO	G	1	1			
3/25	1255	135502 0002	135B02	0	2	SO	G	1	1			
3/25	1300	135B02 0204	135B02	2	4	SO	G	1	1			
3/25	1310	135503 0002	135B03	0	2	SO	G	1	1			
3/25	1315	135B03 0204	135B03	2	4	SO	G	1	1			
3/25	1330	135506 0002	135B06	0	2	SO	G	1	1			
3/25	1335	135B06 0204	135B06	2	4	SO	G	1	1			
3/25	1350	135B05 0002	135B05	0	2	SO	G	1	1			
3/25	1355	135B05 0204	135B05	2	4	SO	G	1	1			
3/25	1415	135B04 0002	135B04	0	2	SO	G	2	2			DO MS/MSD
3/25	1420	135B04 0204	135B04	2	4	SO	G	1	1			
3/25	0000	FD03250301	—	—	—	SO	G	1	1			FROM 135504 0002

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Tony Rojahn	3/26/03	1830	1. RECEIVED BY: FEDERAL EXPRESS	3/26/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0979 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Robert Balkema		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. # 8316 7332 7214		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									PRESERVATIVE USED	4°C	4°C	4°C						
									TYPE OF ANALYSIS	TOC Lloyd Khan	LEC	PH 9081	9045C					
3/30	0745	135508 0002	135808	0	2	SO	G	2	2	X	X							
3/30	0800	135808 0608 (MS)	135808	6	8	SO	G	4	*4	X	X							* DO MS/MSD
3/30	0000	FD03300301	QC	-	-	SO	G	2	2	X	X							FROM 135508 0002

1. RELINQUISHED BY Terry Rojahn	DATE 3/31/03	TIME 1600	1. RECEIVED BY FEDERAL EXPRESS	DATE 3/31/03	TIME 1600
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS X = Additional Parameters for (MS) Analysis!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0978 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn		~~TERRY~~ ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. # 8316 7332 7214		SEATTLE, WA 98108

STANDARD TAT ☒ RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT) INCHES	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	G	G	G	G	G			
									4°C	4°C	4°C	4°C	4°C	4°C	4°C			
									TYPE OF ANALYSIS: EXPLOSIVES 8330	METALS 6020 & HG 7471A	TOC LLYod KHAN	CEC 9081	PH 9045C	AVS/SEM (DRAFT EPA METH.)	SVOC 8270C, SIM, 8151A			
3/29	1745	135D18 0004	135D18	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	0915	135D11 0004	135D11	0	4"	SD	G	2	1	1	X	X	X	X	–			
3/30	0930	135D12 0004	135D12	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	1000	135D13 0004	135D13	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	1030	135D14 0004	135D14	0	4"	SD	G	2	1	1	X	X	X	X	–			
3/30	1045	135D15 0004	135D15	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	1100	135D16 0004	135D16	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	1120	135D21 0004	135D21	0	4"	SD	G	2	1	1	–	–	–	–	–			
3/30	1255	135D20 0004	135D20	0	4"	SD	G	2	1	1	X	X	X	X	–			
3/30	~~1355~~ 1315	135D19 0004	135D19	0	4"	SD	G	2	1	1	–	–	–	–	–			STET
3/29	0000	FD03290301	–	0	4"	SD	G	2	1	1	X	X	X	X	X	TK		FROM 135D05 0004
3/29	0000	FD 03290302	–	0	4"	SD	G	2	1	1	–	–	–	–	–			FROM 135D17 0004

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	3/31/03	1600	FEDERAL EXPRESS	3/31/03	1600
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS X = Additional Parameters for Analysis!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0973 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8316 7332 7214		SEATTLE, WA 98108

STANDARD TAT [X]
RUSH TAT [ ] 24 hr. [ ] 48 hr. [ ] 72 hr. [ ] 7 day [ ] 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	P	P	P	G	G	G			
									PRESERVATIVE USED	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	4°C	4°C		
									TYPE OF ANALYSIS	Explosives 8330	Total Metals 6020	Dissolved Metals & HG 6020	Dissolved Metals & HG 7470A	Ammonia & Nitrate 350.1 & 353.2	SVOC 8270C	SVOC SIM	SVOC 8151A	
3/29	1030	13SW0101	13SW01	-	-	SW	G	4		2	1	-	1					
3/29	1030	13SW0101F	13SW01	-	-	SW	G	1		-	-	1	-					
3/29	1100	13SW0201	13SW02	-	-	SW	G	4		2	1	-	1					
3/29	1100	13SW0201F	13SW02	-	-	SW	G	1		-	-	1	-					
3/29	1420	13SW0301	13SW03	-	-	SW	G	4		2	1	-	1					
3/29	1420	13SW0301F	13SW03	-	-	SW	G	1		-	-	1	-					
3/29	1440	13SW0401	13SW04	-	-	SW	G	10		2	1	-	1	2	2	2		
3/29	1440	13SW0401F	13SW04	-	-	SW	G	1		-	-	1	-					
3/29	1510	13SW0501	13SW05	-	-	SW	G	10		2	1	-	1	2	2	2		
3/29	1510	13SW0501F	13SW05	-	-	SW	G	1		-	-	1	-					
3/29	1535	13SW0601	13SW06	-	-	SW	G	10		2	1	-	1	2	2	2		
3/29	1535	13SW0601F	13SW06	-	-	SW	G	1		2	-	1	-					
3/29	1555	13SW0701	13SW07	-	-	SW	G	4		2	1	-	1					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	3/31/03	1600	1. RECEIVED BY FEDERAL EXPRESS	3/31/03	1500
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 0980 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)	**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn	TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
	CARRIER/WAYBILL NUMBER		**CITY, STATE**
	FED. EX. AB# 8316 7332 7214		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)										PRESERVATIVE USED										TYPE OF ANALYSIS										COMMENTS
									G					P	P	P			4oU	4oU	4oC/HNO3	4oC/HNO3	4oC/H2SO4							Explosives 8330	TAL Metals 6020 & Hg 7470A	Diss. Metals 6020 & Hg 7470A	Ammonia 350.1 & Nitrate 353.2							
3/29	1555	135W0701F	135W07	–	–	SW	G	1	–					–															–	–	1	–						
3/29	1645	135W0901	135W09	–	–	SW	G	4	2					1															–	1		1						
3/29	1645	135W0901F	135W09	–	–	SW	G	1	–					–															–	–	1	–						
3/29	1700	135W1001	135W10	–	–	SW	G	4	2					1															–	1		1						
3/29	1700	135W1001F	135W10	–	–	SW	G	1	–					–															–	–	1	–						
3/30	0930	135W1201 RE	135W12	–	–	SW	G	4	2					1															–	1		1						
3/30	0930	135W1201F	135W12	–	–	SW	G	1	–					–															–	–	1	–						
3/30	1000	135W1301	135W13	–	–	SW	G	4	2					1															–	1		1						
3/30	1000	135W1301F	135W13	–	–	SW	G	1	–					–															–	–	1	–						
3/29	0000	FD03290303	QC	–	–	SW	G	4	2					1															–	1		1						FROM 135W1001
3/29	0000	FD0329 0303F	QC	–	–	SW	G	1	–					–															–	–	1	–						FROM 135W1001F

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	3/31/03	1600	FEDERAL EXPRESS	3/31/03	1600
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO :0279 | CHAIN OF CUSTODY | NUMBER · 0975 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Tony Royal		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX # 8316 7332 7214		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G G G G
PRESERVATIVE USED: 4°C 4°C 4°C 4°C 4°C 4°C 4°C

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT) INCHES	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: EXPLOSIVES 8330	SVOCS 8270C SIM, BIS1A	METALS 6020 # MS 747/1	TOC Lloyd KHAN	CEC 9081	pH 9045C	AVS/SEM (DRAGA EPA METH)	COMMENTS
3/29	1035	135D22 0004	135D22	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1035	135D01 0004	135D01	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1105	135D02 0004	135D02	0	4"	SD	G	2	1	-	1	X	X	X	X	
3/29	1135	135D23 0004	135D23	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1420	135D03 0004	135D03	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1450	135D04 0004	135D04	0	4"	SD	G	2	1	X	1	-	-	-	-	
3/29	1515	135D05 0004	135D05	0	4"	SD	G	4	*2	*X	*2	*X	X	X	X	DO *MS/MSD
3/29	1545	135D06 0004	135D06	0	4"	SD	G	2	1	X	1	-	-	-	-	
3/29	1610	135D07 0004	135D07	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1620	135D08 0004	135D08	0	4"	SD	G	2	1	-	1	X	X	X	X	
3/29	1630	135D17 0004	135D17	0	4"	SD	G	2	1	-	1	X	X	X	X	
3/29	1650	135D09 0004	135D	0	4"	SD	G	2	1	-	1	-	-	-	-	
3/29	1710	135D10 0004	135D10	0	4"	SD	G	2	1	-	1	-	-	-	-	

		DATE	TIME		DATE	TIME
1. RELINQUISHED BY	Tony Royal	3/31/03	1600	1. RECEIVED BY FEDEXAL EXPRESS	3/31/03	1600
2. RELINQUISHED BY		DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY		DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: X = Additional PARAMETERS FOR ANALYSIS!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0984 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Royal		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB # 8316 7332 7063		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: SVOC 8270C	SVOC SIM	SVOC 8151A	PCBs 8082	EXPLOSIVES 8330	EXPLOSIVES PICRATES	METALS 6020 & Hg 7470A	VOCs 8260B	VOCs 8015B	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	G	G	G	G		
PRESERVATIVE USED									4°C	4°C	4°C	4°C	4°C	4°C	4°C/HNO3	4°C/HCl		
4/7	1615	RB04070301	QC	—	—	QC	G	13	2	2	2	2	2	2	1	—		S.S. Mixing Bowl
4/7	1630	RB04070302	QC	—	—	QC	G	13	2	2	2	2	2	2	1	—		Dis. Trowel
4/9	0700	TB04090301	QC	-	-	QC	G	3	-	-	-	-	-	-	-	2	1	TRIP BLANK
4/9	1230	RB04090301	QC	-	-	QC	G	16	2	2	2	2	2	2	1	2	1	SLEEVE

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Royal	4/9/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	4/9/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

ENTS

ION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0985 | PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER RALPH BASINSKI	PHONE NUMBER (412) 921-8308	LABORATORY NAME AND CONTACT: TRIANGLE / NORM HOEFA
SAMPLERS (SIGNATURE) Terry Rojahn		FIELD OPERATIONS LEADER TERRY ROJAHN	PHONE NUMBER (412) 921-8857	ADDRESS 801 CAPITOLA DRIVE
		CARRIER/WAYBILL NUMBER FED. EX AB# 8316 7332 7177		CITY, STATE DURHAM, NC 27713

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: DIOXINS / FURANS 8290	COMMENTS
4/7	1615	RB04070301	QC	–	–	QC	G	2	2	S.S. MIXING BOWL
4/7	1630	RB04070302	QC	–	–	QC	G	2	2	DIS. TROWEL
4/9	1000	1655330002	165B33	0	2	SO	G	1	1	
4/9	1015	1655320002	165B32	0	2	SO	G	1	1	
4/9	1038	1655260002	165B26	0	2	SO	G	1	1	
4/9	1230	RB04090301	QC	–	–	QC	G	2	2	CORE SLEEVE
4/10	1210	1355140001	135B14	0	1	SO	G	1	1	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	4/10/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	4/10/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0987 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7166		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	G/P	G/P	G	G				
									PRESERVATIVE USED								
									4°C	4°C	4°C	4°C					
									TYPE OF ANALYSIS								
									VOCs 8260B	VOCs 8015B	SVOCs (8270C, SIM) & 8151A)	PCB's (8082)					
4/10	0800	TB04100301	QC	—	—	QC	G	3	2	1							Glass 40ml Vial Trip Blank w/HCl
4/10	1210	13SS140001	135814	0	1	SO	G	2	—	—	2	X					
4/10	1230	13SS15 0002 (TR)	135809	0	2	SO	G	5	3	2							Plastic Encore
4/10	1235	13SB15 0204 (TC)	135809	2	4	SO	G	5	3	2							Plastic Encore

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	4/10/03	1900	FEDERAL EXPRESS	4/11/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: X = Additional Parameters to Analyze!

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0988 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX AB# 8316 7332 7155		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: VOCs 8260B	VOCs 8015B	SVOCs 8270C	SVOCs SIM	SVOCs 8151A	Explosives 8330	Explosives PICRATES	Metals 6020 & NH3 Ammonia 350.1 & Nitrates 353.2	COMMENTS
									G	4°C/HCl									
									G	4°C/HCl									
									G	4°C									
									G	4°C									
									G	4°C									
									G	4°C									
									G	4°C/HNO3									
									P	4°C/H2SO4									
4/22	0700	TB042203 01	QC	NA	NA	QC	G	3			2	1							TRIP BLANK
4/22	0800	16GWT0101	16MW T01	NA	NA	GW	G	4			2	2							
4/22	0946	16GWT0201	16MW T02	NA	NA	GW	G	17			3	2	2	2	2	2	2	1	1
4/22	1045	16GW0501	WES-14 05-83	NA	NA	GW	G	*45			9	6	2	2	2	2	2	3	3
4/22	1437	16GWT0401	16MW T04	NA	NA	GW	G	17			3	2	2	2	2	2	2	1	1
4/22	1630	RB042203 01	QC	NA	NA	QC	G	17			3	2	2	2	2	2	2	1	1
4/23	0811	16GW0401	WES-14 04-83	NA	NA	GW	G	17			3	2	2	2	2	2	2	1	1
4/23	1130	16GW0101	WES-14 01-83	NA	NA	GW	G	17			3	2	2	2	2	2	2	1	1

1. RELINQUISHED BY: Terry Rojahn	DATE: 4/23/03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 4/23/03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: * 14 additional Glass Amber 1L Bottles for additional Volume for SVOCs & Explosives (MS/MSD)

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 | CHAIN OF CUSTODY | NUMBER 0991 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7144		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: VOCs 8260B	VOCs 8015A	SVOCs 8270C SIM 8151A	Explosives 8330	Explosives Picrates	Ammonia & Nitrates 350.1 353.2	Metals 6020 & Hg 7470A	Diss Metals 6020 & Hg 7470A	COMMENTS
									G	HCl 4°C									
									G	HCl 4°C									
									G	4°C									
									G	4°C									
									G	4°C									
									P	H2SO4 4°C									
									P	HNO3 4°C									
									P	HNO3 4°C									
									P	4°C									
4/24	0800	TB04240301	QC	NA	NA	QC	G	3			2	1							TRIP BLANK
4/24	0830	RB04240301	QC	NA	NA	QC	G	17			3	2	6	2	2	1	1	-	BLADDER PUMP & TEFLON TUBING
4/24	0830	RB04240301-F	QC	NA	NA	QC	G	1			-	-	-	-	-	-	-	1	↓
4/24	1201	16GW0201	WES-14 02-83	NA	NA	GW	G	17			3	2	6	2	2	1	1	-	
4/24	1300	16GWT0501	16MW T05	NA	NA	GW	G	17			3	2	6	2	2	1	1	-	
4/24	1632	16GW0301	WES-14 03-83	NA	NA	GW	G	17			3	2	6	2	2	1	1	-	
4/24	0000	FD04240301	QC	NA	NA	GW	G	17			3	2	6	2	2	1	1	-	
4/25	0810	RB04250301	QC	NA	NA	~~QC GW~~ (12)	G	4			-	-	-	2	-	1	1	-	PE & Silicon Tubing RINSATE
4/25	0810	RB04250301-F	QC	NA	NA	~~QC GW~~ (12)	G	1			-	-	-	-	-	-	-	1	↓
4/25	1022	13GWT2601	13MW T26	NA	NA	GW	G	4			-	-	-	2	-	1	1	-	
4/25	1135	16GWT0301	16MW T03	NA	NA	GW	G	17			3	2	6	2	2	1	1	-	
4/25	1346	13GWT2101	13MW T21	NA	NA	GW	G	4			-	-	-	2	-	1	1	-	
4/25	0000	FD04250301	QC	NA	NA	GW	G	4			-	-	-	2	-	1	1	-	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	4/25/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	4/25/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO: 0279 CHAIN OF CUSTODY | NUMBER 0992 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921. 8308	LANCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS** South
Terry Rojahn Robert Sullivan		TERRY ROJAHN	(412) 921-8857	940 A HARNEY STREET
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB# 8316 7332 7133		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	P	P	P					
									4°C	4°C / H_2SO_4	4°C / HNO_3	4°C / HNO_3					
									PRESERVATIVE USED								
									TYPE OF ANALYSIS: Explosives (8330)	Ammonia & Nitrates 350.1 & 353.2	Total Metals 6020 & Hg 7470A	Diss. Metals 6020 & Hg 7470A					
4/26	1024	13GWT0101	13MW T01	NA	NA	GW	G	4	2	1	1	-					
4/26	1230	13GWT2501	13MW T25	NA	NA	GW	G	1	1								MIN. VOLUME
4/26	~~1142~~ ~~1536~~	13GWT0301	13MW T03	NA	NA	GW	G	4	2	1	1	-					
4/26	1146	13GWT0301-F	13MW T03	NA	NA	GW	G	1	-	-	-	1					
4/26	1536	13GWT0201	13MW T02	NA	NA	GW	G	4	2	1	1	-					
4/26	1545	13GWT0801	13MW T08	NA	NA	GW	G	4	2	1	1	-					
4/27	0835	13GWT0601	13MW T06	NA	NA	GW	G	1	1								MIN. VOLUME
4/27	0910	13GWT0501	13MW T05	NA	NA	GW	G	4	2	1	1	-					
4/27	0910	13GWT0501-F	13MW T05	NA	NA	GW	G	1	-	-	-	1					
4/27	1051	13GWT0401	13MW T04	NA	NA	GW	G	4	2	1	1	-					
4/27	1200	13GWT0701	13MW T07	NA	NA	GW	G	4	2	1	1	-					
4/27	1506	13GWT1101	13MW T11	NA	NA	GW	G	4	2	1	1	-					
4/27	1710	13GWT1201	13MW T12	NA	NA	GW	G	4	2	1	1	-					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	4/28/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	4/28/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO:0279 | CHAIN OF CUSTODY | NUMBER 0993 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Robert Bathurst Troy Nash		TERRY ROJAHN	(412) 921-0857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7133		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								
									G	P	P	P					
									PRESERVATIVE USED								
									4°C	4°C	4°C / H_2SO_4	4°C / HNO_3	4°C / HNO_3				
									TYPE OF ANALYSIS								
									Explosives (8330)	Ammonia 350.1 & Nitrates 353.2	Total Metals 6020 & Hg 7470A	Diss. Metals 6020 & Hg 7470A	VOCs 8260B	VOCs (TCL) & TCL 8015B	SVOCs 8270C, SIM, 8151A		COMMENTS
4/27	1710	13GWT1201-F	13MW T12	NA	NA	GW	G	1	-	-	-	1					
4/27	1811	13GWT1001	13MW T10	NA	NA	GW	G	4	2	1	1	-					
4/28	0700	TB04280301	QC	NA	NA	QC	G	3	-	-	-	-	2	1			TRIP BLANK
4/28	0911	13GWT0901	13MW T09	NA	NA	GW	G	15	2	1	1	-	3	2	6		
4/28	0000	FD04280301	QC	NA	NA	GW	G	15	2	1	1	-	3	2	6		DUP OF 13GWT0901
4/28	1456	13GWT2401	13MW T24	NA	NA	GW	G	4	2	1	1						

1. RELINQUISHED BY: Troy Nash	DATE: 4/28/03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 4/28/03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0994 | PAGE 1 OF 1

PROJECT NO: 9060	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LANCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Robert Balhoven, Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARVEY STREET
		CARRIER/WAYBILL NUMBER: FED. EX. AB# 8316 7332 7122		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: VOCs 8260B	VOCs 8015B	SVOCs 8270C/SIM/8151A	Explosives 8330	Explosives 8330	Ammonia 350.1 & Nitrates 353.2	Total Metals 6020 & Hg 7470A	Diss. Metals 6020 & Hg 7470A	COMMENTS
												4°C/HCl	4°C/HCl	4°C	4°C	4°C/H2SO4	4°C/HNO3	4°C/HNO3	
4/28	800	TB04280302	QC	NA	NA	QC	G	3	2	1									
4/28	0932	16GWT0601	16MW T06	NA	NA	GW	G	13	3	2	4	1	1	1	1	–			MIN. VOL.
4/28	1220	13GWT2501	13MW T25	NA	NA	GW	G	1	–	–	–	–	–	–	1	–			MIN. VOL.
4/28	1606	13GWT2001	13MW T20	NA	NA	GW	G	17	3	2	6	2	2	1	1	–			
4/28	1606	13GWT2001-F	13MW T20	NA	NA	GW	G	1	–	–	–	–	–	–	–	1			
4/28	1748	13GWT0601	13MW T06	NA	NA	GW	G	1	–	–	–	–	–	–	1	–			MIN. VOL.
4/29	0926	13GWT1401	13MW T14	NA	NA	GW	G	4	-	-	-	2	–	1	1	–			

1. RELINQUISHED BY: Terry Rojahn	DATE: 4/29/03	TIME: 1800	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 4/29/03	TIME: 1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0995 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn Robert Bultmore		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB# 8316 7332 7074		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	P	P	P						
									PRESERVATIVE USED				4°C	4°C/H2SO4	4°C/HNO3	4°C/HNO3		
									TYPE OF ANALYSIS				Explosives 8330	Ammonia & Nitrate 350.1 / 353.2	Total Metals & Hg 6020 7470A	Diss. Metals & Hg 6020 7470A		
5/6	0842	13GWT1601	13MW T16	NA	NA	GW	G	4	2	1	1	-						
5/6	1242	13GWT2301	13MW T23	NA	NA	GW	G	4	2	1	1	-						
5/6	1342	13GWT1801	13MW T18	NA	NA	GW	G	4	2	1	1	-						
5/6	1342	13GWT1801-F	13MW T18	NA	NA	GW	G	1	-	-	-	1						
5/6	1440	13GWT2501	13MW T25	NA	NA	GW	G	1	-	1	-	-						SLOW RECHARGE WELL
5/6	1542	13GWT2201	13MW T22	NA	NA	GW	G	4	2	1	1	-						
5/6	1735	13GWT0601-F	13MW T06	NA	NA	GW	G	1	-	-	-	1						SLOW RECHARGE WELL
5/6	1702	13GWT1501	13MW T15	NA	NA	GW	G	4	2	1	1	-						
5/7	0947	13GWT1301	13MW T13	NA	NA	GW	G	4	2	1	1	-						
5/7	1022	13GWT1701	13MW T17	NA	NA	GW	G	12	6	3	3	-						DO MS/MSD
5/7	1347	13GWT1901	13MW T19	NA	NA	GW	G	4	2	1	1	-						
5/7	0000	FD0507030 1	QC	NA	NA	GW	G	4	2	1	1	-						DUP FROM 13GWT1301

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	5/07/03	1800	1. RECEIVED BY: FED. EX.	5/7/03	1800
2. RELINQUISHED BY:	DATE	TIME	2. RECEIVED BY:	DATE	TIME
3. RELINQUISHED BY:	DATE	TIME	3. RECEIVED BY:	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CTO-0279 | CHAIN OF CUSTODY | NUMBER 0996 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7085		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	P	P	P					
									PRESERVATIVE USED								
									TYPE OF ANALYSIS								
									Explosives 8330	Ammonia & Nitrate 350.1 & 353.2	Total Metals & Hg 6020 & 7470A	Diss. Metals & Hg 6020 & 7470A	4°C	4°C/H_2SO_4	4°C/HNO_3	4°C/HNO_3	
5/7	1300	13GWT2501-F	13MW T25	NA	NA	GW	G	1	-	-	-	1					SLOW RECHARGE WELL
5/7	1700	13GWT0601	13MW T06	NA	NA	GW	G	1	-	1	-	-					↓
5/8	0910	13SW0801	13SW 08	NA	NA	SW	G	4	2	1	1	-					
5/8	0910	13SW0801-F	↓	NA	NA	SW	G	1	-	-	-	1					
5/8	0935	13SW1101	13SW 11	NA	NA	SW	G	4	2	1	1	-					
5/8	0935	13SW1101-F	↓	NA	NA	SW	G	1	-	-	-	1					

1. RELINQUISHED BY Terry Rojahn	DATE 5/8/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 5/8/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

FORM NO. T...

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 0989 | PAGE 1 OF 1

CTO-0279

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
9060	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Tony Agnello		TERRY ROJAHN	(412) 921-8857	340 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8316 7332 7096		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: 8260C	TYPE OF ANALYSIS: SVOCS	COMMENTS
									G	4°C			
5/9	1000	13GWT0902	13MW T09	NA	NA	GW	G	2	2				
5/9	1505	13GWT2002	13MW T20	NA	NA	GW	G	2	2				
5/9	0000	FD0509301	QC	NA	NA	GW	G	2	2				FROM 13GWT0902

1. RELINQUISHED BY	Tony Agnello	DATE 5/9/03	TIME 1800	1. RECEIVED BY	FEDERAL EXPRESS	DATE 5/9/03	TIME 1800
2. RELINQUISHED BY		DATE	TIME	2. RECEIVED BY		DATE	TIME
3. RELINQUISHED BY		DATE	TIME	3. RECEIVED BY		DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.6.2
SWMU 13
CHAIN OF CUSTODY RECORDS
ROUND 2

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4801 | PAGE 1 OF 1

PROJECT NO: CTO N7060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANH HO			
SAMPLERS (SIGNATURE): Terry Rowahn		FIELD OPERATIONS LEADER: TERRY ROWAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 SOUTH HARKNESS ST.			
CARRIER/WAYBILL NUMBER: FED EX AB# 8912 2491 1051			CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	G	P	P	P	G			
									PRESERVATIVE USED		4°C	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	
									TYPE OF ANALYSIS: Explosives SW-846 8330	Misc. Explosives SW-846 8330	Total Metals & Mercury 6020 7470A	Ds Metals & Mercury 6020 7470A	Nitrate + Nitrite & Ammonia	Selected Ion Monitoring - PAHs			
10/22	0930	13SP0101	13 SP01	-	-	SP	G	6	2	2	1	-	1	-			
10/22	0950	13SW1601	13 SW16	-	-	SW	G	6	2	2	1	-	1	-			
10/22	1033	13SP0201	13 SP02	-	-	SP	G	6	2	2	1	-	1	-			
10/22	1045	13SW1401	13 SW14	-	-	SW	G	6	2	2	1	-	1	-			
10/22	1230	13SP0301	13 SP03	-	-	SP	G	6	2	2	1	-	1	-			
10/22	1300	13SW3101	13 SW31	-	-	SW	G	6	2	2	1	-	1	-			
10/22	1330	13SP0401	13 SP04	-	-	SP	G	6	2	2	1	-	1	-			
10/22	1345	13SW2201	13 SW22	-	-	SW	G	6	2	2	1	-	1	-			
10/22	1400	13SW1302	13 SW13	-	-	SW	G	6	6	6	3	-	3	-			DO MS/MSD
10/22	1450	13SW1202	13 SW12	-	-	SW	G	6	2	2	1	-	1	-			
10/22	1538	13SW3001	13 SW30	-	-	SW	G	6	2	2	1	-	1	-			
10/22	0000	13FD10220301	QC	-	-	QC	G	6	2	2	1	-	1	-			DUP OF 13SW1401
10/22	0000	13FD10220303	QC	-	-	QC	G	6	2	2	1	-	1	-			DUP OF 13SW1302

1. RELINQUISHED BY: Terry Rowahn	DATE: 10/22/03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 10/22/03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4802 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB# 8412 2491 1051		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Dis. Metals 6020	Mercury 7470A	HNO3							COMMENTS
													P							
10/22	0930	13SP0101-F	13 SP01	—	1	SP	G	1	1											
10/22	0950	13SW1601-F	13 SW16	—	—	SW	G	1	1											
10/22	1033	13SP0201-F	13 SP02	—	—	SP	G	1	1											
10/22	1045	13SW1401-F	13 SW14	—	—	SW	G	1	1											
10/22	1230	13SP0301-F	13 SP03	—	—	SP	G	1	1											
10/22	1300	13SW3101-F	13 SW31	—	—	SW	G	1	1											
10/22	1330	13SP0401-F	13 SP04	—	—	SP	G	1	1											
10/22	1345	13SW2201-F	13 SW22	—	—	SW	G	1	1											
10/22	1400	13SW1302-F	13 SW13	—	—	SW	G	3	3											DO MS/MSD
10/22	1450	13SW1202-F	13 SW12	—	—	SW	G	1	1											
10/22	1538	13SW3001-F	13 SW30	—	—	SW	G	1	1											
10/22	0000	13FD1022 0301-F	QC	—	—	QC	G	1	1											DUP OF 13SW1401
10/22	0000	13FD1022 0303-F	QC	—	—	QC	G	1	1											DUP OF 13SW1302

1. RELINQUISHED BY Terry Rojahn	DATE 10/22/03	TIME 1900	1. RECEIVED BY FLORAL EXPRESS	DATE 10/22/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4803 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8368	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB # 841224911051		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G								
									PRESERVATIVE USED									
									4°C	4°C								
									TYPE OF ANALYSIS: Explosives & Misc. Expls. SW-846 8330	Metals & Mercury SW-846 6020 & 7471A								
10/22	1240	13SD290004	13 SD29	0	4	SD	G	2	1	1								
10/22	1310	13SD310004 (TK)	13 SD31	0	4	SD	G	2	1	1								
10/22	1542	13SD300004	13 SD30	0	4	SD	G	2	1	1								
10/22	1555	13SD280004	13 SD28	0	4	SD	G	2	1	1								
10/22	0000	13FD1022030Z	QC	0	4	QC	G	2	1	1								DUP OF 13SD290004

1. RELINQUISHED BY	Terry Rojahn	DATE 10/22/03	TIME 1900	1. RECEIVED BY	FEDERAL EXPRESS	DATE 10/22/03	TIME 1900
2. RELINQUISHED BY		DATE	TIME	2. RECEIVED BY		DATE	TIME
3. RELINQUISHED BY		DATE	TIME	3. RECEIVED BY		DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4804 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN MO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
		TERRY ROJAHN	(412) 921-8857	940 South Harney St.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB# 8412 2491 0813		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								
									G	G	P	P	P				
									PRESERVATIVE USED		4°C	4°C	4°C HNO3	4°C H2SO4	4°C HNO3		
									TYPE OF ANALYSIS		Explosives SW-846 8330	Misc. Explosives SW-846 8330	Total Mercury & Hg 7470A 6020	Nitrate + Nitrite & Ammonia & Hg D.S. Metals & Hg 6020 7470A			COMMENTS
10/23	0850	13SW10 02	13 SW10	-	-	SW	G	6	2	2	1	1	-				
10/23	0850	13SW10 02-F	↓	-	-	SW	G	1	-	-	-	-	1				
10/23	0915	13SW1801	13 SW18	-	-	SW	G	6	2	2	1	1	-				
10/23	0915	13SW1801-F	↓	-	-	SW	G	1	-	-	-	-	1				
10/23	0935	13SW1901	13 SW19	-	-	SW	G	6	2	2	1	1	-				
10/23	0935	13SW1901-F	↓	-	-	SW	G	1	-	-	-	-	1				
10/23	1230	13SW0802	13 SW08	-	-	SW	G	6	2	2	1	1	-				
10/23	1230	13SW0802-F	↓	-	-	SW	G	1	-	-	-	-	1				
10/23	1315	13SW20 01	13 SW20	-	-	SW	G	6	2	2	1	1	-				
10/23	1315	13SW20 01-F	↓	-	-	SW	G	1	-	-	-	-	1				
10/23	1415	13SW2701	13 SW27	-	-	SW	G	6	2	2	1	1	-				
10/23	1415	13SW2701-F	↓	-	-	SW	G	1	-	-	-	-	1				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Tony Royal	10/23/03	1830	1. RECEIVED BY FEDERAL EXPRESS	10/23/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 4805 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8508	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 South HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8412 2491 0813		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT) INCHES	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	G							
									4°C	4°C	4°C							
									TYPE OF ANALYSIS: Explosives & Misc. Explosives SW-846 8330 Methods & Mercury SW 846 6020 & 7471A Selected Ion Monitoring									
10/23	1050	135D25 0004	13 SP25	0	4	SD	G	3	1	1	1							
10/23	1332	135D24 0004	13 SD24	0	4	SD	G	2	1	1								
10/23	1425	135D26 0004	13 SD26	0	4	SD	G	2	1	1								
10/23	1420	135D27 0004	13 SD27	0	4	SD	G	2	1	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Ty Nash	10/23/03	1830	1. RECEIVED BY FEDERAL EXPRESS	10/23/03	1730
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4806 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANN HO	SAMPLERS (SIGNATURE)	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
ADDRESS: 940 SOUTH HARNEY ST.	CARRIER/WAYBILL NUMBER: FED EX AB# 8412 2491 0824	CITY, STATE: SEATTLE WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Volatiles SW-846 8260B	Volatiles SW-846 8015B	Explosives SW-846 8330	Misc. Explosives SW-846 8330	Total Metals SW846 6020 & Hg 7470A	Dis Metals SW846 6020 & Hg 7470A	Nitrate + Nitrite EPA 353.2	Selected Ion Monitoring	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED: 4°C/HCl	4°C/HCl	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	COMMENTS
10/24	0700	TB10240301	QC	-	-	QC	G	4	2	2														TRIP BLANK
10/24	0840	13SW3201	13 SW32	-	-	SW	G	6	-	-	(6) 4	(6) 4	(3) 1	-	-	6								Do MS/MSD
10/24	1030	16SW1701	13 SW17	-	-	SW	G	36	9	9	6	6	3	-	3	-								Do MS/MSD
10/24	1030	16SW1701-F	↓	-	-	SW	G	3	-	-	-	-	-	3	-	-								Do MS/MSD
10/24	1400	16SW1801	13 SW18	-	-	SW	G	12	3	3	2	2	1	-	1	-								
10/24	1400	16SW1801-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-	-								
10/24	1500	16SW1401	13 SW14	-	-	SW	G	12	3	3	2	2	1	-	1	-								
10/24	1500	16SW1401-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-	-								
10/24	1518	16SW2101	13 SW21	-	-	SW	G	12	3	3	2	2	1	-	1	-								
10/24	1518	16SW2101-F	↓	-	-	SW	G	1	-	-	-	-	-	1	-	-								
10/24	0000	16FD10240301	QC	-	-	SW	G	12	3	3	2	2	1	-	1	-								DUP OF 16SW1701
10/24	0000	16FD10240301-F	QC	-	-	SW	G	1	-	-	-	-	-	1	-	-								↓

1. RELINQUISHED BY: Terry Rojahn	DATE: 10/24/03	TIME: 1830	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 10/24/03	TIME: 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4807 | PAGE 1 OF 1

PROJECT NO: N9060	FACILITY: CTO 0279 NSWC Grand	PROJECT MANAGER: Ralph Basinski	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: Laucks / Ann Ho
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Terry RoJann	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 South Harney St
		CARRIER/WAYBILL NUMBER: FED EX AB# 8412 2491 0824		CITY, STATE: Seattle, WA 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT) Inches	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Volatiles (Encore) SW-846 8260B	Volatiles (Encore) SW 846 8015B	Volatiles (4oz Jar) SW 846 8260B	Volatiles (4oz Jar) SW 846 8015B	Explosives (4oz Jar) SW 846 8330	Metals & Misc. Exp. SW846 6020 & 7471A	Selected Ion Monitoring	COMMENTS
10/24	0850	13SD32 0004	13 SD32	0	4	SD	G	2			-	-	-	-	-	-	2	Do MS/MSD
10/24	1020	16SD19 0004	16 SD19	0	4	SD	G	8			3	3	-	-	1	1	-	
10/24	1100	16SD17 0004	16 SD17	0	4	SD	G	8			-	-	2	2	2	2	-	Do MS/MSD
10/24	1330	16SD16 0004	16 SD16	0	4	SD	G	8			3	3	-	-	1	1	-	
10/24	1410	16SD18 0004	16 SD18	0	4	SD	G	4			-	-	1	1	1	1	-	
10/24	1420	16SD15 0004	16 SD15	0	4	SD	G	4			-	-	1	1	1	1	-	
10/24	1510	16SD14 0004	16 SD14	0	4	SD	G	4			-	-	1	1	1	1	-	
10/24	1525	16SD21 0004	16 SD21	0	4	SD	G	4			-	-	1	1	1	1	-	
10/24	1611	16SD22 0004	16 SD22	0	4	SD	G	1			-	-	-	-	-	-	1	
10/24	0000	13FD10240301	QC	0	4	SD	G	1			-	-	-	-	-	-	1	DUP OF 13SD32 0004
10/24	0000	16FD10240302	QC	0	4	SD	G	4			-	-	1	1	1	1	-	DUP OF 16SD17 0004

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Tony Lopez	10/24/03	1830	1. RECEIVED BY: FEDERAL EXPRESS	10/24/03	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4813 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / ANH HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX AB# 8412 2491 1040		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: DIS. METALS SW846 6020 & HG: 7470A	4°C	HNO3							COMMENTS
10/27	0900	13SW1501-F	13 SW15	-	-	SW	G	1	1											
10/27	0940	13SW2801-F	13 SW28	-	-	SW	G	1	1											
10/27	1015	13SW0902-F	13 SW09	-	-	SW	G	1	1											
10/27	1110	13SW2502-F (TB)	13 SW25	-	-	SW	G	1	1											
10/27	1305	13SW0702-F	13 SW07	-	-	SW	G	1	1											
10/27	1330	13SW2401-F	13 SW24	-	-	SW	G	1	1											
10/27	1410	13SW2601-F	13 SW26	-	-	SW	G	1	1											
10/27	0000	13FD10270301-F	OC	-	-	SW	G	1	1											DUP OF 13SW2502

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	10/27/03	1900	1. RECEIVED BY FEDERAL EXPRESS	10/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4814 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER RALPH BASINSKI	PHONE NUMBER (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER TERRY ROJAHN	PHONE NUMBER (412) 921-8857	ADDRESS 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER FED. EX. AB # 8412 2491 1040		CITY, STATE SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Volatiles SW846 8260B	Volatiles SW846 8015B	Explosives SW846 8330	Misc. Explosives SW846 8330	Total Metals SW846 6020 & 7470A	Nitrate & Hg EPA 353.2	Sulfate & Nitrate	Nitrate + Nitrite & Chloride & Ammonia & Nitrite (353.2) & Selected Ion Monitoring (350.1)	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	G	P	P	P	P
									PRESERVATIVE USED	4°C/HCl	4°C/HCl	4°C	4°C	4°C/HNO3	4°C/H2SO4	4°C	4°C/H2SO4
10/26	1550	16GWT0202	16 GWT02	-	-	GW	G	13	3	3	2	2	1	1	1		
10/26	0000	16FD10260301	QC	-	-	GW	G	13	3	3	2	2	1	1	1		DUP OF 16GW0402
10/27	0900	13SW1501	13 SW15	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	0940	13SW2801	13 SW28	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	1015	13SW0902	13 SW09	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	1110	13SW2501	13 SW25	-	-	SW	G	8 (1)	-	-	2	2	1	-	-	1	2
10/27	1305	13SW0702	13 SW07	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	1330	13SW2401	13 SW24	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	1410	13SW2601	13 SW26	-	-	SW	G	6	-	-	2	2	1	-	-	1	
10/27	0000	13FD10270301	QC	-	-	SW	G	8 (1)	-	-	2	2	1	-	-	1	DUP OF 2 13SW2602 (12)

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	10/27/03	1900	FEDERAL EXPRESS	10/27/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4815 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojahn		TERRY ROJAHN	(412) 921-8847	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB # 8412 2491 1030		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	P	P	P	G				
									PRESERVATIVE USED		4°C	4°C	4°C / HNO3	4°C / H2SO4	4°C	4°C / H3PO4		
									TYPE OF ANALYSIS		Explosives SW846 8330	Misc. Explosives SW846 8330	Total Metals SW846 6020 & Hg SW846 7470A	Nitrate + Nitrate (353.2) & Ammonia (350.1) SW846 & Chloride	Total Organic Carb and SW846 9060	Volatiles SW846 8260B	Volatiles SW846 8015B	
10/28	1045	13GWT2402	13 GW24	-	1	GW	G	6	2	2	1	1						
10/28	1235	13GWT2302	13 GW23	-	-	GW	G	6	2	2	1	1						
10/28	1545	TB102803 01	QC	-	-	QC	G	4	-	-	-	-	-	-	2	2		
10/28	1550	SB102803 01	QC	-	-	QC	G	15	2	2	1	1	1	2	3	3		TAP H2O
10/28	1615	SB 102803 02	QC	-	-	QC	G	15	2	2	1	1	1	2	3	3		DI H2O
10/28	1555	13GWT1902	13 GW19	-	-	GW	G	6	2	2	1	1						

1. RELINQUISHED BY Terry Rojahn	DATE 10/28/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 10/29/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4816 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8482 2491 0629		SEATTLE WA 98108

STANDARD TAT ☒ EXCEPT FOR QUICK TURN WELLS
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day
← SEE COMMENTS FOR QT

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	G	P	P	P				
									4°C	4°C	4°C / HNO3	4°C / H2SO4	4°C / HNO3				
									TYPE OF ANALYSIS: Explosives SW846 8330	Misc. Explosives SW846 8330	Total Metals + Hg SW846 6020 & 7470A	Nitrate + Nitrite (353.2) Ammonia (350.1) Dis. Metals + Hg SW846 6020 & 7470A					
11/05	0950	13GWT2102	13 MWT21	-	-	GW	G	18	6	6	3	3					DO MS/MSD
11/05	1047	13GWT1702	13 MWT17	-	-	GW	G	6	2	2	1	1					
11/05	1630	13GWT4001	13 MWT40	-	-	GW	G	6	2	2	1	1					(QT)
11/05	0000	13FD11050301	QC	-	-	GW	G	6	2	2	1	1					FROM 13GWT1702
11/06	0845	13GWT2502	13MW T25	-	-	GW	G	1	1	-	-	-					MIN. VOLUME
11/06	1320	13GWT0502	13 MW T05	-	-	GW	G	6	2	2	1	1					
11/06	1320	13GWT0502-F	13 MW T05	-	-	GW	G	1	-	-	-	-	1				
11/06	1500	13GWT4201	13MW T42	-	-	GW	G	3	1	1	-	1					(QT) MIN. VOLUME

1. RELINQUISHED BY Terry Rojahn	DATE 11/6/03	TIME 1900	1. RECEIVED BY Terry Rojahn	DATE 11/6/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS MIN. VOLUME = WELLS THAT DRY UP AND WILL TAKE MORE THAN 1 DAY TO SAMPLE ALL PARAMETERS.

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4817 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	IAUCKS / ANH HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Ty Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB# 8412 2491 0618		SEATTLE WA 98108

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day
(QT)

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Explosives SW 846 8330	Misc Explosives SW 846 8330	Total Metals SW846 6020 & 7470A	Nitrate + Nitrite (353.2)	Ammonia (350.1)	Dis Metals SW 846 6020 & 7470A	COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	P	P	P	
									PRESERVATIVE USED	4°C	4°C	4°C / HNO3	4°C / H2SO4	4°C / HNO3	
11/06	1500	13GWT4201	13GW T42	—	—	GW	G	1	—	—	1				(QT)
11/06	1500	13GWT4201-F	13GW T42	—	—	GW	G	1	—	—	—	—	1		(QT)
11/06	1550	13GWT3701	13GW T37	—	—	GW	G	6	2	2	1	1			(QT)
11/07	1205	13GWT2901	13GW T29	—	—	GW	G	6	2	2	1	1			(QT)
11/07	1400	13GWT3901	13GW T39	—	—	GW	G	6	2	2	1	1			(QT)
11/07	1400	13GWT3901-F	13GW T39	—	—	GW	G	1	—	—	—	—	1		(QT)

1. RELINQUISHED BY Ty Rojahn	DATE 11/7/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 11/7/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS QT = QUICK TURN

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4818 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN MO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY RAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB# 8412 2491 0375		SEATTLE WA 98108

STANDARD TAT ☒ RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☒ 72 hr. ☐ 7 day ☐ 14 day — Explosives only see comments

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	G	P	P	P	G	P		
									PRESERVATIVE USED			4°C / HCl	4°C / HCl	4°C	4°C / HNO3	4°C / H2SO4	4°C	4°C / HNO3		
									TYPE OF ANALYSIS			VOLATILES SW 846 8260B	VOLATILES SW 846 8015B	EXPLOSIVES & MISC. EXPL. SW846 8330	TOTAL METALS + Hg SW 846 6020 & 7470A	NITRATE + NITRITE EPA 353.2	SULFATE & CHLORIDE	TOTAL ORGANIC CARBON	D'S METALS + Hg SW846 6020 & 7470A	
11/8	0700	TB1108030I	QC	-	-	QC	G	4	2	2									TRIP BLANK
11/7	0845	13GWT2502	13GW T25	-	-	GW	G	1	-	-	1						(TR)		FOR MISC. EXPLOSIVES MIN. VOL. SAMPLE
11/8	1215	16GW0302	13GW 03	-	-	GW	G	13	3	3	4	1	1	1	Z-				
11/8	1308	16GWT0603	13GW T06	-	-	GW	G	13	3	3	4	1	1	1	-				
11/8	1640	16GWT0402	13GW T04	-	-	GW	G	15	3	3	4	1	1	1	2				
11/9	1035	16GWT0102	13GW T01	-	-	GW	G	6	3	3	-	-	-	-	-				VERY LOW YIELD; MIN. VOL WELL
11/9	1635	16GWT0302	13GW T03	-	-	GW	G	11	3	3	2	1	1	1	-	(TR)			MIN VOL
11/9	1635	16GWT0302-F	13GW T03	-	-	GW	G	1	-	-	-	-	-	-	-	1			MIN VOL
11/10	0915	13GWT3801	13GW T38	-	-	GW	G	6	VX (TR)	-Z (TR)	-Z (TR)	4	1	*1	X (TR)	-			* ALSO ANALYZE FOR AMMONIA
11/10	0915	13GWT3801-F	13GW T38	-	-	GW	G	1	-	-	-	-	-	-	-	1			
11/10	1330	13GWT0702	13GW T07	-	-	GW	G	6	-	-	4	1	*1						* ALSO ANALYZE FOR AMMONIA
11/10	0000	13FD11180301	QC	-	-	GW	G	6	-	-	4	1	*1	(FROM 13GWT0702)					* ALSO ANALYZE FOR AMMONIA

1. RELINQUISHED BY Terry Rahn	DATE 11-10-03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 11-10-03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS ** Quick Turn For Explosives only @ 13GWT38OI

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4820 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
3060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
		TERRY RUAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB # 8412 2491 0397		SEATTLE WA, 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									
									G	P	G	G	P	G	P	G	P	
									PRESERVATIVE USED		4°C	4°C	4°C/HNO3	4°C	4°C/H2SO4	4°C/NaOH	4°C/HNO3	4°C SEE COMMENTS
									TYPE OF ANALYSIS		Total Metals & Hg 6020 7470A	Explosives SW 846 8330	Misc. Explosives SW 846 8330	Nitrate & Nitrite	Ammonia	Total Organic Carbon	Dis Metals & Hg 6020 7470A	Volatiles 8260B
11/9	0910	13GWT2502	13GW T25	-	-	GW	G	1	1									
11/11	0925	13GWT0302	13GW T03	-	-	GW	G	8	1	2	2	1	2					
11/11	0925	13GWT0302-F	13GW T03	-	-	GW	G	1	-	-	-	-	-	1				
11/11	1315	TB 11110301	QC	-	-	QC	G	4	-	-	-	-	-	-	2	2		TRIP BLANK G/HCl
11/11	1400	16SD220004	16SD 22	-	-	SD	G	6	-	-	-	-	-	-	3	3		PROVIDED (3) 4oz JAR FOR MOISTURE CONTENT W/ ENCORE SAMPLES

1. RELINQUISHED BY Terry Ruahn	DATE 11/11/03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 11/11/03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4821 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412)921-8308	LANCHS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8412 2491 0401		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE / YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Explosives SW 846 8330	Misc. Explosives SW 846 8330	Total Metals & Hg 6020 & 7470A	Nitrate & Nitrite Ammonia	Dis Metals & Hg 6020 & 7470A	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)							G	G	P	P	P	
		PRESERVATIVE USED							4°C	4°C	4°C / HNO3	4°C / H2SO4	4°C / HNO3	
11/18	1400	13SW1102	13SW11	-	-	SW	G	6	2	2	1	1		
11/18	1400	13SW1102-F	13SW11	-	-	SW	G	1	-	-	-	-	1	
11/18	1408	13GWT1202	13GWT12	-	-	GW	G	6	2	2	1	1		
11/19	1140	13GWT2602	13GWT26	-	-	GW	G	6	2	2	1	1		
11/19	1235	13GWT2003	13GWT20	-	-	GW	G	6	2	2	1	1		
11/19	1543	13GWT3201	13GWT20	-	-	GW	G	6	2	2	1	1		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	11-19-03	1900	1. RECEIVED BY FEDERAL EXPRESS		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS				11/19/03	1900

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4822 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / ANN HO
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX AB # 8412 2491 0607		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	P	P	P	G	G	G	P	
									PRESERVATIVE USED	4°C	4°C / HNO3	4°C / HNO3	4°C / H2SO4	4°C / NaOH	4°C / HCl	4°C / HCl	4°C	COMMENTS
									TYPE OF ANALYSIS: Explosives & Misc. Expl. SW 846 8330	Total Metals & Hg 6020 & 7470A	Dis Metals & Hg 6020 & 7470A	Nitrate + Nitrite 7470A	Ammonia (350.1)	Total Organic Carbon (355.2)	Volatiles SW 846 8260B	Volatiles SW 846 8015B	Sulfate & Chloride	
11/20	1055	13GWT1102	13GW T11	-	-	GW	G	6	4	1	-	1						
11/20	1322	13GWT1002	13GW T10	-	-	GW	G	8	4	1	-	1	2					
11/20	1537	13GWT1602	13GW T16	-	-	GW	G	6	4	1	-	1						
11/19	0815	13GWT2502-F	13GW T25	-	-	GW	G	1	-	-	1	-						
11/20	1610	13GWT2502	13GW T25	-	-	GW	G	1	-	-	-	1						
11/21	0700	TB11210301	QC	-	-	QC	G	4	-	-	-	-	-	2	2			
11/21	1003	16GWT1001	16GW T10	-	-	GW	G	13	4	1	-	*1	-	3	3	1		
11/21	1316	16GWT1201	16GW T12	-	-	GW	G	13	4	1	-	*1	-	3	3	1		
11/21	0000	16FD11210301	QC	-	-	GW	G	13	4	1	-	*1	-	3	3	1	DUP OF 16GWT1201	

1. RELINQUISHED BY: Terry Rojahn	DATE: 11-21-03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 11-21-03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: *Nitrate + Nitrite only @ SWMU 16

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4825 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412)921-8308	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
TR FOR Jim Gerdt Scott Brue Terry Rojahn		TERRY ROJAHN	(412)921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB# 8412 2491 0581		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P P P

PRESERVATIVE USED: 4°C | 4°C | 4°C/HNO3 | 4°C | 4°C/HNO3

TYPE OF ANALYSIS: Explosives SW846 8330 | Misc. Explosives SW846 8330 | Total Metals E 7470A Hg | Cr(VI) | Nitrate + Nitrite (353.2) | Ammonia (350.1) | Dis Metals E 7470A Hg

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS									COMMENTS
11/23	1044	13GWT04CA	13GW T04	-	-	GW	G	6	2	2	1	1	-				
11/23	1320	13GWT0102	13GW T01	-	-	GW	G	18	6	6	3	3	-				DUP MS/MSD
11/23	1515	13GWT0802	13GW T08	-	-	GW	G	6	2	2	1	1	-				
11/23	1515	13GWT0802-F	13GW T08	-	-	GW	G	1	-	-	-	-	1				
11/23	1530	13GWT4101	13GW T41	-	-	GW	G	2	2	-	-	-	-				
11/23	0000	13FD11230301	QC	-	-	GW	G	6	2	2	1	1	-				DUP OF 13GWT0802
11/23	0000	13FD11230301-F	QC	-	-	GW	G	1	-	-	-	-	1				DUP OF 13GWT0802-F
11/24	1000	13GWT4101	13GW T41	-	-	GW	G	3	-	*1	1	*1	-				*LOW YIELDING WELL MIN. VOL.
11/24	1000	13GWT4101-F	13GW T41	-	-	GW	G	1	-	-	-	-	1				
11/24	1115	13GWT1402	13GW T14	-	-	GW	G	6	2	2	1	1	-				
11/24	1118	13GWT3101	13GW T31	-	-	GW	G	6	2	2	1	1	-				

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	11-24-03	1900	1. RECEIVED BY FED EX	11-24-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4827 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASHISKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LANCKS / ANN H.
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: TERRY ROSANNI	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX AB# 8412 2491 0570		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Explosives SW 846 8330	Explosives SW 846 8330	Misc. Total Metals 6020 & 7470A	Nitrate + Nitrite (353.1) & Hg 7470A	Ammonia (350.1) & Hg 7470A	Dis Metals 6020 & 7470A	Total Organic Carbon	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)							G	G	P	P	P			
		PRESERVATIVE USED							4°C	4°C	4°C/HNO3	4°C/H2SO4	4°C/HNO3			
11/24	1615	13GWT3001	13GW T30	-	-	GW	G	6	2	2	1	1				
11/24	1732	13GWT3301	13GW T33	-	-	GW	G	2	2							
11/25	0845	13GWT3301	↓	-	-	GW	G	4	-	2	1	1				
11/25	0845	13GWT3301-F	↓	-	-	GW	G	4	-	-	-	-	1			
11/25	1150	13GWT1302	13GW T13	-	-	GW	G	6	2	2	1	1				
11/25	1347	13GWT1502	13GW T15	-	-	GW	G	6	2	2	1	1		*6		*DO MS/MSD ON TOC
11/25	1347	13GWT1502-F	13GW T15	-	-	GW	G	1	-	-	-	-	1			
11/25	0000	13FD1125031	QC	-	-	GW	G	2	-	-	-	-	-	2		
11/25	1425	13GWT2701	13GW T27	-	-	GW	G	6	2	2	1	1				

1. RELINQUISHED BY	DATE 11-25-03	TIME 1900	1. RECEIVED BY FEDERAL EXPRESS	DATE 11-25-03	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** 4828 | **PAGE** 1 **OF** 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / ANH HO
SAMPLERS (SIGNATURE): TK FOR S. GRIER		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED. EX. AB # 8412 2491 0434		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								
									G	G	G	P	P	P	P	G	
									PRESERVATIVE USED								
									4°C/HCl	4°C/HCl	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	4°C/H3PO4	
									TYPE OF ANALYSIS: Volatiles SW 8260B	Volatiles SW 8260B	Explosives + Misc. Expl. SW 8330	Total Metals + Hg 6020 & 7470A	Dis. Metals + Hg 6020 & 7470A	Nitrate + Nitrite 353.2	Sulfate & Chloride	Total Organic Carbon	COMMENTS
12/3	1500	TB12030301	QC	–	–	QC	G	4	2	2							Trip Blank
12/3	1520	16RB12030301	QC	–	–	QC	G	13	3	3	4	1	–	1	1		Bladder Pump
12/3	1535	13RB12030301	QC	–	–	QC	G	6	–	–	4	1	–	*1	–		PE Tubing, Peristaltic
12/3	1535	13RB12030301-F	QC	–	–	QC	G	1	–	–	–	–	1	–	–		" " "
12/3	1600	16RB12030302	QC	–	–	QC	G	15	3	3	4	1	–	1	1	2	Teflon " "
12/4	1018	13GWT0902 (FR)	13GW T09	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1050	13GWT4301	13GW T43	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1150	13GWT3401	13GW T34	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1510	13GWT2202	13GW T22	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	1700	13GWT4401	13GW T44	–	–	GW	G	6	–	–	4	1	–	*1			
12/4	0000	13FD12040301	QC	–	–	GW	G	6	–	–	4	1	–	*1			Dup from 13GWT0902
12/5	0800	16RB12050301	QC	–	–	QC	G	6	3	3	–	–	–	–			Bucket Bit Rinsate
12/5	1027	16GWT1701	16GW T17	–	–	GW	G	13	3	3	4	1	–	1	1		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: TK	12/05/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	12/05/03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: * Also analyze for Ammonia

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4829 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8307	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rolahn		TERRY ROLAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB # 8412 2491 0434		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									P	P	P	G						
									4°C	4°C	4°C/HNO3	4°C						
									TYPE OF ANALYSIS: VOLATILES (ENCORE) SW 846 8260B	VOLATILES (ENCORE) SW 846 8015B	Total Metals & Hg 6020 & 7470A	Total Metals & Hg 6020 & 7471A						
12/5	0940	16SB470405	16SB47	4	5	SO	G	6	3	3								
12/5	1015	16SB480203	16SB48	2	3	SO	G	18	9	9								DO MS/MSD
12/5	1050	16SB490405	16SB49	4	5	SO	G	6	3	3								
12/5	1115	16SB500103	16SB50	1	3	SO	G	6	3	3								
12/5	0000	16FD12050301	QC	-	-	SO	G	6	3	3								DUP OF 16SB500103 ~~16FD12050301~~ TC
12/5	1130	16RB12050302	QC	-	-	QC	G	1	-	-	1							BUCKET BIT RINSATE
12/5	1155	16SS420002	16SB42	0	2	SO	G	1	-	-	-	1						
12/5	1210	16SS430002	16SB43	0	2	SO	G	2	-	-	-	2						
12/5	1225	16SS440002	16SB44	0	2	SO	G	1	-	-	-	1						
12/5	1237	16SS450002	16SB45	0	2	SO	G	1	-	-	-	1						
12/5	1255	16SS460002	16SB46	0	2	SO	G	1	-	-	-	1						
12/5	0000	16FD12050302	QC	-	-	SO	G	1	-	-	-	1						DUP FROM 16SS450002

1. RELINQUISHED BY: Terry Rolahn	DATE: 12/05/03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 12/05/03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4831 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LANCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Scott Sivin, Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8412 2491 0560		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: PCBs SW-846 8082								COMMENTS
12/8	0848	13SS160002	13SB16	0	2	SO	G	1	1										
12/8	0900	13SB160204	↓	2	4	SO	G	1	1										
12/8	0900	13SS170002	13SB17	0	2	SO	G	1	1										
12/8	0905	13SB170204	↓	2	4	SO	G	1	1										
12/8	0912	13SB180002 (TR)	13SB18	0	2	SO	G	1	1										
12/8	0930	13SB180204	↓	2	4	SO	G	1	1										
12/8	0920	13SS190002	13SB19	0	2	SO	G	1	1										
12/8	0930	13SB190203	↓	2	3	SO	G	1	1										
12/8	1005	13SS200002	13SB20	0	2	SO	G	1	1										
12/8	1004	13SS210002	13SB21	0	2	SO	G	1	1										
12/8	1019	13SB210204	↓	2	4	SO	G	2	2										DO MS/MSD
12/8	1030	13SS220002 (TR)	13SB22	0	2	SO	G	1	1										
12/8	1045	13SB22 0204	↓	0	4	SO	G	1	1										

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	12-8-03	1900	1. RECEIVED BY: FEDERAL EXPRESS	12-8-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4832 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 CTO 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Scott Dunn Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX. AB# 841224910560		SEATTLE WA. 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE / YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G								
									PRESERVATIVE USED		4°C	4°C						
									TYPE OF ANALYSIS		PCBs SW-846 8082	PCBs 1L Amber Glass						
12/8	1036	13SS230002	13SB23	0	2	SO	G	1	1									
12/8	1046	13SB230204	↓	2	4	SO	G	1	1									
12/8	1110	13SS240002	13SB24	0	2	SO	G	1	1									
12/8	1120	13SB240203	↓	2	4	SO	G	1	1									
12/8	1104	13SB250002 (TX)	13SB25	0	2	SO	G	1	1									
12/8	1115	13SB250204	↓	2	4	SO	G	1	1									
12/8	0000	13FD120803 01	QC	-	-	SO	G	1	1									DUP FROM 13SB180204
12/8	0000	13FD120803 02	QC	-	-	SO	G	1	1									DUP FROM 13SB210204
12/8	0740	13RB120803 01	QC	-	-	AQ	G	2	-	2								BUCKET BIT
12/8	0937	13RB120803 02	QC	-	-	AQ	G	2	-	2								BUCKET BIT

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	12-8-03	1900	1. RECEIVED BY: FEDERAL EXPRESS	12-8-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4833 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LANCHS / ANN HO
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER: FED. EX AB # 8412 2491 0560		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	G	G	P	P	P	P	G	
									4°C	4°C/HCl	4°C/HCl	4°C	4°C/HNO3	4°C/HNO3	4°C/H2SO4	4°C	4°C/H3PO4
									TYPE OF ANALYSIS: Volatiles SW 846 8260B	Volatiles SW 846 8260B	Explosives SW-846 8330	Total Metals & Hg 6020 / 7470A	Dis Metals & Hg 6020 / 7470A	Nitrate 353.2	Sulfate & Chloride	Total Organic Carbon SW846 9060	
12/6	0700	TB12060301	QC	-	-	QC	G	4	2	2								
12/6	0905	16SW0102	16SW01	-	-	SW	G	6	3	3								
12/6	0935	16SW0202	16SW02	-	-	SW	G	6	3	3								
12/6	1008	16SW0702	16SW07	-	-	SW	G	6	3	3								
12/6	0000	16FD12060301	QC	-	-	SW	G	6	3	3								DUP FROM 16SW0202
12/6	1030	16GWT0801	16GWT08	-	-	GW	G	8	3	3	*1	*1						* MIN. VOL WELL VERY SLOW RECHARGE
12/6	1330	16GWT1101	16GWT11	-	-	GW	G	8	3	3	*1	1						* MIN VOL. FOR EXPLOSIVES
12/6	1352	16GWT1501	16GWT15	-	-	GW	G	15	3	3	4	1	-	1	1	2		
12/6	1352	16GWT1501-F	↓	-	-	GW	G	1	—	-	-	-	1					
12/7	0850	13GWT0202	13GWT02	-	-	GW	G	6	-	-	4	1	-**	1				* ALSO ANALYZE AMMONIA
12/7	1000	16GWT1101	16GWT11	-	-	GW	G	1	-	-	*1	-	-					* MIN VOL. FOR MISC. EXPLOSIVES
12/7	1000	16GWT1101-F	↓	-	-	GW	G	1	—	-	-	-	1					
12/7	1410	13GWT2801	13GWT28	-	-	GW	G	1	-	-	*4	1	-**	1				* ~~MIN VOL FOR EXPLOSIVES~~ TIC

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Terry Rojahn	12-8-03	1900	FEDERAL EXPRESS	12-8-03	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: ** ALSO ANALYZE FOR AMMONIA

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4834 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / ANN HO
SAMPLERS (SIGNATURE): [signature] [signature]		FIELD OPERATIONS LEADER: TERRY ROSAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARKNEY ST
		CARRIER/WAYBILL NUMBER: FED. EX AB# 841284910560		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	G	P	P	P					
									4°C	4°C	4°C/HNO3	4°C	4°C/HNO3					
									TYPE OF ANALYSIS: Explosives SW 846 8330	Misc. Explosives SW 846 8330	Total Metals 6020 / 7470A Ni+Mn+Fe	Aromatics 3510 / 8270A Dis. Metals 6020 / 7470A						
12/7	1538	13GWT1802	13GW T18	—	—	GW	G	6	2	2	1	1						
12/7	1538	13GWT1802-F	↓	—	—	GW	G	1	-	-	-	-	1					
12/8	1500	13RB12080303	QC	—	—	QC	G	6	2	2	1	1						Bladder Pump
12/7	1410	13GWT2801-F	13GW T28	—	—	GW	G	1	-	-	-	-	1					
12/8	1050	13GWT3601	13GW T36	—	—	GW	G	18	6	6	3	3						DO MS/MSD
12/8	0000	13FD12080303	QC	—	—	QC	G	6	2	2	1	1						DUP OF 13GWT3601

1. RELINQUISHED BY: [signature]	DATE: 12-8-03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 12-8-03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4836 | PAGE 1 OF 1

PROJECT NO: CTO N9060 0279	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / ANH HO
SAMPLERS (SIGNATURE): J. Davis / Tony Kopek FOR S. GRUSS		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST
		CARRIER/WAYBILL NUMBER: FED. EX AB # 8412 2491 0526 (FR)		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Explosives & Misc Exp. SW-846 8330	Total Metals 6020 / 7470A	Nitrate + Nitrite (353.2)	Ammonia (350.1)	Dis Metals 6020 / 7470A	COMMENTS
				CONTAINER TYPE PLASTIC (P) or GLASS (G)					G	P	P	P		
				PRESERVATIVE USED					4°C	4°C/HNO3	4°C/H2SO4	4°C/HNO3		
12/7	1300	13GWT0602	13GW T06	-	-	GW	G	1	*1					* MIN VOL.
12/8	1558	13GWT4501	13GW T45	-	-	GW	G	2	*2					* MIN VOL.
12/9	1110	13GWT4701	13GW T47	-	-	GW	G	6	4	1	1			
12/9	1124	13GWT4601	13GW T46	-	-	GW	G	6	4	1	1			
12/9	1645	13GWT4501	13GW T45	-	-	GW	G	1	-	1	-			
12/9	1730	13GWT0602	13GW T06	-	-	GW	G	1	-	*1	-			* MIN VOL ~300ml
12/10	1145	13GWT3501	13GW T35	-	-	GW	G	5	3	1	1			
12/10	1145	13GWT3501-F	13GW T35	-	-	GW	G	1	-	-	-	1		
12/10	1300	13GWT4501	13GW T45	-	-	GW	G	1	-	-	*1			* MIN VOL ~150ml
12/10	1300	13GWT4501-F	13GW T45	-	-	GW	G	1	-	-	-	1		* MIN VOL ~500ml
12/10	1500	TB12100301	QC	-	-	QC	G	4	-	-	-	-	2	2	TRIP BLANK
12/10	1510	RB12100301	QC	-	-	QC	G	12	4	1	1	-	3	3	DED. BAILER

1. RELINQUISHED BY: Tony Kopek	DATE: 12-10-03	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 12-10-03	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 4837 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N9060 0279	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANN HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: TERRY ROHAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX AB# 8412 2491 0504		CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2003)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									P	P								
									4°C	HNO3	4°C	H2SO4						
		TYPE OF ANALYSIS							D.S. Metals + Hg 6020 / 7470A	Nitrate + Nitrite (353.2)	Ammonia 350.1							
12/10	1800	13GWT0602-F	13GWT06	-	-	GW	G	1	1	-								MIN. Vol. ~ 300ml
12/11	1615	13GWT0602	↓	-	-	GW	G	1	-	1								MIN. Vol ~

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Tony Nagel	12/11/03	1900	1. RECEIVED BY: FEDERAL EXPRESS	12/11/03	1900
2. RELINQUISHED BY:	DATE	TIME	2. RECEIVED BY:	DATE	TIME
3. RELINQUISHED BY:	DATE	TIME	3. RECEIVED BY:	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.6.3
SWMU 13
CHAIN OF CUSTODY RECORDS
ROUND 3

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0050 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 S. HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. / AB # 8447 8135 5362		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	P	P						
									4°C	4°C / HNO3	4°C / HNO3						
		TYPE OF ANALYSIS							Explosives SW-846 8330	Total Metals & Hg SW-846 6020 / 7470A	Dis. Metals & Hg SW-846 6020 / 7470A						
7/23	1128	13GWT2403	13GW T24	-	-	GW	G	2	2								
7/23	1652	13GWT1103	13GW T11	-	-	GW	G	2	2								
7/23	1745	13GWT2603	13GW T26	-	-	GW	G	2	2								
7/24	1045	13GWT0803	13GW T08	-	-	GW	G	2	2								
7/24	1205	13GWT0403	13GW T04	-	-	GW	G	2	2								
7/24	1435	13GWT0203	13GW T02	-	-	GW	G	2	2								
7/24	1510	13GWT2503	13GW T25	-	-	GW	G	(2) #3	2	1	+(1)						
7/24	1510	13GWT2503-F	↓	-	-	GW	G	1	-	-	1						
7/24	1635	13GWT0503	13GW T05	-	-	GW	G	3	2	1	-						
7/24	1635	13GWT0503-F	↓	-	-	GW	G	1	-	-	1						
7/24	1825	13GWT0303	13GW T03	-	-	GW	G	2	2								
7/25	1122	13GWT0703	13GW T07	-	-	GW	G	2	2								
7/25	1218	13GWT1203	13GW T12	-	-	GW	G	2	2								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	7/26/04	1730	1. RECEIVED BY: FEDERAL EXPRESS	7/26/04	1730
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0051 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC	RALPH BASINSKI	(412) 921-8308	LANCKS / ANH HO
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Terry Rojak		TERRY ROJANN	(412) 921-8857	940 S. HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED. EX / AB # 8447 8135 5362		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: EXPLOSIVES SW-846 8330	COMMENTS
7/25	1547	13GWT1603	13GW T16	-	-	GW	G	6	6			Do MS/MSD
7/25	1642	13GWT2303	13GW T23	-	-	GW	G	2	2			
7/25	0000	13FD07250401	QC	-	-	GW	G	2	2			FROM 13GWT0703
7/26	1042	13GWT3002	13GW T30	-	-	GW	G	2	2			
7/26	1043	13GWT3102	13GW T31	-	-	GW	G	2	2			

		DATE	TIME		DATE	TIME
1. RELINQUISHED BY	Terry Rojak	7/26/04	1730	1. RECEIVED BY: FEDERAL EXPRESS	7/26/04	1730
2. RELINQUISHED BY		DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY		DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0052 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANN HO			
SAMPLERS (SIGNATURE): Terry Rojahn TR FOR Jim Goerdt	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY STREET
CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 5384			CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Explosives SW-846 8330	Total Metals SW-846 6020/7470A	Dis. Metals SW-846 6020/7470A	COMMENTS
									G	4°C				
									P	4°C/HNO3				
									P	4°C/HNO3				
7/25	1405	13GWT0603	13GW T06	-	-	GW	G	1	1					
7/26	1650	13GWT3302	13GW T33	-	-	GW	G	3	2	1				
7/26	1650	13GWT3302-F	↓	-	-	GW	G	1	-	-	1			
7/27	0954	13GWT1903	13GW T19	-	-	GW	G	2	2					
7/27	0954	13GWT3202	13GW T32	-	-	GW	G	5 (MS) (MSD)	6					DO MS/MSD
7/27	1152	13GWT2902	13GW T29	-	-	GW	G	2	2					
7/27	1554	13GWT2203	13GW T22	-	-	GW	G	2	2					
7/27	1628	13GWT1403	13GW T14	-	-	GW	G	2	2					
7/28	1300	13GWT2103	13GW T21	-	-	GW	G	2	2					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	7/28/04	1830	1. RECEIVED BY: FEDERAL EXPRESS	7/28/04	1830
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0053 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANN HO & H. PRENTICE			
SAMPLERS (SIGNATURE): Terry Rojahn For C. Lancy & J. Goerdt	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY Street
	CARRIER/WAYBILL NUMBER: FED. EX. AB# 8447 8135 5395		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C
TYPE OF ANALYSIS: EXPLOSIVES SW-846 8330

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS		COMMENTS
7/29	0850	13GWT1803	13GW T18	-	-	GW	G	2	2	
7/29	1047	13GWT3402	13GW T34	-	-	GW	G	2	2	
7/29	1048	13GWT3602	13GW T36	-	-	GW	G	2	2	
7/29	1359	13GWT3902	13GW T39	-	-	GW	G	2	2	
7/29	1510	13GWT1703	13GW T17	-	-	GW	G	2	2	
7/29	1602	13GWT4502	13GW T45	-	-	GW	G	2	2	
7/28 ~~7/29~~	1604	13GWT1003	13GW T10	-	-	GW	G	2	2	
7/29	1704	13GWT1503	13GW T15	-	-	GW	G	2	2	
7/30	1102	13GWT3702	13GW T37	-	-	GW	G	2	2	
7/30	1124	13GWT4002	13GW T40	-	-	GW	G	2	2	
7/30	1333	13GWT4602	13GW T46	-	-	GW	G	2	2	
7/30	1608	13GWT2702	13GW T27	-	-	GW	G	2	2	
7/30	0000	13FD0730401	QC	-	-	GW	G	2	2	DUP OF 13GWT3702

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	7/30/04	1830	1. RECEIVED BY: FEDERAL EXPRESS	7/30/04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0054 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / ANH HO & H. PRENTICE			
SAMPLERS (SIGNATURE): Charles C. Ivy III; Terry Rojahn	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 5400			CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									COMMENTS
									G	P	P							
									PRESERVATIVE USED			4°C	4°C / HNO3	4°C / HNO3				
									TYPE OF ANALYSIS			EXPLOSIVES SW-846 8330	Total Metals SW-846 6020/7470A Hg	Dis. Metals SW-846 6020/7470A Hg				
7/30	1749	13GWT2004	13GW T20	-	-	GW	G	3	2	1								
7/31	0822	13GWT4202	13GW T42	-	-	GW	G	2	2									
7/31	1234	13GWT2802	13GW T28	-	-	GW	G	2	2									
7/31	1442	13GWT3802	13GW T38	-	-	GW	G	2	2									
7/31	1710	13GWT0904	13GW T09	-	-	GW	G	2	2									
8/01	0816	13GWT4102	13GW T41	-	-	GW	G	2	2									
8/01	0825	13GWT3502	13GW T35	-	-	GW	G	2	2									
8/01	0850	13GWT4302	13GW T43	-	-	GW	G	2	2									
8/01	1143	13GWT4402	13GW T44	-	-	GW	G	2	2									
8/01	1420	13GWT5102 (T4)	13GW T51	-	-	GW	G	3	2	1								
8/01	1420	13GWT5101-F	13GW T51	-	-	GW	G	*1	-	-	*1							*Filtered
8/01	1547	13GWT1303	13GW T13	-	-	GW	G	2	2									
8/01	1811	13GWT4702	13GW T47	-	-	GW	G	3	2	1								

1. RELINQUISHED BY: Terry Rojahn	DATE: 8/2/04	TIME: 1200	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 8/2/04	TIME: 1200
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0055 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 5400		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: EXPLOSIVES SW-846 8330	COMMENTS
8/01	1821	13GWT0103	13GW T01	-	-	GW	G	2	2			

1. RELINQUISHED BY: Terry Rojahn	DATE: 8/2/04	TIME: 1200	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 8/2/04	TIME: 1200
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0056 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER RALPH BASINSKI	PHONE NUMBER (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE) Terry Rojahn		FIELD OPERATIONS LEADER TERRY ROJAHN	PHONE NUMBER (412) 921-8857	ADDRESS 940 SOUTH HARNEY STREET
		CARRIER/WAYBILL NUMBER FED EX AB# 8447 8135 5410		CITY, STATE SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOLATILES SW-846 8260B	VOLATILES SW-846 8015B	PCBS	EXPLOSIVES SW-846 8330	TOTAL METALS & Hg SW 846 6020/7470A				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	P				
PRESERVATIVE USED									4°C/HCl	4°C/HCl	4°C	4°C	4°C/HNO3				
8/10	1630	TB 08100401	QC	-	-	QC	G	4	2	2							
8/10	1645	SB 08100401	QC	-	-	QC	G	11	3	3	2	2	1				DI H_2O
8/10	1700	SB 08100402	QC	-	-	QC	G	11	3	3	2	2	1				TAP H_2O
8/10	1730	RB 08100401	QC	-	-	QC	G	2	-	-	2	-	-				SLEEVE
8/10	1745	RB 08100402	QC	-	-	QC	G	2	-	-	2	-	-				TROWEL

1. RELINQUISHED BY Terry Rojahn	DATE 8/11/04	TIME 1900	1. RECEIVED BY FED EX.	DATE 8/11/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0057 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROHAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB # 8447 8135 5410		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: PCB SW-846 8082	COMMENTS
8/10	0923	135B460406	135B 46	4	6	SO	G	1	1			
8/10	0940	135B260002 (FD)	135B 26	0	2	SO	G	1	1			
8/10	0943	135B260204	↓	2	4	SO	G	1	1			
8/10	0957	135B280204	135B 28	2	4	SO	G	1	1			
8/10	1005	135B280406	↓	4	6	SO	G	1	1			
8/10	1222	135S370002	135B 37	0	2	So	G	1	1			
8/10	1225	135B370204	↓	2	4	SO	G	1	1			
8/10	1036	135B290002 (TR)	135B 29	0	2	SO	G	1	1			
8/10	1040	135B290204	↓	2	4	SO	G	1	1			
8/10	1106	135B320002 (TR)	135B 32	0	2	SO	G	1	1			
8/10	1109	135B320204	↓	2	4	SO	G	1	1			
8/10	1050	135B310406	135B 31	4	6	SO	G	1	1			
8/10	1052	135B310608	↓	6	8	SO	G	1	1			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/11/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/11/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0058 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		FED EX AB# 8447 8135 5410		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: PCBs SW-846 8082	COMMENTS
8/10	1121	13SS330002	13SB33	0	2	SO	G	1	1			
8/10	1124	13SB330204	↓	2	4	SO	G	1	1			
8/10	1139	13SS340002	13SB34	0	2	SO	G	1	1			
8/10	1143	13SB340204	↓	2	4	SO	G	1	1			
8/10	1155	13SS360002	13SB36	0	2	SO	G	1	1			
8/10	1159	13SB360204	↓	2	4	SO	G	1	1			
8/10	1207	13SS350002	13SB35	0	2	SO	G	1	1			
8/10	1210	13SB350204	↓	2	4	SO	G	1	1			
8/10	1357	13SB420406	13SB42	4	6	SO	G	1	1			
8/10	1400	13SB420608	↓	6	8	SO	G	1	1			
8/10	1417	13SB410406	13SB41	4	6	SO	G	1	1			
8/10	1420	13SB410608	↓	6	8	SO	G	1	1			
8/10	1429	13SS400002	13SB40	0	2	SO	G	1	1			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	8/11/04	1900	1. RECEIVED BY: FEDERAL EXPRESS	8/11/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0059 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 343 7448	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED EX AB # 8447 8135 5410		CITY, STATE: SEATTLE WA 98108

STANDARD TAT [X]
RUSH TAT [ ]
[ ] 24 hr. [ ] 48 hr. [ ] 72 hr. [ ] 7 day [ ] 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: PCBs SW-8480B2							COMMENTS
8/10	1431	135B40 0204	135B 40	2	4	SO	G	1	1									
8/10	1440	135538 0002	135B 38	0	2	SO	G	3	3									DO MS/MSD
8/10	1443	135B38 0204	↓	2	4	SO	G	1	1									
8/10	1455	135539 0002	135B 39	0	2	SO	G	1	1									
8/10	1459	135B39 0204	↓	2	4	SO	G	1	1									
8/10	1505	135B44 0406	135B 44	4	6	SO	G	1	1									
8/10	1530	135B43 0406	135B 43	4	6	SO	G	1	1									
8/10	0000	13FD08100401	QC	-	-	SO	G	1	1									DUP OF 135B310406
8/10	1018	135527 0002	135B 27	0	2	SO	G	1	1									
8/10	1021	135B27 0204	↓	2	4	SO	G	1	1									
8/10	0840	135530 0002	135B 30	0	2	SO	G	2	2									DO MS/MSD
8/10	0846	135B30 0204	↓	2	4	SO	G	1	1									
8/10	0904	135B47 0204 0406 (TB)	135B 47	4	6	SO	G	1	1									

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	8/11/04	1900	1. RECEIVED BY: FEDERAL EXPRESS	8/11/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0060 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 5410		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									G	P	P	G					
									PRESERVATIVE USED				4°C	4°C	4°C	4°C	
									TYPE OF ANALYSIS				PCBS SW-846 8082	VOLATILES SW-846 8260B	VOLATILES SW-846 8015B	% Moisture	
8/11	0928	135B450406	135B 45	4	6	SO	G	1	1								
8/11	0000	13FD081104 01	QC	–	–	SO	G	1	1								FROM 135B300204
8/11	1348	165B650102	165B 65	1	2	SO	G	6	–	3	2	1					
8/11	1356	165B650206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1405	165B650608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1423	165B640102 (FD)	165B 64	1	2	SO	G	6	–	3	2	1					
8/11	1435	165B640206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1441	165B640608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1456	165B630102	165B 63	1	2	SO	G	6	–	3	2	1					
8/11	1508	165B630206	↓	2	6	SO	G	6	–	3	2	1					
8/11	1517	165B630608	↓	6	8	SO	G	6	–	3	2	1					
8/11	1537	165B610102	165B 61	1	2	SO	G	6	–	3	2	1					
8/11	1545	165B610206	↓	2	6	SO	G	6	–	3	2	1					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/11/04	1900	1. RECEIVED BY FEDERAL EXPRESS	8/11/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

By Laucks / Hughwood M. Powell

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0072 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
~~4078-7448~~ / CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 5844		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)								COMMENTS
									PRESERVATIVE USED	4°C/HNO3	4°C	4°C/HCl	4°C/HCl				
									TYPE OF ANALYSIS	Total Metals & Hg SW846 6020/7470A	Explosives SW846 8330	Volatiles SW846 8260B	Volatiles SW846 8015B				
8/14	0830	RB080140401	QC	-	-	QC	G	1	P	1							BUCKET BIT
8/14	~~TZ~~ 1250	13GWT5001	13GW T50	-	-	GW	G	3	P	1	2						
8/14	1521	13GWT4901	13GW T49	-	-	GW	G	3	P	1	2						
8/14	1722	13GWT4801	13GW T48	-	-	GW	G	9	P	3	6						MS/MSD
8/14	0000	13FD08140401	QC	-	-	GW	G	3	P	1	2						
8/15	0715	16TB08150401	QC	-	-	QC	G	4	P	-	-	2	2				TRIP BLANK
8/15	1105	16GWT0403	16GW T04	-	-	GW	G	8	P	-	2	3	3				
~~TZ~~																	

1. RELINQUISHED BY: Terry Rojahn	DATE 8/16/04	TIME 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE 8/16/04	TIME 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0095 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER RALPH BASINSKI	PHONE NUMBER (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE) Terry Rojahn		FIELD OPERATIONS LEADER TERRY ROJAHN	PHONE NUMBER (412) 921-8857	ADDRESS 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER FED EX AB # 836632362343 (DRY ICE)		CITY, STATE SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS (Zip Lock Bag)	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Explosives/Misc Expl. SW846 8330 & Mod.	Dry Ice							COMMENTS
									P			Q							
9/21	1330	13VG001010001	13VEG 01	-	-	VG	G	1	1										
9/21	1340	13VG002020001	↓	-	-	VG	G	1	1										
9/21	1400	13VG003010001	13VEG 02	-	-	VG	G	1	1										
9/21	1410	13VG004020001	↓	-	-	VG	G	1	1										
9/21	1425	13VG005030001	13VEG 04	-	-	VG	G	1	1										
9/21	1435	13VG006010001	↓	-	-	VG	G	3	3										DO MS/MSD
9/21	1450	13VG007020001	↓	-	-	VG	G	1	1										
9/21	1500	13VG008030001	13VEG 03	-	-	VG	G	1	1										
9/21	1510	13VG009010001	↓	-	-	VG	G	1	1										
9/21	1515	13VG010030001	13VEG 05	-	-	VG	G	1	1										
9/21	1520	13VG011020001	↓	-	-	VG	G	1	1										
9/21	1535	13VG012010001	13VEG 06	-	-	VG	G	1	1										
9/21	1545	13VG013020001	↓	-	-	VG	G	1	1										

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	9/22/04	1900	1. RECEIVED BY FEDERAL EXPRESS	9/22/04	1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS VG = PLANT TISSUE

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0097 | PAGE 1 OF 1

PROJECT NO: 7448 CTO 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE			
SAMPLERS (SIGNATURE): Terry Rojahn	FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
CARRIER/WAYBILL NUMBER: 8447 8135 5782 (RUSH) FED EX AB # 836632362343 (DRY ICE)		CITY, STATE: SEATTLE, WA 98108	

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS (ZIP Lock Bag)	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: Explosives / MIS Expl. SW 846 8330 / MOD.	DRY ICE	Q	COMMENTS
9/21	1605	13VG014030001	13VEG 07	—	—	VG	G	1	1					
9/21	1615	13VG015040001	13VEG 08	—	—	VG	G	1	1					
9/21	1625	13VG016030001	13VEG 09	—	—	VG	G	1	1					
9/21	0000	13FD09210401	QC	—	—	VG	G	1	1					FROM 13VG006010001
9/21	1540	13RB09210401	QC	—	—	QC	G	2	*2					*AG. GLASS AMBER

1. RELINQUISHED BY: Terry Rojahn	DATE: 9/22/04	TIME: 1900	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 9/22/04	TIME: 1900
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0104 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448	NSWC CRANE	BASINSKI	412 921 8303	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
SJConti		CONTI	412 921 8422	940 SOUTH HARNEY
		CARRIER/WAYBILL NUMBER		CITY, STATE SEATTLE, WA. 98108
		FED EX AB # 8447 8135 5546		(SED) SW

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW (SD) QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: METALS + Hg 846 6020, 7471A	EXPLOSIVES SW846 8330 RDX	SW 846 mod NITRATE/NITRITE	As (W) TOTAL METALS 6020/7470A	DISS METALS + Hg 6020/7470A	COMMENTS
									G	4°C						
									G	4°C						
									G	4°C						
									P	4°C H2SO4						
									P	4°C HNO3						
									P	4°C HNO3						
10/6	0900	13SD3301	13SW/SD33	0	4"	SD	G	1	1							Sand
10/6	0930	13SD3002	13SW/SD30	0	4"	SD	G	1	1							"
10/6	1010	13SD2802	13SW/SD28	0	4"	SD	G	1	1							"
10/6	1045	13SW3401	13SW/SD34	0	2"	SW	G	5	—		2	2	1			SW
10/6	1100	13SD3401	"	0	4"	SD	G	1	1							Sand
10/6	1345	13SW3501	13SW/SD35	0	2"	SW	G	15	—		6	6	3			SW
10/6	1410	13SD3501	"	0	4"	SD	G	1	1							Sand
10/6	0000	13FD10060401	—	—	—	SW	G	5	—		2	2	1			SW DUP OF SW3501
10/6	1515	13SW3102	13SW/SD31	0	2"	SW	G	1	—					1		SW
10/6	1515	13SW3102-F	"	0	2"	SW	G	1	—						1	SW
10/6	1520	13SD3102	"	0	4"	SD	G	2	2							Sandy Clay
10/6	0000	13FD10060402	—	—	—	—	G	1	1							SD DUP OF SD3102
								35								

1. RELINQUISHED BY SJConti	DATE 10/7/04	TIME 1600	1. RECEIVED BY FED EX	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0105 | PAGE 2 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448	NSWC CRANE	BASINSKI	4129218308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
SJ Conti		CONTI	412 921 8422	940 SOUTH HARNEY
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 844781355546		SEATTLE, WA. 98108

STANDARD TAT ☐
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: MET ALS+Hg (4oz) SW 6020, 7471A	VOLATILES 8260B	EXPLOSIVES 8015B	RDX SW 846 8330	NITRATE/NITRITE AS (N)	TOTAL METALS+Hg 6020/7470A	DISS METALS+Hg 6020/7470A	VOLATILES 8260B	VOLATILES (Encore) 8015B (Encore)	COMMENTS
				CONTAINER TYPE PLASTIC (P) or GLASS (G)					G	G	G	G	P	P	P	P		
				PRESERVATIVE USED					4°C	4°C HCl	4°C	4°C	4°C H2SO4	4°C HNO3	4 HNO3	4°C		
10/7	0855	13SW0102	13SW/SD01	0	2"	SW	G	21						1				
10/7	0855	13SW0102-F	"	0	2"	SW	G	1							1			Filtered
(13) 10/7	0900	13SD0102	"	0	4"	SD	G	1	1									
10/7	0930	13SD2202	13SW SD22	0	4"	SD	G	1	1									
10/7	1050	16SD1302	13SW SD13	0	4"	SD	G	1	1									
(16) 10/7	1100	16SD2701	13SW SD27	0	4"	SD	G	7	1							3	3	
10/7	1115	16SD0902	13SW SD13	0	4"	SD	G	1	1									
10/7	0800	TB10070401	QC	—	—	QC	G	4	—	2	2							AQ TRIP BLANK GLASS.

1. RELINQUISHED BY SJ Conti	DATE 10/7/04	TIME 1600	1. RECEIVED BY FED EX	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0124 | PAGE 1 OF 1

PROJECT NO: CTO 7448 343	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308	LABORATORY NAME AND CONTACT: LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE): Terry Rojahn		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857	ADDRESS: 940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER: FED. EX. AB# 844781356623		CITY, STATE: SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE / YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P	G	
									PRESERVATIVE USED	4°C	4°C/HCl	4°C/HCl	4°C	4°C/H_2SO_4	4°C/HNO3	4°C/HNO3	4°C
									TYPE OF ANALYSIS	VOLATILES SW 846 8260B	VOLATILES SW 846 8260B	EXPLOSIVES SW 846 8330	Nitrate + Nitrite EPA 353.2	Total METALS & Hg 6020 / 7470A	Dis METALS & Hg 6020 / 7470A	EXP SW 846 8330 & RDX SW 846 8330 MODIFIED	COMMENTS
10/26/2004	0700	16TB10260401	QC	-	-	QC	G	4		2	2						TRIP BLANK
10/26	1105	16SW2601	16SW SD02	-	-	SW	G	10		3	3	-	*3	1	-		*MS/MSD
10/26	1105	16SW2601-F	↓	-	-	SW	G	1		-	-	-	-	-	1		
10/26	0000	16FD10260401	QC	-	-	SW	G	1		-	-	-	1	-	-		From 16SW2601
10/26	1200	16SW3001	16SW SD30	-	-	SW	G	13		3	3	*6	-	1	-		* DO MS/MSD
10/26	1200	16SW3001-F	↓	-	-	SW	G	1		-	-	-	-	-	1		
10/26	0000	16FD10260402	QC	-	-	SW	G	2		-	-	2	-	-	-		From 16SW3001
10/26	1510	13SW3301	13SW SD33	-	-	SW	G	5		-	-	-	1	-	-	4	
10/26	1535	13SW3002	13SW SD30	-	-	SW	G	6		-	-	-	1	1	-	4	
10/26	1535	13SW3002-F	↓	-	-	SW	G	1		-	-	-	-	-	1		
10/26	1600	13SW2802	13SW SD28	-	-	SW	G	3		-	-	-	-	3	-		* DO MS/MSD
10/26	1600	13SW2802-F	↓	-	-	SW	G	3		-	-	-	-	-	3		* DO MS/MSD
10/26	0000	13FD10260401	QC	-	-	SW	G	1		-	-	-	-	1	-		

1. RELINQUISHED BY: Terry Rojahn	DATE: 10-27-04	TIME: 1830	1. RECEIVED BY: FEDERAL EXPRESS	DATE: 10-27-04	TIME: 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 0125 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 CTO 343	NSWC CRANE	R. BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		T. ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 6623		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2004)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Dis Metals 6020 / Hg 7470A	Total Metals 6020 / Hg 7470A	Nitrate + Nitrite EPA 353.2	Exp. SW 846 8330 & RDX SW 846 Modified	COMMENTS
				CONTAINER TYPE PLASTIC (P) or GLASS (G)					P	P	P	G	
				PRESERVATIVE USED					4°C / HNO3	4°C / HNO3	4°C / H2SO4	4°C	
10/26	0000	13FD10260401-F	QC	-	-	SW	G	1	1	-	-	-	
10/27	0950	13SW1502	13SW SD15	-	-	SW	G	3	-	-	1	2	
10/27	1028	13SW1402	13SW SD14	-	-	SW	G	3	-	-	1	2	
10/27	1055	13SW2202	13SW SD22	-	-	SW	G	1	-	1	-	-	
10/27	1055	13SW2202-F	↓	-	-	SW	G	1	1	-	-	-	
10/27	1125	13SW1602	13SW SD16	-	-	SW	G	3	-	-	1	2	

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	10-27-04	1830	1. RECEIVED BY FEDERAL EXPRESS	10-27-04	1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.6.4
SWMU 13
CHAIN OF CUSTODY RECORDS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

APPENDIX C.6.5
SWMU 13
CHAIN OF CUSTODY RECORDS
ADDITIONAL SEDIMENT SAMPLING

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3717 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
7448 343 CTO	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 S. HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 4756		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT) (IN) TR	BOTTOM DEPTH (FT) (IN) TR	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): G	PRESERVATIVE USED: 4°C	TYPE OF ANALYSIS: Metals (Except Hg) SW-846 6020	COMMENTS
5/17	0943	13SD4201	13SW SD42	0	4	SD	G	1	1			
5/17	1028	13SD4101	13SW SD41	0	4	SD	G	1	1			
5/17	1105	13SD4001	13SW SD40	0	4	SD	G	1	1			
5/17	1125	13SD3901	13SW SD39	0	4	SD	G	1	1			
5/17	1140	13SD3801	13SW SD38	0	4	SD	G	1	1			
5/17	1150	13SD3701	13SW SD37	0	4	SD	G	1	1			
5/17	1205	13SD3601	13SW SD36	0	4	SD	G	2	2			DO MS/MSD
5/17	1320	13SD4301	13SW SD43	0	4	SD	G	1	1			
5/17	1335	13SD4401	13SW SD44	0	4	SD	G	1	1			
5/17	1355	13SD4501	13SW SD45	0	4	SD	G	1	1			
5/17	0000	13FD051705 01	QC	0	4	SD	G	1	1			FROM 13SD3601

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Terry Rojahn	5-18-05	1800	1. RECEIVED BY: FEDERAL EXPRESS	5-18-05	1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C.6.6
SWMU 13
CHAIN OF CUSTODY RECORDS
PCB DELINEATION INVESTIGATIONS

APPENDIX C.6.7
SWMU 13
QUALITY CONTROL SAMPLING LOGS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/14/06
Task/Contract #	CTO 0357	**QA Sample Type**	Field Duplicate	**Modified By**	John Wright
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	6/14/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	-Select-	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/14/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth amber w/Teflon cap	SO	4°C	DUP	112GN6878-2152006-1	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/14/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/15/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/14/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	2	Glass	1L Amber	GW	4°C	DUP	112GN6878-2152006-1	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/15/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/21/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	-Select-	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/15/06	00:00	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2152006-1	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/16/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/17/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	-Select-	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/16/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2172006-2	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/15/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/17/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/15/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2172006-2	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/17/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/17/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	-Select-	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/17/06	00:00	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2172006-2	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/17/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/17/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/17/06	12:45	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	Bucket Bit	112GN6878-2172006-2	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/17/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/17/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/17/06	13:00	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	DPT Sleeve	112GN6878-2172006-2	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Anonymous
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/20/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	00:00	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Anonymous
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/20/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/17/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/20/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/20/06
Status	Archive	**Sampled By**	D. Hickey & T. Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SD	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**	Rinsate Blank	**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	6/14/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	08:20	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	SS Scoop Sampler	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**	Field Duplicate	**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	6/14/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	00:00	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/19/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	00:00	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/19/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/19/06
Status	Archive	**Sampled By**	Terry Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	08:30	SW-846-8330	NONE	2	Glass	1L Amber	AQ	4°C	SS Spoon	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/20/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/20/06
Status	Archive	**Sampled By**	D. Hickey & T. Rojahn	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/19/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SD	4°C	DUP	112GN6878-2202006-3	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/20/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/21/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/20/06	00:00	SW-846-8330.	Nitroaromatics, Nitramines, and RDX Degradation Products	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2212006-4	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/20/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/21/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/20/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2212006-4	

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**		**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Corresponding Sample ID**		**Created Date**	2/20/06
Task/Contract #	CTO 0357	**QA Sample Type**		**Modified By**	Terry Rojahn
WBS Code #	0000	**Sample Location**	QC	**Modified Date**	2/21/06
Status	Archive	**Sampled By**	James Goerdt	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/6/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✓	2/20/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C	DUP	112GN6878-2212006-4	
✗	2/20/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C			
✗	2/20/06	00:00	SW-846-8330	Nitroaromatics and Nitramines	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C			

APPENDIX C.6.8
SWMU 13
QUALITY CONTROL SAMPLING LOGS
PCB DELINEATION INVESTIGATIONS

Tetra Tech NUS, Inc.

QUALITY CONTROL SAMPLING LOG

PCB Sampling - SWMU 13 - August 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**QC Sample ID #**	13FD08240601	**Created By**	David Hickey
TtNUS Project #	112GN7448	**Corresponding Sample ID**	13SB950102	**Created Date**	8/29/06
Task/Contract #	CTO 0343	**QA Sample Type**	Field Duplicate	**Modified By**	James Goerdt
WBS Code #		**Sample Location**	QC	**Modified Date**	9/12/06
Status	Archive	**Sampled By**	David Hickey	**Printed By**	James Goerdt
		Concentration	Low concentration	**Printed Date**	2/1/07

Log Entries

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Matrix	Preservative		Comments	Chain of Custody #
✗	8/24/06	00:00	SDI A00133/A00134	SDI RaPID Assay PCB Test Kit	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C			
✓	8/24/06	00:00	SW-846 8082	PCBs	1	Glass	4 oz. wide-mouth clear w/Teflon cap	SO	4°C		112GN7448-8292006-8	

APPENDIX C.11.4
SWMU 13
EQUIPMENT CALIBRATION FORMS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	LaMotte 2020	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Manufacturer**	LaMotte	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Serial Number**	1136-1699	**Modified By**	
WBS Code #	0000			**Modified Date**	
Client				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Calibration Records

Date	Calibrator	Turbidity (0 NTU)	Turbidity (10 NTU)	Comments
2/14/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.0 Post: 10.00 Std: NA Exp: NA	
2/15/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.5 Post: 10.00 Std: NA Exp: NA	
2/16/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 11.0 Post: 10.00 Std: NA Exp: NA	
2/18/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 9.95 Post: 10.00 Std: NA Exp: NA	
2/20/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 9.95 Post: 10.0 Std: NA Exp: NA	
2/28/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.9 Post: 10.00 Std: NA Exp: NA	
3/1/06	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 9.75 Post: 10.00 Std: NA Exp: NA	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	YSI	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Manufacturer**	YSI	**Created Date**	2/14/06
Task/Contract #	CTO 0357	**Serial Number**	01J0851 AF	**Modified By**	
WBS Code #	0000			**Modified Date**	
Client				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Calibration Records

Date	Calibrator	pH (7 SU)	pH (4 SU)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Comments
2/14/06	Terry Rojahn	Pre: 7.09 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 4.12 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 1067 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 8.65 Post: 9.06 Std: NA Exp: NA	Pre: 237.4 Post: 237.5 Std: 04E9753 Exp: 08/14/06 ORP: 20.0	
2/15/06	Terry Rojahn	Pre: 7.05 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 3.97 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 1023 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 9.32 Post: 9.20 Std: NA Exp: NA	Pre: 233.7 Post: 235.0 Std: 04E9753 Exp: 8/14/06 ORP: 22.0	
2/16/06	Terry Rojahn	Pre: 7.00 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 4.00 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 1001 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 8.92 Post: 9.02 Std: NA Exp: NA	Pre: 233.8 Post: 237.5 Std: 04E9753 Exp: 8/14/06 ORP: 20.1	
2/18/06	Terry Rojahn	Pre: 7.03 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 4.05 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 968 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 9.97 Post: 9.93 Std: NA Exp: NA	Pre: 241.8 Post: 237.4 Std: 04E9753 Exp: 8/14/06 ORP: 19.9	
2/19/06	James Goerdt	Pre: 6.93 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 3.98 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 945 Post: 999 Std: 4985 Exp: 06/23/06	Pre: 8.67 Post: 9.65 Std: NA Exp: NA	Pre: 246.2 Post: 237.4 Std: 04E9753 Exp: 8/14/06 ORP: 12.87	
		Pre: 7.03	Pre: 4.08	Pre: 987		Pre: 233.8	

2/20/06	Terry Rojahn	Post: 7.00 Std: 4594 Exp: 07/28/06	Post: 4.00 Std: 4439 Exp: 02/23/06	Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 8.78 Post: 9.43 Std: NA Exp: NA	Post: 237.5 Std: 04E9753 Exp: 8/14/06 ORP: 12.87	
2/28/06	Terry Rojahn	Pre: 7.01 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 4.02 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 985 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 9.34 Post: 9.73 Std: NA Exp: NA	Pre: 223.3 Post: 237.5 Std: 04E9753 Exp: 8/14/06 ORP: 19.87	Change DO membrane
3/1/06	Terry Rojahn	Pre: 6.97 Post: 7.00 Std: 4594 Exp: 07/28/06	Pre: 4.02 Post: 4.00 Std: 4439 Exp: 02/23/06	Pre: 1002 Post: 1000 Std: 4985 Exp: 06/23/06	Pre: 9.74 Post: 9.53 Std: NA Exp: NA	Pre: 236.1 Post: 137.4 Std: 04E9753 Exp: 8/14/06 ORP: 19.96	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	LaMotte 2020	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Manufacturer**	LaMotte	**Created Date**	2/19/06
Task/Contract #	CTO 0357	**Serial Number**	4074-1103	**Modified By**	
WBS Code #	0000			**Modified Date**	
Client				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Calibration Records

Date	Calibrator	Turbidity (0 NTU)	Turbidity (10 NTU)	Comments
2/19/06	James Goerdt	Pre: 0 Post: 0 Std: NA Exp: NA	Pre: 9.5 Post: 10 Std: NA Exp: NA	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	YSI	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Manufacturer**	YSI	**Created Date**	2/19/06
Task/Contract #	CTO 0357	**Serial Number**	99K0055 AA	**Modified By**	
WBS Code #	0000			**Modified Date**	
Client				**Printed By**	James Goerdt
Status	Archive			**Printed Date**	2/6/07

Calibration Records

Date	Calibrator	pH (7 SU)	pH (4 SU)	Conductivity (mS/cm)	DO (mg/L)	ORP (mV)	Comments
2/19/06	James Goerdt	Pre: 6.93 Post: 7.00 Std: 4594 Exp: 7/28/06	Pre: 4.28 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 932 Post: 1000 Std: 4985 Exp: 6/23/06	Pre: 11.44 Post: 9.97 Std: NA Exp: NA	Pre: 248.5 Post: 237:5 Std: 04E9753 Exp: 8/14/06 ORP: 12.71	

APPENDIX C.8.1
SWMU 13
MONITORING WELL DEVELOPMENT RECORDS
ROUND 1

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW701
Site: SWMU 13
Date Installed: 3/30/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE Pump

Depth to Bottom (ft.): 17.95' TOC
Static Water Level Before (ft.): 7.71' TOC
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: BOB BALKOVEC
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.0 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0850	START	2 l gal/min	—	10.08	5.77	230	7999	DK. GRAY
0852	2 gal	~~2 gal~~	DRY	—	—	—	—	
0857	—	—	9.00	—	—	—	—	
0902	—	—	8.70	—	—	—	—	
0907	—	—	8.45	—	—	—	—	
0917	—	—	8.00	—	—	—	—	
0918	START	3 l gal/min	—	10.80	5.46	223	925	LT. GRAY
0919	—	—	DRY	—	—	—	—	
0429	—	—	9.05	—	—	—	—	
0434	—	—	8.51	—	—	—	—	
0440	START	—	—	10.42	5.55	220	525.5	GRAY
0441	25 gal	—	DRY	—	—	—	—	
0451	START	—	9.20	10.98	5.01	325	7999	PULLED OUT PUMP TO DRAIN.
0452	—	—	DRY	—	—	—	—	
1002	START	—	9.70	10.99	5.00	228	7999	GRAY
1003	7 gal	—	DRY	—	—	—	—	GOOD PRODUCER

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW102
Site: SWMU 13
Date Installed: 3/29/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: Bailer (S.S.)

Depth to Bottom (ft.): 29.95'
Static Water Level Before (ft.): 18.44
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.9 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1005		NA	18.44	—	—	—	—	
1010	~3.5	"	28.40	13.93	5.23	1.198	+1000	(DRY) GRAY BRN
1015	↓	"	29.10	—	—	—	—	RECHARGE ~~RATE~~ (TR)
1020		"	27.65	—	—	—	—	"
1025	↓	"	27.46	—	—	—	—	"
1030	~3.5	"	—	—	—	—	—	(RESTART PURGE)
1036	~4	"	(DRY)	14.58	5.42	0.712	+1000	(DRY) GRAY BRN
1046	↓	"	28.68	—	—	—	—	RECHARGE
1056		"	28.33	—	—	—	—	"
1057	↓	"	RESTART	14.03	5.43	1.193	+1000	(RESTART PURGE)
1101	~4.5	"	(DRY)	—	—	—	—	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW/T03
Site: SWMU 13
Date Installed: 3/30/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 18.10
Static Water Level Before (ft.): 9.59
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.5 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0851	0	~1gal	9.59	—	—	—	—	START PURGE
0853	~ 2.5	—	(DRY)	10.20	5.72	0.435	+1000	BRN (DRY)
0858	↓	—	1458	—	—	—	—	RECHARGE
0903		—	14.30	—	—	—	—	↓
0908		—	14.10	—	—	—	—	
0909	↓	—	~~(DRY) FT~~	11.73	6.43	0.430	+1000	(RESTART) BRN
0910	~ 3.5	—	(DRY)	—	—	—	—	(DRY)
0920	↓	—	14.58	—	—	—	—	RECHARGE
0930		—	14.27	—	—	—	—	↓
0931	↓	—	(RESTART)	10.92	5.72	0.412	+1000	(RESTART)
0932	~ 4	—	(DRY)	—	—	—	—	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW104
Site: SWMU 13
Date Installed: 3/30/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: Waterra Pump

Depth to Bottom (ft.): 17.80'
Static Water Level Before (ft.): 13.88'
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): .8
Casing ID (in.): 2 inch PVC

Responsible Personnel: Bob Ballance
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.0 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1356	START	3 L/gal/min	—	13.96	5.49	649	>1000	SURGED 1353-1356 BROWN
1358	—	—	DRY					
1408	—	—	15.00					
1418		—	14.50					
~~1424~~	~~START~~	—	—	14.10	5.61	531	>1000	
1423	3 gal	—	DRY					
1433	—	—	15.33					
1444	—	—	14.20					
1454	—	—	14.36					
1455	START	—	—	14.20	5.62	480	>1000	
1456	4 gal	—	DRY					

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT05
Site: SWMU 13
Date Installed: 3/29/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 19.15
Static Water Level Before (ft.): 7.96
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): ~1.9
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. McJAGH
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1123		~1 gpm	7.96					Start Purge
1125	~2 gal	-	(DRY)	13.80	5.50	0.646	+1000	(DRY) ORANGE BRN
1133	↓	-	15.03	-	-	-	-	RECHARGE
1138		-	14.65	-	-	-	-	↓
1143	↓	-	14.30	-	-	-	-	↓
1143	~2 gal	-	Restart	13.96	5.49	0.649	+1000	(Restart) ORANGE BRN
1144	~3 gal	-	(Dry)	-	-	-	-	(DRY)
1154	↓	-	16.15	-	-	-	-	RECHARGE
1204	↓	-	15.31	-	-	-	-	↓
1204	~3 gal	-	Restart	13.96	5.49	0.649	+1000	(Restart) ORANGE BRN
1205	~4 gal	-	(Dry)	-	-	-	-	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT06
Site: SWMU 13
Date Installed: 4/7/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 17.60
Static Water Level Before (ft.): 12.20
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): ~1 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.0 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0905	0	–	12.20	–	–	–	–	start purge
0907	1.5	~1 gpm	(DRY)	11.83	6.83	0.480	+1000	Lt. BRN
0912	↓	–	16.02	–	–	–	–	RECHARGE
0917	↓	–	15.94	–	–	–	–	↓
0922	↓	–	15.89	–	–	–	–	RESTART
0933	1.6	–	(DRY)	–	–	–	–	(DRY) Lt. BRN
0933	↓	–	16.80	–	–	–	–	RECHARGE
0943	1.7	–	16.72	–	–	–	–	(DRY) Lt. BRN RESTART
0953	↓	–	16.35	–	–	–	–	RECHARGE
1003	↓	–	16.35	–	–	–	–	↓
1013	1.8	–	16.33	13.48	7.55	0.516	+1000	(DRY) Lt. BRN RESTART

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW707
Site: SWMU 13
Date Installed: 3/29/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE Pump

Depth to Bottom (ft.): 17.95
Static Water Level Before (ft.): 4.14
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.3
Casing ID (in.): 2 inch PVC

Responsible Personnel: BOB BALKOVEC
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.0 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1116	START	2 gal/min						SURGED 1113 - 1116 BROWN
1117	"	"	"	13.26	5.48	962	>2000	
1120	"	"	DRY					
1130	"	"	12.10'					
1140	"	"	10.71					
1141	START	2 gal/min	"	13.96	5.49	649	>2000	
1143	"	"	DRY					ORANGE BROWN
1153	"	"	14.17					
1203	"	"	12.94					
1204	START	"	"	14.40	5.51	600	>2000	
1205	8 gal	"	DRY					

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT08
Site: SWMU 13
Date Installed: 3/30/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 17.50
Static Water Level Before (ft.): 4.68
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.1 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. RAJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ms/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1358	0	~1gpm	4.68	—	—	—	—	START PURGE
1403	5	—	(DRY)	13.98	5.49	0.249	+1000	(DRY) ORANGE BRN
1408	↓	-	8.30	—	—	-	-	RECHARGE
1413	↓	-	7.75	-	-	-	-	"
1418	↓	-	7.30	-	-	-	-	"
1419	5	-	RESTART	11.20	5.32	0.082	+1000	(RESTART PURGE) ORANGE BRN
1423	9	-	(DRY)	-	-	-	-	(DRY)
1428	↓	-	10.32	-	-	-	-	RECHARGE
1433	↓	-	9.67	-	-	-	-	"
1438	↓	-	9.20	-	-	-	-	"
1443	↓	-	8.77	-	-	-	-	"
1443	9	-	RESTART	10.84	5.39	0.093	+1000	(RESTART PURGE)
1445	12	-	(DRY)	-	-	-	-	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT09
Site: SWMU 13
Date Installed: 4/1/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: WATTERAIA

Depth to Bottom (ft.): 23.00
Static Water Level Before (ft.): 8.93
Static Water Level After (ft.): 20.90
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.2 gal

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1547	0	-	8.93	-	-	-	-	Start Purge
1551	6gal	-	21.00	13.58	5.21	0.683	+1000	DRY BRN
1556	↓	-	14.10	-	-	-	-	RECHARGE
1601	↓	-	11.41	-	-	-	-	↓
1606	6gal	-	10.58	-	-	-	-	↓
1610	12gal	-	20.80	12.52	4.73	0.636	+1000	DRY BRN
1620	↓	-	13.26	-	-	-	-	RECHARGE
1630	↓	-	10.92	-	-	-	-	↓
1633	17gal	-	20.90	12.83	4.18	0.632	+1000	DRY BRN

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW7 10
Site: SWMU 13
Date Installed: 3/27/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 28.13
Static Water Level Before (ft.): 14.30
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.2 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1515	0	1gpm	TD-28.14.30					Start Pump
1516	—	—	—	17.13	4.99	0.453	+1000	Gray Brn
1521	5 gal	—	(DRY)	—	—	—	—	(DRY)
1526	↓	—	26.25	—	—	—	—	RECHARGE
1536	↓	—	25.70	—	—	—	—	↓
1541	5 gal	—	—	18.64	4.96	0.497	+1000	Gray Brn (Restart)
1542	6 gal	—	(DRY)	—	—	—	—	(DRY)
1552	↓	—	25.50	—	—	—	—	RECHARGE
1602	↓	—	24.85	—	—	—	—	↓
1603	6 gal	—	—	15.79	4.78	0.330	+1000	(Restart) Lt Grey Brn
1604	7 gal	—	(DRY)	—	—	—	—	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW11
Site: SWMU 13
Date Installed: 3/28/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 17.75
Static Water Level Before (ft.): 8.30
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.5 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 1.1 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1629	0	1.2 gpm	8.30	—	—	—	—	START PURGE
1630	↓	↓	—	12.86	4.68	0.200	+1000	ORANGE BRN
1633	~5 gal	↓	(DRY)	—	—	—	—	(DRY)
1638	↓	—	14.00	—	—	—	—	RECHARGE
1643	↓	—	13.00	—	—	—	—	↓
1648	~5 gal	—	12.15	—	—	—	—	↓
1649	↓	—	12.15	12.60	4.32	0.203	+1000	(RESTART) LT ORANGE BRN
1650	7 gal	—	(DRY)	—	—	—	—	(DRY)
1700	↓	—	11.95	—	—	—	—	RECHARGE
1710	↓	—	11.34	—	—	—	—	↓
1721	7 gal	—	—	12.09	4.56	0.205	+1000	RESTART LT ORANGE BRN
1723	8 gal	—	(DRY)	—	—	—	—	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT12
Site: SWMU 13
Date Installed: 3/27/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 22.4
Static Water Level Before (ft.): 9.26
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 3.9 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.2 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1511	0	~1 gpm	9.26	-	-	-	-	Start Purge
1513	3 gal	-	(DRY)	13.68	5.06	0.136	+1000	(DRY) (BRN)
1518	↓	-	19.40	-	-	-	-	RECHARGE
1523	↓	-	18.94	-	-	-	-	↓
1528	↓	-	18.71	-	-	-	-	↓
1528	3 gal	-	Restart	13.59	5.65	0.160	+1000	Restart Purge
1529	4 gal	-	(DRY)	-	-	-	-	(DRY) (BRN)
1539	↓	-	20.22	-	-	-	-	RECHARGE
1549	↓	-	19.78	-	-	-	-	↓
1550	4 gal	-	Restart	14.75	5.70	0.167	+1000	Restart (BRN)
1551	5 gal	-	(DRY)	-	-	-	-	DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW13
Site: SWMU 13
Date Installed: 4/23/03
Date Developed: 4/29/03
Dev. Method: Surged & Pumped
Pump Type: Watterra

Depth to Bottom (ft.): 21.40
Static Water Level Before (ft.): 9.48
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal.): 2.7 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. Lojann
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole - ppm
PID Readings: Breathing Zone - ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1308	-	-	9.48					
1312	TR ~~3.5~~ 6gal	-	DRY	14.14	9.88	0.115	+1000	DRY
1317	↓	-	9.57	-	-	-	-	RECHARGE
1322	↓	-	5.93	-	-	-	-	↓
1327	↓	-	5.24	-	-	-	-	↓
1330	11gal	-	DRY	14.55	9.99	0.136	+1000	DRY
1340	↓	-	6.02	-	-	-	-	RECHARGE
1350	↓	-	5.10	-	-	-	-	↓
1353	17gal	-	DRY	11.64	4.97	0.135	+100	DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT14
Site: SWMU 13
Date Installed: 3/31/03
Date Developed: 4/15/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 25.60
Static Water Level Before (ft.): 14.21
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.8 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0809	0	-	14.21	-	-	-	-	Start PURGE
0811	3 GAL	-	23.18	13.83	6.03	0.824	+1000	(DRY) DARK BRN
0816	↓	-	18.71	-	-	-	-	RECHARGE
0821	↓	-	16.80	-	-	-	-	↓
0826	3.5	-	15.24	-	-	-	-	↓
0829	6.5	-	23.20	14.20	5.98	0.749	+1000	(DRY) DARK BRN
0839	↓	-	15.73	-	-	-	-	RECHARGE
0849	6.5	-	14.73	-	-	-	-	↓
0852	10 GAL	-	23.15	14.11	5.79	0.586	+1000	(DRY) GREY BRN

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW15
Site: SWMU 13
Date Installed: 3/25/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 27.87
Static Water Level Before (ft.): 13.97
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.2 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. RAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1146	0	—	13.97	—	—	—	—	BRN Start Purge
1148	↓	~1gpm	—	13.19	5.32	0.336	+1000	BRN
1152	6	—	(DRY)	14.58	5.19	0.329	+1000	BRN (DRY)
1157	↓	—	25.0+	—	—	—	—	RECHARGES
1202	↓	—	24.31	—	—	—	—	↓
1207	↓	—	23.52	—	—	—	—	↓ Restart
1209	↓	—	—	21.12	5.2	0.402	+1000	BRN
1211	8.5	—	(DRY)	→	→	→	→	(DRY)
1221	↓	—	25.73	—	—	—	—	RECHARGE
1231	↓	—	24.13	—	—	—	—	↓ Restart
1232	↓			16.20	4.82	0.341	+1000	Lt. BRN
1235	~9		(DRY)	—	—	—	—	(DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

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Well: 13MW16
Site: SWMU 13
Date Installed: 3/27/03
Date Developed: 4/13/03
Dev. Method: Surged & Pumped
Pump Type: Waste Pump

Depth to Bottom (ft.): 17.31
Static Water Level Before (ft.): 12.18'
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): .8
Casing ID (in.): 2 inch PVC

Responsible Personnel: BxB
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1517	START							SURGED 1512-1517 BROWN
1520			BELOW PUMP	12.14	5.53	272	2404	
1521			DRY					
1531			15.28					
1541			15.05					
1542	START			12.71	5.60	241	>2000	
1543			DRY					
1553			15.55					
1603			15.40					
1604	START						>2000	
1605	3 Gal		DRY	13.41	5.82	192	>2000	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT17
Site: SWMU 13
Date Installed: 3/26/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: Wattera/A

Depth to Bottom (ft.): 20.30
Static Water Level Before (ft.): 10.91
Static Water Level After (ft.): 11.75
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.6 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. Rowan
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0825	0	—	10.91					(BRN) START PURGE
0830	8	—	—	13.35	6.03	0.304	+1000	"
0835	16	—	—	12.73	5.71	0.191	+1000	"
0836	16	—	12.44	—	—	—	—	"
0847	24	—	12.52	11.75	5.51	0.192	+1000	(BRN) END PURGE

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT18
Site: SWMU 13
Date Installed: 3/26/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 33.44
Static Water Level Before (ft.): 16.71
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 3gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. KUHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1044	0	—	16.71					Start Purge
1045	↓	~1gpm	—	15.21	6.01	0.363	+1000	BRN
1049	↓	—	—	14.73	5.28	0.949	+1000	BRN
1050	5gal	—	(DRY)	→	→	→	→	(DRY)
1055	↓	—	31.60	—	—	—	—	Recharge
1100	↓	—	31.18	—	—	—	—	Recharge
1105	↓	—	30.78	15.32	5.20	0.379	+1000	↓ Restart DRN
1106	6gal	—	(DRY)	—	—	—	—	(DRY)
1116	↓	—	32.00	—	—	—	—	RECHARGE
1126	↓	—	31.25	15.26	4.80	0.367	+1000	1+ BRN Restart
1127	7gal	—	(DRY)	—	—	—	—	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT19
Site: SWMU 13
Date Installed: 3/31/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: WATTERAIS

Depth to Bottom (ft.): 22.05
Static Water Level Before (ft.): 9.88
Static Water Level After (ft.): 20.45
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.8
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1654	0	0	–	–	–	–	–	START PURGE
1656	2.5 gal	–	18.50	12.96	6.22	1.619	+1000	(DRY) LT. GREY
1701	↓	–	16.33	–	–	–	–	RECHARGE
1706	↓	–	15.29	–	–	–	–	↓
1711	2.5 gal	–	14.46	–	–	–	–	↓
1713	4 gal	–	19.10	13.14	5.65	1.012	+1000	(DRY) GREY
1723	↓	–	16.28	–	–	–	–	RECHARGE
1733	4 gal	–	14.84	–	–	–	–	↓
1735	6 gal	–	20.45	12.49	5.57	1.207	+1000	DRY GREY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT20
Site: SWMU 13
Date Installed: 4/1/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 22.85
Static Water Level Before (ft.): 5.20
Static Water Level After (ft.): 22.85
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.9
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1450	0	–	22.75	–	–	–	–	Start Purge
1453	3.5 gal	–	18.60	12.86	5.09	1.631	+1000	DRY BRN
1458	↓	–	16.91	–	–	–	–	Recharge
1503	↓	–	16.04	–	–	–	–	↓
1508	3.5 gal	–	15.48	–	–	–	–	↓
1509	4.25 gal	–	20.15	13.25	5.05	1.770	+1000	DRY BRN
1519	↓	–	18.62	–	–	–	–	Recharge
1529	4.25 gal	–	17.60	–	–	–	–	↓
1531	5 gal	–	22.95	13.80	4.63	1.600	+1000	DRY BLK

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT21
Site: SWMU 13
Date Installed: 3/28/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: WATTERA

Depth to Bottom (ft.): 17.76
Static Water Level Before (ft.): 9.45
Static Water Level After (ft.): 16.53
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.5
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0908	0	-	~~17.76~~ 9.45	—	—	—	—	Start Purge
0911	4	-	15.00 (DRY)	12.69	5.66	0.207	+1000	(DRY) BRN Quick Recharge
0916	↓	-	12.60	—	—	—	-	RECHARGE
0921	↓	-	11.71	—	-	-	-	↓
0926	↓	-	11.50	—	-	-	-	↓
0929	7	-	15.30 (DRY)	11.89	5.65	0.198	+1000	(DRY) BRN
0934	↓	-	13.16	-	-	-	-	RECHARGE
0939	↓	-	12.35	—	-	-	-	↓
0944	7	-	11.76	-	-	-	-	↓
0947	10	-	16.53	13.18	5.18	0.193	+1000	(DRY)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW122
Site: SWMU 13
Date Installed: 3/20/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 17.76
Static Water Level Before (ft.): 10.62
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.2
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1008	0	-	10.62	-	-	-	-	start Purge
1011	2.5	-	16.30	11.84	5.36	0.211	+1000	DRY ORANGE BRN
1016	↓	-	14.98	-	-	-	-	RECHARGE
1021	↓	-	14.32	-	-	-	-	↓
1026	2.5	-	13.77	-	-	-	-	↓
1029	3.5	-	17.02	12.74	5.03	0.235	+1000	DRY
1034	↓	-	15.70	-	-	-	-	RECHARGE
1039	↓	-	14.48	-	-	-	-	↓
1044	3.5	-	13.41	-	-	-	-	↓
1046	4.5	-	16.15	12.58	5.00	0.222	+1000	(DRY) ORANGE BRN

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT23
Site: SWMU 13
Date Installed: 4/11/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: WATTERRA

Depth to Bottom (ft.): 24.50
Static Water Level Before (ft.): 8.28
Static Water Level After (ft.): 22.10
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.6
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1353	0	–	8.28	–	–	–	–	Start Purge
1355	4 gal	–	19.97	13.08	6.29	0.248	+1000	(Dry) Lt. BRN
1400	↓	–	17.28	–	–	–	–	RECHARGE
1405	↓	–	16.71	–	–	–	–	↓
1410	4 gal	–	16.10	–	–	–	–	↓
1411	5 gal	–	21.80	13.30	5.83	0.251	+1000	(DRY) BRN
1421	↓	←	19.02	–	–	–	–	Recharge
1431	5 gal	–	17.58	–	–	–	–	↓
1432	5.5 gal	–	22.10	13.27	5.89	0254	+1000	(Dry)

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT 24
Site: SWMU 13
Date Installed: 4/1/03
Date Developed: 4/19/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 25.19
Static Water Level Before (ft.): 9.55
Static Water Level After (ft.): 23.90
Screen Length (ft.): 10'
One Well Volume (gal/L): 2.6
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. Rojahn
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1255	0	-	(TD) 25-9.55	-	-	-	-	Start Purge
1258	4 gal	-	23.20	15.60	6.56	0.681	+1000	(Dry) Brn
1303	↓	-	21.39	-	-	-	-	Recharge
1308	↓	-	20.07	-	-	-	-	↓
1313	4 gal	-	19.22	-	-	-	-	↓
1315	6 gal	-	23.95	14.86	6.58	0.633	+1000	(Dry) Brn
1325	↓	-	22.50	-	-	-	-	Recharge
1335	6 gal	-	20.80	-	-	-	-	↓
1337	7.5 gal	-	23.90	14.31	6.47	0.674	+1000	Dry Brn

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW125
Site: SWMU 13
Date Installed: 3/28/03
Date Developed: 4/14/03
Dev. Method: Surged & Pumped
Pump Type: Waterra

Depth to Bottom (ft.): 18.02
Static Water Level Before (ft.): 10.59
Static Water Level After (ft.): 17.10
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.2
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0 ppm
PID Readings: Breathing Zone 0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1100	0	-	10.59	-	-	-	-	Start Purge
1101	1.5	-	16.90	12.37	598	0.562	+1000	DRY (BRN)
1106	↓	-	15.53	-	-	-	-	RECHARGE
1111	↓	-	15.45	-	-	-	-	↓
1116	1.5	-	15.40	-	-	-	-	↓
1117	2.25	-	16.85	11.99	6.46	0.610	+1000	DRY (BRN)
1122	↓	-	16.65	-	-	-	-	RECHARGE
1127	↓	-	16.62	-	-	-	-	↓
1132	2.25	-	16.59	-	-	-	-	↓
1133	2.5	-	17.10	12.05	6.51	0.639	+1000	DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT26
Site: SWMU 13
Date Installed: 3/28/03
Date Developed: 4/12/03
Dev. Method: Surged & Pumped
Pump Type: WHALE

Depth to Bottom (ft.): 22.17
Static Water Level Before (ft.): 9.84
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.8 gal
Casing ID (in.): 2 inch PVC

Responsible Personnel: T. ROJAHN
Drilling Company: Bowser-Morner
Project Name: NSWC CRANE
Project Number: N9060 CTO 0279
PID Readings: Bore Hole 0.1 ppm
PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0745	–	–	9.84	–	–	–	–	– Start Purge
0747	~1.8	~1gpm	(DRY)	–	–	–	+1000	Lt. BRN (Dry)
0754	↓	–	1903	–	–	–	–	Recharge
0759	↓	–	1875	–	–	–	–	↓
0804	↓	–	1841	–	–	–	–	↓ Restart
0805	~2.5	–	(DRY)	11.64	6.90	0.415	+1000	(Dry) Lt. BRN
0815	↓	–	19.60	–	–	–	–	Recharge
0825	↓	–	19.18	–	–	–	–	↓ Restart
0826	~3.4	–	(DRY)	11.80	6.68	0.389	+1000	(Dry) Lt. BRN
0836	↓	–	20.45	–	–	–	–	Recharge
0846	↓	–	20.03	–	–	–	<	↓ Restart
0847	~4.0	–	(DRY)	12.02	6.59	0.367	+1000	(Dry) Lt Brn

APPENDIX C.8.2
SWMU 13
MONITORING WELL DEVELOPMENT RECORDS
ROUND 2

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT27 | Depth to Bottom (ft.): 22.4 | Responsible Personnel: T. ROSALIAL
Site: SWMU 13 | Static Water Level Before (ft.): 10.2 | Drilling Co.: BOWSER MORNER
Date Installed: 11-5-03 | Static Water Level After (ft.): | Project Name: NSWC CRANE
Date Developed: 11-18-03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: SURGE & PURGE | One Well Volume: 7.4' | PID Readings: Borehole — ppm
Pump Type: PERISTALTIC | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1230	0	—	10.2	—	—	—	—	START DEV.
1240	7L	700	13.13	—	—	—	>1000	GRAYISH BRN
1250	14L	700	16.70	—	—	—	>1000	GRAY BRN
1300	21L	700	20.50	—	—	—	>1000	GRAY
1307	25.9 L	700	DRY	—	—	—	>1000	GRAY
1317	25.9 L	—	21.30	—	—	—	—	RECHARGE
1327	25.9 L	—	20.60	—	—	—	—	" RESTART PUMP
1333	30.1 L	700	DRY	16.51	6.19	0.346	>1000	LT GRAY
1348	30.1 L	—	21.20	—	—	—	—	RECHARGE
1358	30.1L	—	20.68	—	—	—	—	"
1403	33.6L	700	DRY	16.05	5.97	0.313	>1000	LT. GREY

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MWT 28
Site: SWMU 13
Date Installed: 11-19-03
Date Developed: 11/22/03
Dev. Method: SURGE & PURGE
Pump Type: WATERRA/BAILER

Depth to Bottom (ft.): 91.70'
Static Water Level Before (ft.): 80.57'
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: 1.8 g
Casing ID (in.): 2"

Responsible Personnel: S. GRIER
Drilling Co.: BOWSER-MORNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole 5% ppm
PID Readings: Breathing Zone 0.8 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
INITIAL	0	0	80.57 (dry)	→	→	→	→	START
1020	3.0	~~WATERRA~~	89.90	18.16	10.72	0.445	999+	GREY - NO ODOR
1030	—	—	89.50	—	—	—	—	ALLOWING RECHARGE
1040	—	—	—	—	—	—	—	SURGED W/ BLOCK
1050	3.25	BAILER	90.05 (dry)	16.34	10.93	0.463	999+	ALLOWING RECHARGE
1100	—	—	89.85	—	—	—	—	
1110	3.25 gal	BAILER	89.75 (dry)	17.13	10.74	0.444	999+	GREY - NO ODOR

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT29 | Depth to Bottom (ft.): 21.2 | Responsible Personnel: F. WUDKWYCH
Site: SWMU 13 | Static Water Level Before (ft.): 9.78 | Drilling Co.: BOWSER MORNER
Date Installed: 11-4-03 | Static Water Level After (ft.): Dry | Project Name: NSWC CRANE
Date Developed: 11-6-03 | Screen Length (ft.): 10 | Project Number: 9060
Dev. Method: PUMP + SURGE | One Well Volume: 1.9 gal | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2 | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0827	—	—	9.78	—	—	—	—	SURGE FOR 5 MIN, BEGIN PUMP
0830	3	1 gpm	DRY	—	—	—	—	THICK - DARK BROWN
0848	RESUME	PUMPING	7.7	—	—	—	—	↓ ROUGHLY 6" OF
0855	8		DRY	—	—	—	—	SEDIMENT ON BOTTOM
0908			9.7	—	—	—	—	
0914	12		DRY	15.68	5.38	0.535	>999	DARK BROWN
0935			8.00	—	—	—	—	
0937	16		DRY	15.14	5.51	0.534	>999	DIRTY BROWN
0955			9.35	—	—	—	—	
1000	22 gal		DRY	15.09	5.28	0.543	>999	BROWN
END								

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MWT 30 | Depth to Bottom (ft.): 26.65' | Responsible Personnel: S. GRIER
Site: SWMU 13 | Static Water Level Before (ft.): 11.90' | Drilling Co.: BOWSER MORNER
Date Installed: 11/6/03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11/20/03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: SURGE & PURGE | One Well Volume: 2.4 gal. | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1550	0	1.5 gpm	11.90					
1556	5.0 g	~~0.25 g/min.~~	25.00 (dry)	15.60	4.34	0.542	950	GREY, SLIGHT ORGANIC ODOR
1606	↓	—	21.70	—	—	—	—	ALLOWING RECHARGE
1616	↓	1.5 gpm	20.15	—	—	—	—	SURGED W/ BLOCK
1620	6.25	~~0.25 g/min.~~	26.50	14.90	4.56	0.537	999+	
1622	↓		25.85 (dry)	—	—	—	—	ALLOWING RECHARGE
1632	↓		23.55	—	—	—	—	
1642	↓		21.91	—	—	—	—	SURGED W/ BLOCK
1650	7.5 gal	1.5 g/min	DRY	14.47	4.36	0.528	999+	

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MWT 31
Site: SWMU 13
Date Installed: 11/5/03
Date Developed: 11/20/03
Dev. Method: SURGE & PURGE
Pump Type: Whale

Depth to Bottom (ft.): 20.90'
Static Water Level Before (ft.): 11.14'
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume: 1.69
Casing ID (in.): 2"

Responsible Personnel: J. GRIER
Drilling Co.: BOWSER MORNER
Project Name: NSWC CRANE
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1330	0.25	~~1.5 gpm~~	13.10	15.81°C	6.60	0.740	999+	BROWN, NO ODOR
1336	5.25	~~2 GAL/min~~	17.10 (dry)	—	—	—	—	ALLOW RECHARGE
1348	←	—	15.85	—	—	—	—	
1358	→	~~1.5 gpm~~	15.45	—	—	—	—	MUCH MUD IS REMOVED
1400	7.50	~~6 GAL/min~~	18.77 (dry)	15.44°C	6.46	0.857	999+	17.10 → 18.77
1410	—	—	17.28	—	—	—	—	ALLOWING RECHARGE
1420	—	—	16.40	—	—	—	—	
1430	10.00		19.75 (dry)	15.04	6.34	0.675	999+	
								BROUGHT PUMP OUT
1440	—		17.40					TO SURGE W/ BLACK
1450	—		16.58					
1455	11.00		20.09	15.78	6.53	0.535	999+	

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT32 | Depth to Bottom (ft.): 20.65 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 10.35 | Drilling Co.: BOWSER MORNER
Date Installed: 10-29-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11-4-03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: 1.6 gal | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

Surge 5 min prior to start of pump

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1435	0	—	10.35	—	—	—	—	BRN
1438	3.5 gal	—	(DRY)	—	—	—	—	DRY
1448	↓	—	14.41	—	—	—	—	RECHARGE
1458	↓	—	13.25	—	—	—	—	RECHARGE (RESTART PUMP)
1500	6.5 gal	—	(DRY)	18.76	6.30	0.441	>1000	(DRY) BRN
1510	↓	—	16.00	—	—	—	—	RECHARGE
1520	↓	—	14.50	—	—	—	—	RECHARGE (RESTART PUMP)
1522	8 gal	—	(DRY)	18.25	5.96	0.455	>1000	(DRY) TANNISH - BRN

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT33 | Depth to Bottom (ft.): 21.8 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 13.8 | Drilling Co.: BOWSER MORNER
Date Installed: 11-6-03 | Static Water Level After (ft.): | Project Name: NSWC CRANE
Date Developed: 11/19/03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: SURGE & PUMP | One Well Volume: 4.9L | PID Readings: Borehole — ppm
Pump Type: PERISTALTIC | Casing ID (in.): 2"ϕ | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1542	—	—	13.80	—	—	—	—	—
1552	8.00 L	800	20.40	—	—	—	71000	GRAY BRN
1554	9.60 L	800	(DRY)	—	—	—	—	(DRY)
1604	9.60 L	—	20.48	—	—	—	—	RECHARGE
1614	9.60 L	—	20.09	—	—	—	—	"
1617	12.00 L	800	(DRY)	14.15	6.00	0.202	71000	BRN (DRY)
1627	12.00 L	—	20.95	—	—	—	—	RECHARGE
1632	12.00 L	—	20.73	—	—	—	—	"
1633	12.80 L	800	(DRY)	13.99	5.89	0.247	71000	BRN (DRY

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT 34 | Depth to Bottom (ft.): ~~23.0~~ 22.9 | Responsible Personnel: SCOTT GRIER / T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 5.49 | Drilling Co.: BOWSER MORNER
Date Installed: 11/11/03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11/18/03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: Surge & Purge | One Well Volume: 2.9 gal / 10.6L | PID Readings: Borehole — ppm
Pump Type: Peristaltic pump | Casing ID (in.): 2" ⌀ | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µs/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1500	0	≈ 100	5.49'	16.31	6.01	0.548	999+	Lt. Brown color —
1530	6.00L	200	6.9±	16.23	6.13	0.513	548	No odor
1535	7.00L	200	7.0±	—	—	—	—	
~~1600~~	7.00L	750	~~11.05 (DRY)~~	—	—	—	~~4,000~~	BRN
1620	22.00L	750	13.15	—	—	—	+1000	BRN
1630	30.00L	800	13.75	~~16.53~~	5.44	~~0.482~~	~~+1000~~	BRN
1640	38.00L	800	17.33	16.60	5.55	0.384	>1000	BRN
1650	46.00L	800	20.20	16.47	5.45	0.414	>1000	BRN
1658	52.4 L	800	DRY	—	—	—	—	DEV. Complete
1708	—	—	19.44	—	—	—	—	RECHARGE

SG

T.R.

53L MAX VOL

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT35 | Depth to Bottom (ft.): 70.2 | Responsible Personnel: T. Rojahn
Site: SWMU 13 | Static Water Level Before (ft.): 64.16 | Drilling Co.: Bowser Morner
Date Installed: 11-19-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 12-7-03 | Screen Length (ft.): 10 | Project Number: N 9060
Dev. Method: Bailer (D.) | One Well Volume: 4L | PID Readings: Borehole — ppm
Pump Type: " | Casing ID (in.): 2"ø | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1535	~~TD~~ 4 0	—	64.16	—	—	—	—	Start DEV
1538	4	—	—	13.25	9.67	0.345	>1000	GREY
1545	8	—	—	13.54	9.72	0.355	>1000	"
1550	12	—	—	13.19	9.65	0.393	>1000	"
1555	14.5	—	—	—	—	—	—	DRY
1605	—	—	69.43	—	—	—	—	RECHARGE
1615	—	—	69.33	—	—	—	—	"
1625	—	—	69.26	—	—	—	—	"
			* Slow Recovery		Well	*		

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT36 | Depth to Bottom (ft.): ~27.4 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 19.3 | Drilling Co.: BOWSER MORNER
Date Installed: 11/5/03 | Static Water Level After (ft.): 27.10 | Project Name: NSWC CRANE
Date Developed: 11/10/03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: ~5L | PID Readings: Borehole — ppm
Pump Type: PERISTALTIC | Casing ID (in.): 2" ø | PID Readings: Breathing Zone — ppm

SURGE 1355 - 1400 HRS

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1400	0	—	19.3	—	—	—	—	BRN
1410	7L	0.7L	24.25	15.08	5.82	0.668	>1000	LT. BRN
1420	14L	0.7L	26.85	14.69	5.67	0.659	>1000	" "
1422	15.4L	0.7L	DRY	—	—	—	—	DRY
1432	15.4L	—	24.20	—	—	—	—	RECHARGE
1442	15.4L	—	22.65	—	—	—	—	RECHARGE START PUMP
1447	18.9L	0.7L	24.48	14.47	5.90	0.629	107	SL CLOUDY
1452	22.4L	0.7L	26.30	14.87	5.52	0.632	533	CLOUDY
1457	25.9L	0.7L	27.10	14.66	5.63	0.621	73.1	V.SL. CLOUDY
1502	29.4	0.7L	27.10	14.64	5.58	0.623	36.1	CLEAR

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT37 | Depth to Bottom (ft.): 27.15 | Responsible Personnel: T. ROJAHN
Site: SWMU13 | Static Water Level Before (ft.): 14.00 | Drilling Co.: BOWSER MORNER
Date Installed: 10-24-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11-4-03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: 2.1gal | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

SURGE 5 min prior to pumping

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1329	0	-	14.0	-	-	-	-	BRN
1333	4gal	-	(DRY)	-	-	-	-	(DRY)
1343	↓	-	19.05	-	-	-	-	RECHARGE
1353	↓	-	16.78	-	-	-	-	" START PUMP
1355	7gal	-	(DRY)	17.40	5.83	0.437	939	(DRY) CLOUDY - TANNISH
1405	↓	-	20.30	-	-	-	-	RECHARGE
1416	↓	-	17.78	-	-	-	-	RECHARGE & START PUMP
1417	10gal	-	(DRY)	15.70	5.06	0.397	549	(DRY) CLOUDY

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT38 | Depth to Bottom (ft.): 67.6 | Responsible Personnel: E. WUDKWYCH
Site: SWMU13 | Static Water Level Before (ft.): 61.14 | Drilling Co.: BOWSER MORNER
Date Installed: 11-4-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11-6-03/11-7 | Screen Length (ft.): 10 | Project Number: 9060
Dev. Method: SURGE, PUMP + BAILER | One Well Volume: 1 gal | PID Readings: Borehole — ppm
Pump Type: WATTERA | Casing ID (in.): 2 | PID Readings: Breathing Zone — ppm

	Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
11/6	1300								SURGE FOR 5 MIN
	1400	1							WATTERA - NOT WORKING
	1500	— SWITCH TO		BAILER					WELL NOT PRODUCING
	1650	3		67.13 - DRY					ENOUGH WATER
11/7	0810	↓		62.21					
	0825	4 1/2		BAIL DRY					GREY
	1537	↓		62.95					
	1550	6		DRY					

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT39 | Depth to Bottom (ft.): 26.7 | Responsible Personnel: F. WUDKWYCH
Site: SWMU13 | Static Water Level Before (ft.): 16.78 | Drilling Co.: BOWSER MORNER
Date Installed: 11-4-03 | Static Water Level After (ft.): Dry | Project Name: NSWC CCANE
Date Developed: 11-6-03 | Screen Length (ft.): 10 | Project Number: 9060
Dev. Method: PUMP + SURGE | One Well Volume: 1.6 gal | PID Readings: Borehole — ppm
Pump Type: WHALE/TYPHOON | Casing ID (in.): 2 | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ms/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1043	0							SURGE FOR 5MIN BEGIN PUMPING
1048	3		DRY					GREYISH BROWN, V. THICK
1110	↓		22.2					
1114	5½		DRY	13.34	6.47	0.356	7999	GREY
1137	↓		22.75				~~7050~~	GREY
1140	6½		DRY	12.21	6.84	0.361	705	
END								

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT40 | Depth to Bottom (ft.): 27.7' | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 18.19 | Drilling Co.: BOWSER MORNER
Date Installed: 10-23-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11-04-03 | Screen Length (ft.): 10 | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: 6.2L | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2 | PID Readings: Breathing Zone — ppm

SURGE 5 min PRIOR TO DEV.

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1053	0	4L/MIN	18.19	—	—	—	—	BRN
1059	5gal	~~5gal~~ (FR)	WL BELOW PUMP T.S	—	—	—	—	(DRY)
1109	↓	—	20.64	—	—	—	—	RECHARGE
1119	↓	—	19.03	—	—	—	—	" Restart Pump
1120	~~5~~ (FR)	—	—	15.87	5.79	0.287	7(000	TANNISH - Cloudy
1122	8gal	—	(DRY)	—	—	—	—	(DRY)
1132	↓	—	20.38	—	—	—	—	RECHARGE
1142	↓	—	19.12	—	—	—	—	" Restart Pump
1145	11.5gal	—	(DRY)	18.94	5.67	0.286	658	SL Cloudy - Cloudy

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MWT41 | Depth to Bottom (ft.): 67.8 TOC | Responsible Personnel: M. G. COCHRAN
Site: SWMU 13 | Static Water Level Before (ft.): 65.80 Toc | Drilling Co.: BOWSER -MORNER
Date Installed: 11-10-03 | Static Water Level After (ft.): ~67 | Project Name: NSWC CRANE
Date Developed: 11-18-03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: BAILER | One Well Volume: 0.3 gal | PID Readings: Borehole — ppm
Pump Type: — | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1500	1 GALLON	-	65.80	—	—	—	—	CLOUDY, PURGED DRY,
								4 BAILERS.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT42 | Depth to Bottom (ft.): 23.45 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 20.6 | Drilling Co.: BOWSER MORNER
Date Installed: 10/22/03 | Static Water Level After (ft.): DRY | Project Name: NSWC CCAND
Date Developed: 11/04/03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: 1.9L | PID Readings: Borehole — ppm
Pump Type: WHALE | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

SURGED 5 MIN PRIOR TO PUMPING

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0939	0	—	20.6	—	—	—	—	DARK GREY
0940	1L	1L/MIN	(DRY)	—	—	—	—	
0942	1L	—	21.15	—	—	—	—	RECHARGE
0950	1L	—	20.00	—	—	—	—	"
1000	1L	—	20.90	—	—	—	—	" RESTART PUMP
1001	2L	1L/MIN	~~22.10~~ (DRY)	16.12	6.75	0.257	>1000	DARK GREY
1002	2L	—	22.10	—	—	—	—	RECHARGE
1010	2L	—	21.79	—	—	—	—	"
1020	2L	—	21.55	—	—	—	—	" RESTART PUMP
1021	3L	1L/MIN	DRY	15.78	6.48	0.250	>1000	DARK GREY

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT43 | Depth to Bottom (ft.): 22.50 | Responsible Personnel: T. Rojano
Site: SWMU 13 | Static Water Level Before (ft.): 9.40 | Drilling Co.: Bowser Morner
Date Installed: 11-6-03 | Static Water Level After (ft.): | Project Name: NSWC CRANE
Date Developed: 11-23-03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: Surge & Purge | One Well Volume: 2.1 gal / 8L | PID Readings: Borehole — ppm
Pump Type: Peristaltic | Casing ID (in.): 2"ø | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1230	0	-	9.40	—	-	—	—	START DEV.
1240	6L	600	15.65	16.16	5.68	0.351	>1000	G-cy
1250	12L	600	19.30	15.67	5.12	0.355	~114	Sl. Cloudy
1259	17.4L	600	(DRY)	—	-	—	—	DRY
1309	17.4L	600	21.54	—	-	—	—	RECHARGE
1319	17.4L	600	20.82	—	—	—	—	" RESTART PUMP
1323	19.8L	600	(DRY)	15.35	5.20	0.361	870	V. Cloudy
1333	19.8L	-	21.61	—	—	—	—	RECHARGE
1343	19.8L	-	21.02	—	—	—	—	"
1347	21.6L	600	DRY	15.34	5.03	0.340	>1000	G-cy

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT44 | Depth to Bottom (ft.): 85.81 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 64.46 | Drilling Co.: BOWSER MORNER
Date Installed: 11-10-03 | Static Water Level After (ft.): DRY | Project Name: NSWC CRANE
Date Developed: 11-23-03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: WATTERRIA | One Well Volume: 3.5 gal | PID Readings: Borehole 31 ppm
Pump Type: WATTERRIA | Casing ID (in.): 2" Ø | PID Readings: Breathing Zone 0.0 ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1100	0	-	64.46	-	-	-	-	DARK GREY
1107	4	-	81.70	15.60	7.99	0.543	>1000	" "
1129	4	-	78.90	-	-	-	-	RECHARGE
1134	6	-	84.50	15.73	8.14	0.538	>1000	DARK GREY
1144	6	-	81.50	-	-	-	-	RECHARGE
1149	6	-	80.70	-	-	-	-	"
1153	8	-	DRY	15.25	8.11	0.564	>100	DARK GREY
	+ 2 gal. in Tubing							
	10 Total							

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MWT 45
Site: SWMU 13
Date Installed: 11/10/03
Date Developed: 11/20/03
Dev. Method: WATTERRA
Pump Type: "

Depth to Bottom (ft.): 83.00
Static Water Level Before (ft.): 41.65
Static Water Level After (ft.): Dry
Screen Length (ft.): 10'
One Well Volume: 6.759
Casing ID (in.): 2"

Responsible Personnel: S. GRIER
Drilling Co.: BOWSER MORNER
Project Name: NWSC CRANE
Project Number: 9060
PID Readings: Borehole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1020	0	—	41.65	—	—	—	—	
1030	6.75	—	dry	15.06	9.22	0.161	999+	GREY BROWN - NO ODOR
1040	↓	—	81.65	—	—	—	—	ALLOW RECHARGE
1050	↓	—	80.43					
1105	7.00	—	81.09	20.80	9.42	0.208	999+	GREY BROWN NO ODOR
1115	↓		81.02					ALLOW RECHARGE FROM 18.09'
1125	7.25		79.95	14.97	9.50	0.201	999+	GREY BROWN NO ODOR
1145	7.25		dry	—	—	—		
1155			81.62	—	—	—	—	ALLOW RECHARGE
1205			81.55	—	—	—	—	

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT46 | Depth to Bottom (ft.): 67.6 | Responsible Personnel: T. RoJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 58.3 | Drilling Co.: BOWSER MORNER
Date Installed: 11/22/03 | Static Water Level After (ft.): 60.12 | Project Name: NSWC CRANE
Date Developed: 12/4/03 | Screen Length (ft.): 10' | Project Number: N9060
Dev. Method: SURGE & PURGE | One Well Volume: 6 L | PID Readings: Borehole — ppm
Pump Type: DIS. BAILER | Casing ID (in.): 2" | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.) L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1533	—	—	—	—	—	—	—	
1541	6	1 VOL	—	1130	6.24	0.753	>1000	GREY BRN
1549	12	2	—	1131	6.51	0.790	>1000	" "
1556	18	3	—	1134	6.62	0.799	>1000	" "
1604	24	4	—	1137	6.71	0.808	>1000	" "
1610	30	5	—	1155	6.58	0.821	>1000	" "
1618	36	6	—	1170	6.46	0.833	>1000	" "
1624	42	7	—	1155	6.62	0.830	>1000	" "
1631	48	8	—	1142	6.74	0.826	>1000	" "
1638	54	9	—	—	—	—	>1000	" "
1644	60	10	—	—	—	—	>1000	" "
1650	66	11	—	1112	6.89	0.824	>1000	" "
1655	72	12	—	—	—	—	>1000	" "
1702	78	13	—	—	—	—	>1000	" "
1707	84	14	60.12	1120	6.84	0.830	>1000	" "

MONITORING WELL DEVELOPMENT RECORD

Well: 13MW147 | Depth to Bottom (ft.): 20.2 | Responsible Personnel: T. ROJAHN
Site: SWMU 13 | Static Water Level Before (ft.): 6.3 | Drilling Co.: BOWSER MORNER
Date Installed: ~~11/4/03~~ 11/20/03 | Static Water Level After (ft.): 0 | Project Name: NSWC CRANE
Date Developed: 11/24/03 | Screen Length (ft.): 10' | Project Number: 9060
Dev. Method: SURGE & PUMP | One Well Volume: 8.7 L | PID Readings: Borehole ~ ppm
Pump Type: PERISTALTIC | Casing ID (in.): 2" Ø | PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume ~~(Gal.)~~ L	Flow Rate (ml/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1335	0	800	6.30	—	—	—	—	BRN
1345	8 L	800	9.77	11.51	4.02	0.832	449	V. LT. BRN
1355	16 L	800	11.10	13.19	3.63	0.900	71000	LT. BRN
1405	24 L	800	13.35	12.92	3.54	0.908	405	V. LT. BRN
1415	32 L	800	15.50	12.91	3.69	0.906	71000	LT BRN
1425	40 L	800	17.90	12.65	3.86	0.874	71000	LT. BRN
1435	48 L	800	DRY	—	—	—	—	—
1445	—	—	16.10	—	—	—	—	RECHARGE

OVER 5 WELL VOL PURGED

APPENDIX C.8.3
SWMU 13
MONITORING WELL DEVELOPMENT RECORDS
ROUND 3

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13 MW/T 48
Site: SWMU 13
Date Installed: 7/28/04
Date Developed: 7/31/04
Dev. Method: SWAGS & Purge
Pump Type: WHALER

Depth to Bottom (ft.): 12.75
Static Water Level Before (ft.): 10.98
Static Water Level After (ft.): 11.07
Screen Length (ft.): 5'
One Well Volume (gal/L): 1.2
Casing ID (in.): 2"ø

Responsible Personnel: T. ROJAHN
Drilling Company: B-M
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1401	—	—	10.98	—	—	—	—	—
1402	1	194	—	22.36	7.21	0.582	>1000	BRN
1405	6		11.07	21.00	7.20	0.599	85	V. SL. CLOUDY
1410	16	294	11.07	20.87	6.96	0.579	30	CLEAR
1415	26		11.07	20.90	6.99	0.574	15	CLEAR

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT49
Site: SWMU 13
Date Installed: 7/27/04
Date Developed: 7/31/04
Dev. Method: Surge & Purge
Pump Type: ~~SUBMERSIBLE~~ (SP) WATERRA

Depth to Bottom (ft.): 11.86
Static Water Level Before (ft.): 8.01
Static Water Level After (ft.): DRY
Screen Length (ft.): 5'
One Well Volume (gal/L): 2.5
Casing ID (in.): 2" ϕ

Responsible Personnel: T. ROJAHN
Drilling Company: B-M
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole - ppm
PID Readings: Breathing Zone - ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1307			8.01	19.97	7.16	0.444	>1000	BRN
1311	5		DRY	—	—	—	—	DRY
1316			8.15	—	—	—	—	RECHARGED
~~1321~~								
~~1326~~								
1331	↓							
1321	5		8.15	19.85	6.57	0.413	>1000	BRN
1323	10.5		DRY	—	—	—	—	DRY
1328	10.5		8.30	19.82	6.58	0.408	>1000	BRN
1334	18		DRY	—	—	—	—	DRY

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT50
Site: SWMU 13
Date Installed: 7/27/04
Date Developed: 7/31/04
Dev. Method: Surge Purge
Pump Type: ~~WATER~~ (ES) WATERRA

Depth to Bottom (ft.): 28.18
Static Water Level Before (ft.): 16.10
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal)(L): 7.4
Casing ID (in.): 2"ø

Responsible Personnel: T. ROJAHN
Drilling Company: B-M
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0955		NA	16.1	—	—	—	—	
0959	1.5		20.6	13.89	7.25	0.722	210	Cloudy
1004	4.0		(DRY (4)')	—	—	—	—	Recharge
1009	↓		~~28~~ 25.05	—	—	—	—	↓
1014			25.74	—	—	—	—	
1019	↓		25.60	—	—	—	—	
1024	4.0		25.48	—	—	—	—	
1026	↓		25.48	15.40	7.91	0.754	>1000	Grey Brown
1030	5.0		(DRY)	—	—	—	—	Recharge
1035	↓		27.52	—	—	—	—	"
1040			27.43	—	—	—	—	"
1045	5.0		27.39	—	—	—	—	"
1047	5.5	↓	(DRY)	—	—	—	—	Restart Purge

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 13MWT51
Site: SWMU 13
Date Installed: 7/27/04
Date Developed: 7/31/04
Dev. Method: Surge & Purge
Pump Type: WHALER

Depth to Bottom (ft.): 17.72
Static Water Level Before (ft.): 7.96
Static Water Level After (ft.): DRY
Screen Length (ft.): 10'
One Well Volume (gal/L): 1.8
Casing ID (in.): 2

Responsible Personnel: T. ROJAHN
Drilling Company: BOJONES MORNER
Project Name: NSWC-CRANE
Project Number: 7448
PID Readings: Bore Hole — ppm
PID Readings: Breathing Zone — ppm

Time	Cumulative Water Volume (Gal.)	Flow Rate (mL/min.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)
0850		—	7.96	—	—	—	—	BRN
0855	5gal	1gpm	(DRY)	16.23	7.05	0.321	>1000	DRY
0900	↓	—	12.30	—	—	—	—	RECHARGE
0905		—	11.55	—	—	—	—	"
0910		—	10.76	—	—	—	—	"
0915	↓	—	10.55	—	—	—	—	" / RESTART
0916	5gal	—	10.55	17.86	6.67	0.336	>1000	BRN
0918	6gal	0.5gpm	(DRY)	—	—	—	—	DRY
0923	↓	—	13.21	—	—	—	—	RECHARGE
0928		—	12.93	—	—	—	—	"
0933	↓	—	12.65	—	—	—	—	"
0934	6gal	—	12.65	—	—	—	—	RESTART
0936	7gal	—	(DRY)	15.65	6.55	0.342	>1000	DRY

APPENDIX C.9.1
SWMU 13
WATER LEVEL MEASUREMENT SHEETS
ROUND 1

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	CRANE	**Project No.:**	N9060
Location:	CRANE, IN	**Personnel:**	B. Balkovec / T. Rojahn
Weather Conditions:	Hot and Sunny Low 90's	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _x_	**Remarks:**	SWMU 13

Well Number	Date	Time	Elevation of Reference Point (feet)	Stickup / Depth to Water (feet)	Depth to Water* (feet)	Elevation of Water (feet)	Comments
13MWT01	5/5/2003	1730	715.34		6.21	709.13	
13MWT02	5/5/2003	1732	704.72		17.15	687.57	
13MWT03	5/5/2003	1728	721.10		8.79	712.31	
13MWT04	5/5/2003	1737	706.84		12.98	693.86	
13MWT05	5/5/2003	1733	696.44		5.42	691.02	
13MWT06	5/5/2003	1720	717.93		15.11	702.82	
13MWT07	5/5/2003	1741	687.22		3.12	684.10	
13MWT08	5/5/2003	1738	700.56		3.17	697.39	
13MWT09	5/5/2003	1650	705.90		7.74	698.16	
13MWT10	5/5/2003	1636	700.15		13.65	686.50	
13MWT11	5/5/2003	1638	682.29		7.87	674.42	
13MWT12	5/5/2003	1639	682.12		7.88	674.24	
13MWT13	5/5/2003	1610	701.98		3.62	698.36	
13MWT14	5/5/2003	1612	705.5		13.25	692.25	
13MWT15	5/5/2003	1631	696.65		12.88	683.77	
13MWT16	5/5/2003	1629	684.35		8.49	675.86	
13MWT17	5/5/2003	1628	693.01		8.70	684.31	
13MWT18	5/5/2003	1633	702.92		19.06	683.86	
13MWT19	5/5/2003	1615	705.82		8.31	697.51	
13MWT20	5/5/2003	1646	702.07		4.22	697.85	
13MWT21	5/5/2003	1626	690.74		7.69	683.05	
13MWT22	5/5/2003	1624	671.96		7.44	664.52	
13MWT23	5/5/2003	1645	699.14		7.45	691.69	
13MWT24	5/5/2003	1642	693.93		8.45	685.48	
13MWT25	5/5/2003	1622	681.57		16.00	665.57	
13MWT26	5/5/2003	1619	687.49		9.10	678.39	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: CRANE
Project No.: N9060
Location: CRANE, IN
Personnel: B. Balkovec / T. Rojahn
Weather Conditions: Mostly Cloudy 70's and Windy
Measuring Device: M-Scope
Tidally Influenced: Yes ____ No _x__
Remarks: SWMU 13

Monitoring Well/Piezometer Number	Date	Time	Reference Point Elevation (ft msl)	Stick-up/ Down (ft)	Water Level* (ft below Reference Point)	Groundwater Elevation (ft msl)	Comments
13MWT01	5/11/2003	1359	715.34		5.82	709.52	
13MWT02	5/11/2003	1350	704.72		17.10	687.62	
13MWT03	5/11/2003	1401	721.10		8.88	712.22	
13MWT04	5/11/2003	1449	706.84		12.75	694.09	
13MWT05	5/11/2003	1505	696.44		4.13	692.31	
13MWT06	5/11/2003	1402	717.93		15.62	702.31	
13MWT07	5/11/2003	1500	687.22		3.10	684.12	
13MWT08	5/11/2003	1448	700.56		2.92	697.64	
13MWT09	5/11/2003	1405	705.90		7.40	698.50	
13MWT10	5/11/2003	1443	700.15		13.11	687.04	
13MWT11	5/11/2003	1458	682.29		7.78	674.51	
13MWT12	5/11/2003	1457	682.12		7.58	674.54	
13MWT13	5/11/2003	1516	701.98		3.18	698.80	
13MWT14	5/11/2003	1514	705.5		13.08	692.42	
13MWT15	5/11/2003	1432	696.65		12.63	684.02	
13MWT16	5/11/2003	1425	684.35		8.61	675.74	
13MWT17	5/11/2003	1423	693.01		8.09	684.92	
13MWT18	5/11/2003	1436	702.92		19.04	683.88	
13MWT19	5/11/2003	1524	705.82		6.80	699.02	
13MWT20	5/11/2003	1410	702.07		4.00	698.07	
13MWT21	5/11/2003	1421	690.74		7.34	683.40	
13MWT22	5/11/2003	1420	671.96		7.25	664.71	
13MWT23	5/11/2003	1412	699.14		7.17	691.97	
13MWT24	5/11/2003	1413	693.93		8.23	685.70	
13MWT25	5/11/2003	1417	681.57		16.61	664.96	
13MWT26	5/11/2003	1415	687.49		8.93	678.56	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: CRANE
Project No.: N9060
Location: CRANE, IN
Personnel: B. Balkovec / T. Rojahn
Weather Conditions: Mostly Cloudy 70's and Windy
Measuring Device: M-Scope
Tidally Influenced: Yes ____ No _x__
Remarks: SWMU 13

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)	Total Well Depth From TOC (feet)	Water Level Indicator Reading (feet)*	Groundwater Elevation (feet)	Comments
13SG01	5/11/2003	1354	698.35		1.73	696.62	
13SG02	5/11/2003	1355	701.95		3.64	698.31	
13SG03	5/11/2003	1517	696.24		1.96	694.28	
13SG04	5/11/2003	1518	688.99		2.38	686.61	
13SG05	5/11/2003	1520	692.94		3.89	689.05	
13SG06	5/11/2003	1523	704.88		2.37	702.51	
13SG07	5/11/2003	1414	680.30		1.50	678.80	
13SG08	5/11/2003	1419	665.95		5.05	660.90	
13SG09	5/11/2003	1429	675.30		4.15	671.15	
13SG10	5/11/2003	1455	676.1		4.78	671.32	

* All measurements to the nearest 0.01 foot

APPENDIX C.9.2
SWMU 13
WATER LEVEL MEASUREMENT SHEETS
ROUND 2

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N9060
Location:	SWMU 13	**Personnel:**	T. Rojahn/F. Ramser
Weather Conditions:	Sunny	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	---

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT01	1/19/2004	1347	715.34		7.55	NA	707.79	
13MWT02	1/19/2004	1357	704.72		16.24	NA	688.48	
13MWT03	1/19/2004	1344	721.10		9.98	NA	711.12	
13MWT04	1/19/2004	1408	706.84		14.09	NA	692.75	
13MWT05	1/19/2004	1404	696.44		5.78	NA	690.66	
13MWT06	1/19/2004	1342	717.93		11.91	NA	706.02	
13MWT07	1/19/2004	1417	687.22		4.21	NA	683.01	
13MWT08	1/19/2004	1412	700.56		3.88	NA	696.68	
13MWT09	1/19/2004	1337	705.90		8.77	NA	697.13	
13MWT10	1/19/2004	1421	700.15		14.96	NA	685.19	
13MWT11	1/19/2004	1427	682.29		8.76	NA	673.53	
13MWT12	1/19/2004	1430	682.12		10.75	NA	671.37	
13MWT13	1/20/2004	1128	701.98		4.93	NA	697.05	
13MWT14	1/20/2004	1104	705.50		14.17	NA	691.33	
13MWT15	1/19/2004	1443	696.65		14.59	NA	682.06	
13MWT16	1/19/2004	1501	684.35		11.01	NA	673.34	
13MWT17	1/19/2004	1458	693.01		8.89	NA	684.12	
13MWT18	1/19/2004	1446	702.92		20.21	NA	682.71	
13MWT19	1/20/2004	1058	705.82		10.96	NA	694.86	
13MWT20	1/19/2004	1333	702.07		5.00	NA	697.07	
13MWT21	1/19/2004	1508	690.74		9.09	NA	681.65	
13MWT22	1/19/2004	1516	671.96		8.18	NA	663.78	
13MWT23	1/19/2004	1331	699.14		8.5	NA	690.64	
13MWT24	1/19/2004	1328	693.93		9.25	NA	684.68	
13MWT25	1/19/2004	1523	681.57		7.05	NA	674.52	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N9060
Location:	SWMU 13	**Personnel:**	T. Rojahn/F. Ramser
Weather Conditions:	Sunny	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ____ No _X_	**Remarks:**	---

Location/Well Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT26	1/19/2004	1326	687.49		10.05	NA	677.44	
13MWT27	1/19/2004	1441	698.13		9.31	NA	688.82	
13MWT28	1/19/2004	1339	705.55		79.63	NA	625.92	
13MWT29	1/20/2004	1122	700.44		5.82	NA	694.62	
13MWT30	1/20/2004	1109	698.94		11.72	NA	687.22	
13MWT31	1/20/2004	1052	696.21		10.65	NA	685.56	
13MWT32	1/20/2004	1039	696.04		9.52	NA	686.52	
13MWT33	1/20/2004	1048	701.97		10.63	NA	691.34	
13MWT34	1/19/2004	1512	695.93		5.42	NA	690.51	
13MWT35	1/19/2004	1424	681.73		63.96	NA	617.77	
13MWT36	1/20/2004	0900	667.21		19.26	NA	647.95	
13MWT37	1/20/2004	0913	662.29		14.37	NA	647.92	
13MWT38	1/20/2004	0911	661.04		61.9	NA	599.14	
13MWT39	1/20/2004	0920	654.44		14.25	NA	640.19	
13MWT40	1/20/2004	0941	667.18		18.55	NA	648.63	
13MWT41	1/20/2004	0940	665.67		66.58	NA	599.09	
13MWT42	1/20/2004	0949	670.31		21.14	NA	649.17	
13MWT43	1/20/2004	1002	690.9		8.50	NA	682.4	
13MWT44	1/20/2004	1007	683.82		64.57	NA	619.25	
13MWT45	1/19/2004	1505	690.59		72.75	NA	617.84	
13MWT46	1/20/2004	0925	653.61		58.1	NA	595.51	
13MWT47	1/20/2004	1115	677.23		7.32	NA	669.91	
13SG01	1/19/2004	1401	698.35		1.77	NA	696.58	
13SG02	1/19/2004	1351	701.95		3.68	NA	698.27	
13SG03	1/19/2004	1602	696.24		1.87	NA	694.37	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N9060
Location:	SWMU 13	**Personnel:**	T. Rojahn/F. Ramser
Weather Conditions:	Sunny	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	—

Well Number (Code)	Date	Time (Military)	Elevation of Reference Point (feet)*	Depth to Water (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	
13SG04	1/19/2004	1535	688.99		2.45	NA	686.54	
13SG05	1/19/2004	1539	692.94		3.9	NA	689.04	
13SG06	1/19/2004	1531	704.88		2.35	NA	702.53	
13SG07	1/19/2004	1319	680.3		1.47	NA	678.83	
13SG08	1/19/2004	1519	665.95		5.08	NA	660.87	
13SG09	1/19/2004	1452	675.3		4.15	NA	671.15	
13SG10	1/19/2004	1433	676.1		4.82	NA	671.28	
13SG11	1/19/2004	1554	675.36		2.74	NA	672.62	

* All measurements to the nearest 0.01 foot

APPENDIX C.9.3
SWMU 13
WATER LEVEL MEASUREMENT SHEETS
ROUND 3

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N7448
Location:	SWMU 13	**Personnel:**	T. Rojahn
Weather Conditions:	Mostly Sunny & 40^0s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT01	11/14/2004	1649	715.34		7.56	NA	707.78	
13MWT02	11/14/2004	1644	704.72		15.88	NA	688.84	
13MWT03	11/14/2004	1652	721.10		12.17	NA	708.93	
13MWT04	11/14/2004	1619	706.84		15.42	NA	691.42	
13MWT05	11/14/2004	1629	696.44		8.73	NA	687.71	
13MWT06	11/14/2004	1655	717.93		14.78	NA	703.15	
13MWT07	11/14/2004	1616	687.22		4.84	NA	682.38	
13MWT08	11/14/2004	1623	700.56		3.87	NA	696.69	
13MWT09	11/14/2004	1701	705.90		8.64	NA	697.26	
13MWT10	11/14/2004	1626	700.15		16.11	NA	684.04	
13MWT11	11/14/2004	1608	682.29		8.82	NA	673.47	
13MWT12	11/14/2004	1602	682.12		11.50	NA	670.62	
13MWT13	11/14/2004	1258	701.98		4.40	NA	697.58	
13MWT14	11/14/2004	1735	705.50		14.69	NA	690.81	
13MWT15	11/14/2004	1556	696.65		15.49	NA	681.16	
13MWT16	11/14/2004	1541	684.35		14.23	NA	670.12	
13MWT17	11/14/2004	1538	693.01		9.04	NA	683.97	
13MWT18	11/14/2004	1553	702.92		20.52	NA	682.4	
13MWT19	11/14/2004	1728	705.82		11.31	NA	694.51	
13MWT20	11/14/2004	1704	702.07		5.23	NA	696.84	
13MWT21	11/14/2004	1534	690.74		9.20	NA	681.54	
13MWT22	11/14/2004	1523	671.96		9.13	NA	662.83	
13MWT23	11/14/2004	1706	699.14		9.25	NA	689.89	
13MWT24	11/14/2004	1709	693.93		10.04	NA	683.89	
13MWT25	11/14/2004	1515	681.57		6.79	NA	674.78	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N7448
Location:	SWMU 13	**Personnel:**	T. Rojahn
Weather Conditions:	Mostly Sunny & 40^{0}s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT26	11/14/2004	1512	687.49		11.09	NA	676.4	
13MWT27	11/14/2004	1559	698.13		9.86	NA	688.27	
13MWT28	11/14/2004	1657	705.55		78.38	NA	627.17	
13MWT29	11/14/2004	1255	700.44		5.46	NA	694.98	
13MWT30	11/14/2004	1732	698.94		11.37	NA	687.57	
13MWT31	11/14/2004	1720	696.21		10.74	NA	685.47	
13MWT32	11/14/2004	1716	696.04		10.55	NA	685.49	
13MWT33	11/14/2004	1725	701.97		11.54	NA	690.43	
13MWT34	11/14/2004	1527	695.93		6.45	NA	689.48	
13MWT35	11/14/2004	1605	681.73		64.40	NA	617.33	
13MWT36	11/14/2004	1433	667.21		19.56	NA	647.65	
13MWT37	11/14/2004	1439	662.29		14.71	NA	647.58	
13MWT38	11/14/2004	1436	661.04		62.33	NA	598.71	
13MWT39	11/14/2004	1444	654.44		13.84	NA	640.6	
13MWT40	11/14/2004	1454	667.18		18.74	NA	648.44	
13MWT41	11/14/2004	1456	665.67		67.05	NA	598.62	
13MWT42	11/14/2004	1500	670.31		21.21	NA	649.1	
13MWT43	11/14/2004	1637	690.9		9.70	NA	681.2	
13MWT44	11/14/2004	1634	683.82		64.80	NA	619.02	
13MWT45	11/14/2004	1530	690.59		69.83	NA	620.76	
13MWT46	11/14/2004	1446	653.61		58.25	NA	595.36	
13MWT47	11/14/2004	1240	677.23		7.02	NA	670.21	
13MWT48	11/14/2004	1315	548.67		10.02	NA	538.65	S.C. meas.
13MWT49	11/14/2004	1315	553.90		7.21	NA	546.69	S.C. meas.
13MWT50	11/14/2004	1400	560.49		7.02	NA	553.47	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N7448
Location:	SWMU 13	**Personnel:**	T. Rojahn
Weather Conditions:	Mostly Sunny & 40^{0}s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT51	11/14/2004	1315	571.36		3.77	NA	567.59	
13SG01	11/14/2004	1643	698.35		1.76	NA	696.59	
13SG02	11/14/2004	1647	701.95		3.71	NA	698.24	
13SG03	11/14/2004	1234	696.24		1.95	NA	694.29	
13SG04	11/14/2004	1254	688.99		2.46	NA	686.53	
13SG05	11/14/2004	1301	692.94		3.92	NA	689.02	
13SG06	11/14/2004	1304	704.88		2.35	NA	702.53	
13SG07	11/14/2004	1712	680.3		1.55	NA	678.75	
13SG08	11/14/2004	1520	665.95		5.10	NA	660.85	
13SG09	11/14/2004	1549	675.3		4.18	NA	671.12	
13SG10	11/14/2004	1613	676.1		4.96	NA	671.14	
13SG11	11/14/2004	1246	675.36		2.30	NA	673.06	
13SG12	11/14/2004	1336	595.28		6.87	NA	588.41	
13SG13	11/14/2004	1324	572.52		5.87	NA	566.65	
13SG14	11/14/2004	1356	567.75		6.37	NA	561.38	
13SG15	11/14/2004	1409	544.18		9.97	NA	534.21	
13SG16	11/14/2004	1416	537.01		Dry	NA	Dry	
13SG17	11/14/2004	1420	532.48		Dry	NA	Dry	
13SG18	11/14/2004	1310	524.23		8.16	NA	516.07	

* All measurements to the nearest 0.01 foot

APPENDIX C.10.1
SWMU 13
FIELD TASK MODIFICATION REQUEST FORMS
ROUND 1

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE Project/Installation Name	0279/9060 CTO & Project Number	9060-01 Task Mod. Number
QAPP/SEC. 3.5.4 Modification To (e.g. Work Plan)	SWMUs 13 & 16 Site/Sample Location	MARCH 4, 2003 Date

Activity Description: WELL DRILLING at SWMUs 13 & 16 WAS PROPOSED USING DPT OR hollow STEM AUGER with split spoon SAMPLING ABOVE BEDROCK AND ROTARY DRILLING BELOW BEDROCK.

Reason for Change: THIS Activity CAN best be ACCOMPLISHED USING SONIC (ALSO REFERRED to AS ROTOSONIC) TECHNOLOGY. THE AddVANTAGES OF USING SONIC TECHNOLOGY ARE LISTED ON THE ATTACHED SHEET.

Recommended Disposition: INSTALL MONITORING WELLS @ SWMUs 13 & 16 USING SONIC TECHNOLOGY

Terry Rojahn
Field Operations Leader (Signature)

03-04-03
Date

Approved Disposition:

Ralph Russomi
Project/Task Order Manager (Signature)

3/21/03
Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

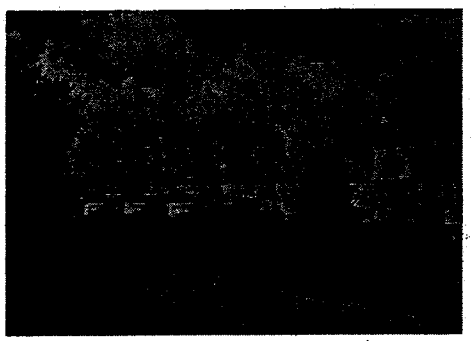
Other: _____

ADDVANTAGES TO SONIC TECHNOLOGY

- Improves productivity.
- While drilling is performed a casing is advanced, therefore, eliminating the need for a permanent casing to be installed in the unconsolidated material.
- Drilling provides a continuous core with nearly a 100% recovery rate thus facilitating borehole logging activities.
- Larger sample volume (4-inch diameter by 5-foot long).
- This technology produces a cleaner hole thus enhancing well development.
- Produces less IDW.
- It can be set up for DPT.

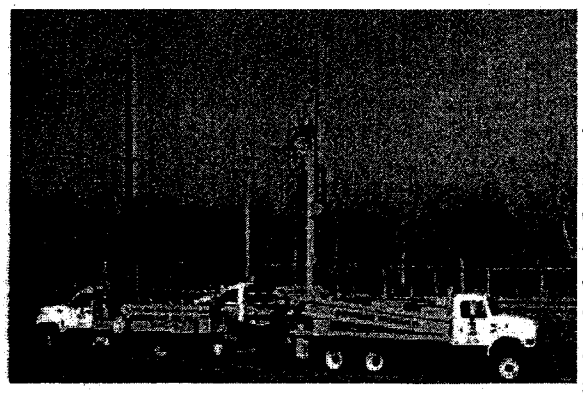
Sonic Technology Description

Bowser-Morner's four sonic rigs are among the newest on the market. While actual depth capability in various formations is unkown, these 'new and improved' rigs are capable of advancing in excess if 400' using 4", 6", 8", 10" or 12" sonic tooling. A brief discussion of Sonic technology follows.



A sonic drill uses high frequency mechanical oscillations, developed in the special drill head, to transmit resonant vibrations and rotary power through the drill tooling to the drill bit allowing it to achieve exceptional drilling penetration rates without the need for drilling fluids or air to effectively take overburden core samples. This is accomplished by the oscillator's conversion of centrifugal force generated by counter rotating, chambered rollers to sinusoidal or longitudinal force. Frequencies in excess of 180 Hz (as previously mentioned) are generated. These frequencies match the natural frequency of the drill tooling, causing no dampening of the vibratory wavelength to the bit. Therefore, this sonic vibratory action fluidizes the soil particles, destroying the shear strength and pushing the particles away from the tip of the drill bit and along the sides of the drill string. This liquefaction process allows for clean, rapid and smooth penetration of overburden formations.

This unique methodology allows the machine to perform overburden and even bedrock core sample drilling with speed, precision, and an absolute minimal amount of disturbance and compaction that cannot be accomplished by any other equipment.



One of the main advantages of the sonic drill is its superior ability to produce continuous core samples of both unconsolidated and consolidated formations with significant detail and accuracy. The core samples can be analyzed to provide a precise and detailed stratigraphic profile of any overburden condition including dry or wet saturated sands and gravels, cobbles and boulders, clays, silts and hard tills. Recovery of a sample is as consistently close to 100% as any other boring

methodology.

The sonic rig also utilizes a dual line of drill pipe. The inner string of drill rods has the core barrel(s) attached. All overburden core sampling is done ahead of the outer string of drill casing with no fluid or air added to insure accurate, representative, undiluted samples. After the core barrel has been advanced, the outer drill casing is advanced to the same depth. This can best be accomplished with water; however, dry casing advancement methods can also be employed and are often performed by Bowser-Morner. With the outer casing left in place to hold the hole open, the core barrel is then removed from the borehole. The core sample can then be extracted into plastic sleeves, stainless steel sample trays, wooden core boxes or virtually any container. The outer drill casing ensures there is no sample contamination from uphole material by sealing it off, providing

Also, when water use is permitted for casing advancement, it is by far the quickest and most effective means of combating heaving sands without the use of drilling mud or bentonite.

The outer casing also serves to hold the borehole open for installation of monitoring wells, piezometers, vents, observation wells, instrumentation or other downhole equipment. The outer drill casing has nominal diameters of 6" and 8", allowing ample space to install 2" and 4" wells with a 1" or 1 1/4" tremie pipe to place sand packs, seals, slurries and grouts into the annular space between the well screen/riser and the outer casing and borehole annulus. The drill bits used on the outer drill casing are open and are 5 7/8" through 8 1/2" diameter depending on borehole size requirements.

Another unique feature of the Sonic drilling method is the ability to ensure the filter pack and bentonite chip or pellet seal can actually be compacted into the borehole annulus by the resonant vibration applied to the outer casing as it is extracted from the borehole with the well screen and riser, pack, seal and grout or slurry installed in the annular space. The vibratory effect makes 'bridging' unheard of and virtually eliminates the potential problem of locking the well and pulling it back as the outer casing string is extracted. This positive placement of well backfill materials allows for very controlled and quick well installations. Coupled with the lack

of cuttings slurry, such as in auger drilling, this positive placement greatly reduces well development time and increases well yields.

As required, the Sonic can retrieve thin wall (Shelby) or lined split spoon samples for lab analysis. Another feature is the ability to vibrate a two-inch drive point screen on the end of drill rods with an inflatable packer to seal off the casing. Then, a submersible pump can be lowered in the drill rods to evacuate x volumes of water before collecting a water sample.

Other features of the rig are:

1. It can be set up for conventional air coring;
2. It can drill hard bedrock by conventional air rotary or downhole hammer methods;
3. It can also be operated as a straight fluid rotary machine;
4. It can core through rocks and boulders and most bedrock formations;
5. Due to the liquefaction principal, it produces a fraction of the drill cuttings and fluids that other methods produce.

The speed, efficiency, superior sampling procedure, depth capacity, safety, reduction of drill cuttings and fluids, and the versatility of the Sonic machine make it a very cost effective and productive way of drilling, sampling, and installing.

Applications include environmental borings, installation of monitoring wells, aggregate exploration (ideal with the large diameter sample to significant depths), rock exploration, methane probes, conductor casing installation, extraction wells, instrumentation and virtually any other application < 12" in diameter and 500' in depth. We have also set up the Sonic for angle borings up to 45. Our Sonic Rig can advance a borehole up to 18" in diameter with some modifications, such as fabrication of an appropriate-sized trash barrel, customized rod make up/break-out, etc.

With the addition of Sonic capability, Bowser-Morner has acquired the latest technology to the subsurface industry and shown its 'commitment to excellence' once again in meeting customers' needs.

Boring, Sampling and Testing Rigs and Equipment

Environmental || Geotechnical and Mineral || Other Applications || Sonic Technology Applications
Well Rehabilitation Services

Home || Analytical Services || Geotechnical Engineering || Construction Materials Testing
Construction Field Observation & Testing || Environmental Services || Subsurface Explorations
Radon Laboratory Services || What's New || More About Us
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TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-02
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/SEC. 3.5.4	SWMUS 13 & 16	MARCH 4, 2003
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Work plan states that bentonite pellets be allowed to hydrate for at least 3 hours before grout is added to the hole.

Reason for Change: To shorten the time allowed for hydration of bentonite pellets. Waiting 3 hours is not necessary if a high-solids bentonite is used in lieu of a cement/bentonite mix.

Recommended Disposition: After 3 feet of bentonite pellets are placed above the sand pack, allow pellets to hydrate for 1 hour before grout mix is added. Then instead of cement/bentonite mix, use a 30% high solids bentonite mix to approximately 4 feet below ground surface. This one hour wait is sufficient based on conversations w/ bentonite supplier and paper by Jim Papp.

Terry Roach — 03-04-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Ramsdell — 3/21/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

VOCs as indicated by the PID reading). The duplicate samples should be placed in the same type of containers and handled in the same manner as the regular soil samples. The duplicate samples will be given unique QC sample identifications (see SOP CTO166-02). One rinsate blank will be collected for every 10 soil samples. For soil samples, the rinsate blank will consist of running distilled water over a decontaminated sampling spoon into a decontaminated mixing bowl. This water will be used to fill sample bottles for the rinsate blank. This process will continue until all the necessary bottles are filled for the rinsate sample (see Tables 3-3 and 3-16).

Soil borings will be backfilled with either the soil cuttings (if uncontaminated) or bentonite pellets (if contaminated) in accordance with Section 3.11.

When a boring has been sampled and backfilled, it will be identified by a tall wooden lath driven into the soil near the boring; a 2-by-2-inch inch wooden stake will be driven into the center of the backfilled boring. The stake and the lath will both have brightly colored flagging attached to them to increase visibility, and both will be labeled using a waterproof marker with a unique soil boring number, corresponding to the boring log containing the survey data for the boring.

3.5.3 Inspection and Repair of Existing Monitoring Wells

Existing monitoring wells at SWMU 16 (WES-14-01-83 through WES-14-05-83) will be sampled as part of this investigation. These wells may have broken casings, bent casings, missing caps, no locks, broken locks, obstructions, and other problems. In addition, it is likely that some of the wells may contain enough sediment at the bottom that the well screen may be partially or totally clogged. Therefore, at the beginning of field activities, the existing wells will be located, inspected, and repaired if possible. For example, broken or bent polyvinyl chloride (PVC) riser pipes above the ground surface will be sawed off and new riser pipes will be added. Caps and locks will be replaced if necessary. The height of casing above ground surface and the depth to the bottom of the well will be measured and recorded. This information will be compared to the boring logs and well construction logs to confirm that the wells are open through the screen interval. These activities are addressed in SOP CTO166-09. Each of the existing wells will need to be redeveloped (see SOP CTO166-10) before any sampling can occur. After sampling all existing wells will be resurveyed.

3.5.4 Well Drilling and Installation

A total of 57 shallow wells will be installed at SWMUs 12, 13, and 16, and 30 wells may be installed at SWMU 19 as part of this investigation. Shallow well borings that do not encounter bedrock will be drilled

using DPT or hollow-stem auger drilling with split-spoon soil sampling. In some locations at SWMUs 12, 13, and 16, bedrock may be reached before shallow ground water is encountered. At these locations, monitoring wells will be completed as bedrock installations using rotary drilling.

At SWMUs 12, 13, and 16, where bedrock well installations are anticipated, up to two (SWMU 16) or four (SWMUs 12 and 13) well borings will be continuously sampled using hollow-stem auger drilling with split-spoon soil sampling or DPT through the soil until bedrock is reached; this will be continued with rotary coring to the final depth (minimum 2-inch-diameter samples). The soil samples and bedrock cores should provide an accurate characterization of stratigraphy, fracture distribution, and other features of the soil and rock units spanning the study area. Procedures for drilling and logging a boring in rock are included in SOP CTO166-11. After these holes have been cored, they will be enlarged to a minimum diameter of 5 inches using an air rotary drill rig. Remaining borings that extend into bedrock will be drilled using air rotary methods. Geologic logging of these borings will be based on the rock chips brought up with the circulating air (SOP CTO166-11). In addition, the rates of water produced during drilling will be carefully observed in order to identify rock zones that might be fractured and have above-average permeability characteristics. Drilling standby may be required to monitor for the presence of ground water.

Either a temporary steel casing or hollow-stem auger flights will be placed through the overburden and into the bedrock to minimize collapse and to minimize downward vertical contaminant migration during drilling of the bedrock borings. The temporary casings or auger flights will be removed just after the installation of the permanent PVC riser pipe, sand pack, and bentonite pellet seal; and immediately before installation of the ~~cement-bentonite grout~~ high solids bentonite mixture.

~~At least three each of the shallow well~~ 8 borings at SWMUs 12, 13, and 16 (to be identified by the field geologist) will be sampled continuously through the overburden, using either DPT or split-spoon sampling, until the total depth is reached or bedrock drilling is conducted. The remaining shallow well borings may be sampled at 5-foot intervals or as determined by the field geologist. Bedrock drilling, if required in the shallow well borings, can be conducted using a conventional rotary drilling with a roller bit and water wash.

A permanent monitoring well will be installed in each of the well borings. The wells will be constructed of 2-inch-diameter, Schedule 40, flush joint, PVC riser pipe and slotted screen (see SOP CTO166-12). In each well, the screen will be 10 feet long and have a slot size of 0.02 inch (factory slotted). All riser pipe and screen sections will be new and certified clean. Each well will consist of slotted screen and enough solid riser pipe above so that the riser will extend approximately 2.5 feet above the ground surface.

(20 to 40 Sieve Size)

A sand filter pack will be placed around the annulus of the well screen, from the bottom of the hole upward to 3 feet above the top of the well screen. Three feet of bentonite chips will be placed above the sandpack, and they will be allowed to wet and expand for at least 1/2 hours before bentonite grout is added to the hole. After at least 1/2 hours has elapsed, the remainder of the well annulus will be filled up to the ground surface with a ~~cement-bentonite grout~~ mixture. A tremie pipe will be used to place the high solids mixture grout in the well annulus to help ensure a good seal ~~around the well annulus~~. An outer, black steel protective casing will be installed around the PVC casing. The outer casing will extend at least 2 feet below the ground surface and no more than 4 inches above the inner PVC well cap. The steel casing will have a hinged cap, or removable cap, and a padlock. A 6-inch-thick, 3-by-3-foot concrete surface pad will be placed around the well at the ground surface. In addition, four barrier posts will be installed around the concrete pad. Details regarding well construction sand pack and grout materials, the outer protective casing, the well pad, and the protective barrier posts are included in SOP CTO166-12.

30% high solids bentonite to approximately 4 feet bgs. The remainder of the annulus will be filled with cement grout to the surface pad.

3.5.5 Packer Testing of Uncased Borings

At SWMUs 12, 13, or 16, where bedrock well installations are anticipated, the cored well borings may also be packer tested. The decision to perform packer testing will be based on information collected during drilling (fractures, water yield, and/or total footage cored) that would warrant a more detailed evaluation of specific water-yielding zones in the bedrock. A double inflatable packer assembly attached to the drill string of the drilling rig will be used to hydraulically test specific sections of each new uncased boring. The procedures for conducting a packer test are presented in SOP CTO166-13. The packer assembly will be thoroughly decontaminated before being placed in a boring. The inflatable packers will be set 5 to 10 feet apart (i.e., the vertical section of rock tested in a single test is 5 to 10 feet). The packer assembly will be lowered down the boring so that the packers isolate a section of the hole that was identified during drilling as being fractured or yielding above-average rates of ground water. Two to three different zones will be tested for each hole, as determined by the field geologist. The number and depths of the zones to be tested will be determined by the FOL and lead field geologist based on their best judgment.

The packer tests will be the pump-out type, where ground water is pumped out of the hole from the isolated section of boring. A pump positioned between the two packers will pump water out of the packed-off interval. Thus, no external water will be introduced to the holes during the packer tests. The flow rate of water discharging from the pump and the hydraulic pressure within the pack-off interval will be measured frequently during the test. The pumping rate will be held nearly constant. Initially, the pumping rate will be at a low level (e.g., 1 gallon per minute or less). If this pumping rate can be sustained for 15 minutes and the water level stabilizes, then the rate will be increased to about 5 gallons per minute.

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / 9060	9060-03
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP / TABLE 3-1 SEC. 3.5.7	SWMUS 13 & 16 GROUNDWATER & SURFACE WATER	MARCH 4, 2003
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: FIELD MEASUREMENTS FOR NITRATE IN GROUNDWATER (found in SECTION 3.5.7) were to be ACCOMPLISHED USING A HACH FIELD TEST KIT AS PRESENTED IN TABLE 3-1 OF the QAPP.

Reason for Change: Nitrate ANALYSIS will be performed by a FIXED BASE LAB for ALL groundwater and surface WATER SAMPLING locations at SWMUS 13 & 16. FOR consistency nitrate will be ANALYZED in SURFACE WATER to ESTABLISH A possible link with groundwater.

Recommended Disposition: FIELD ANALYSIS OF nitrate will not be NECESSARY SINCE nitrate will be ANALYZED by A FIXED BASE LAB.

Terry Rogalski — Field Operations Leader (Signature)

03-04-03 — Date

Approved Disposition:

Ralph Pisanelli — Project/Task Order Manager (Signature)

3/21/03 — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE Project/Installation Name	0279/9060 CTO & Project Number	9060-04 Task Mod. Number
QAPP (SEC. 3.5.10 Modification To (e.g. Work Plan)	SWMUS 13 & 16 SURFACE WATER Site/Sample Location	MARCH 4, 2003 Date

Activity Description: QAPP states that A filtered surface water sample collected for dissolved metals analysis is to be drawn into a plastic syringe and forced through a 0.45-µm filter cartridge directly into a sample container.

Reason for Change: SOP CTO166-19 states that new, clean, disposable tubing and a 0.45µm filter will be used in combination with A peristaltic pump @ EACH SURFACE WATER SAMPLING LOCATIONS. Also, given the fact that the dedicated filter should be pre-rinsed w/sample water and the volume of sample required the peristaltic pump is the better method.

Recommended Disposition: Follow NSWC CRANE SOP CTO166-19

Terry Rogers — 03-04-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Rinaldi — 3/4/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE Project/Installation Name	0279/9060 CTO & Project Number	9060-05 Task Mod. Number
QAPP/SEC. 3.4.2/TABLE 3-5 Modification To (e.g. Work Plan)	Groundwater @ SWMUS 13 & 16 Site/Sample Location	MARCH 4, 2003 Date

Activity Description: SEC. 3.4.2 states that one rinsate sample will be collected and analyzed each day... Table 3-5 reflects A rate OF 1 per 10 samples with a min. OF one per day of sampling.

Reason for Change: Historically @ CRANE the frequency OF RINSATE blanks through bladder pumps has been 1 per 5 samples. Additionally, IF A peristaltic pump IS USED to purge & sample some OF the monitoring WELLS then one batch blank ON the dedicated disposable EQUIPMENT USED WAS considered sufficent. Note: U.S. EPA Region 5 RCRA QAPP guidance says field blank (i.e. rinsate) frequency = 1/10 TEQ 3-5-3

Recommended Disposition: Bladder pump rinsate frequency - 1 per 5 samples. Peristaltic pump - Batch blank on disposable equipment (i.e., all tubing & filter lots).

Terry Rogers — MARCH 4, 2003
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Rowntree — 3/24/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC Crane	0279/9060	9060-06
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/Table 3-2 pg 33	SWMUs 13+16	March 18, 2003
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Ammonia is listed under Miscellaneous Parameters to be analyzed for in Soils for SWMU 13.

Reason for Change: Ammonia should not be analyzed in Soils for SWMU 13.

Recommended Disposition: Remove Ammonia from analyses for soils for SWMU 13

Edward Sadlmyer — 3/18/03

~~Field Operations Leader~~ (Signature) Project Chemist — Date

Approved Disposition:

Ralph Rinaldi — 3/21/03

Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TABLE 3-2

SUMMARY OF SOIL SAMPLES AND LABORATORY ANALYSES
CTO 166
NSWC CRANE, CRANE, INDIANA
PAGE 2 OF 7

	Parameters [1]	Volatiles [2]		Semivolatiles			Explosives		Dioxin	Dyes	PCBs	Metals		Miscellaneous Parameters						
Description	Sample ID	SW-846 8260B	SW-846 8015B	SW-846 8270C	Selected Ion Monitoring	SW-846 8151A	SW-846 8330	Picrates	SW-846 8290	NSWC Crane	SW-846 8082	Metals SW-846 6020	Mercury SW-846 7471A	Cyanide	Perchlorate	TOC	CEC	pH	Ammonia	
13SB03	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB04	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB05	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB06	0-2 ft bgs	1	1	1	1	1			1		1									
	0-4 ft bgs	1	1	1	1	1			1		1									
13SB07	0-2 ft bgs															1	1	1	X	
	above water table															1	1	1	X	
13SB08	0-2 ft bgs															1	1	1	X	
	above water table															1	1	1	X	
13SB09	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB10	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB11	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB12	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB13	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB14	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB15	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
13SB16	0-2 ft bgs			1	1	1			1		1									
	0-4 ft bgs			1	1	1			1		1									
Total Samples SWMU 13		2	2	28	28	28	0	0	28	0	28	0	0	0	0	4	4	4	X 0	
SWMU 16																				
16SB01	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1							
	TBD	1		1	1	1	1	1			1	1	1							
16SB02	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1			1	1	1		
	TBD	1		1	1	1	1	1			1	1	1			1	1	1		
16SB03	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1							
	TBD	1		1	1	1	1	1			1	1	1							
16SB04	0-2 ft bgs	1	1	1	1	1	1	1			1	1	1							

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC Crane	0279/9060	9060-07
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/Table 3-16 pg 60	SWMUs 13 & 16	March 18, 2003
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Nitrate/Nitrite and Ammonia analyses are missing from Table 3-16.

Reason for Change: To complete Table 3-16

Recommended Disposition: Add Nitrate/Nitrite and Ammonia analyses to Table 3-16.

Ed Sedlmyer — 3/18/03

~~Field Operations Leader~~ (Signature) — Date

Project Chemist

Approved Disposition:

Ralph Russomanno — 3/21/03

Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TABLE 3-16

SUMMARY OF SAMPLE ANALYSES, CONTAINER TYPES AND VOLUMES, PRESERVATION REQUIREMENTS, AND HOLDING TIMES FOR AQUEOUS SAMPLES
CTO 166, NSWC CRANE
PAGE 1 OF 2

Parameter	Analyte/Methodology	Sample Container	Container Volume	Preservation[1]	Maximum Holding Time[2]
Explosives	Explosives SW-846 8330	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	Picric and Picramic Acid Laucks HPLC Method	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Metals	Total SW-846 6020, 7470A	Polyethylene, plastic cap w/ plastic liner	1000 mL	HNO_3 to pH <2	Within 180 days; mercury within 28 days
	Dissolved SW-846 6020, 7470A	Polyethylene, plastic cap w/ plastic liner	1000 mL	HNO_3 to pH <2	Within 180 days; mercury within 28 days
Volatiles	SW-846 8260B	Glass, black phenolic plastic screw cap, Teflon-lined septum	(6) 40 mL	Cool to 4 °C, dark, zero headspace, HCl to pH <2	14 days to analysis
	SW-846 8015B	Glass, black phenolic plastic screw cap, Teflon-lined septum	(6) 40 mL	Cool to 4 °C, dark, zero headspace, HCl to pH <2	14 days to analysis
Semivolatile	SW-846 8270C	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	Selective Ion Monitoring SW-846 8270C	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
	PCP and Hexachlorophene SW-846 8151A	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
PCBs	PCBs SW-846 8082	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Dyes	NSWC Crane	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C, dark	Extraction 7 days; analysis within 40 days of extraction
Dioxin	SW-846 8290	Amber glass, Teflon-lined cap	(2) 1000 mL	Cool to 4 °C	Extraction 30 days; analysis within 45 days of extraction
Perchlorate	EPA Method 314.0	Polyethylene, plastic cap w/ plastic liner	500 mL	Cool to 4 °C, dark	28 days to analysis
Nitrate/Nitrite	EPA Method 353.2	"	"	"	"
Ammonia	EPA Method 350.1	"	"	"	"

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-08
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/FIGURES 3-2 & 3-3	SWMUS 13 & 16	6-09-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Upon receipt of the actual survey data the surveyed sample locations were compared to the proposed sample locations.

Reason for Change: Significantly shifted sampling locations are addressed individually in the attached table. At SWMU 16 all other miner shifts (235') were representative of the area to be sampled. These locations were measured in (not surveyed) and shifted due to line of sight obstructions (mainly e.g. railroad cars, trees, magazine, etc.)

Recommended Disposition: NA

Terry Royal — 6-09-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph Ramsdale — 6/10/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

SAMPLING LOCATIONS SHIFTED SIGNIFICANTLY (50 FEET OR MORE) FROM THE PROPOSED LOCATION AS A RESULT OF A FIELD DECISION

SAMPLING LOCATION	DIRECTION MOVED	DISTANCE MOVED	REASON(S) MOVED
13MWT01	NE	~50'	(1)
13MWT02	SE	~50'	(2) & (3)
13MWT04	SW	~120'	(1)
13MWT06	SW	~60'	(2)
13MWT08	NNE	~70'	(4)
13MWT09	W	~190'	(5)
13MWT11	NE	~60'	(2)
13MWT14	SE	~90'	(3)
13MWT15	SE	~50'	(6)
13MWT19	SSE	~120	(3)
13MWT20	N	~100'	(5)
13MWT21	SW	~60'	(2) & (3)
13MWT25	NW	~60'	(2) & (3)
13SW/SD03	S	~140'	(7)
13SW/SD04	SE	~50'	(8)
13SW/SD05	NW	~100'	(5)
13SW/SD06	NW	~80'	(5)
13SW/SD07	NW	~60'	(5)
13SW/SD08	SE	~70'	(8)
13SW/SD09	SW	~70'	(7)
13SW11	E	~60'	(5) & (7)
13SW/SD09	NW	~50'	(7)
13SD21	SE	~60'	(9)
13SB07	E	~50'	(10)
16SD11	WSW	~160	(5)

(1) Moved to avoid steep terrain
(2) Moved to avoid possible underground utilities
(3) Moved to avoid a congested area (surface obstructions, above ground utilities, traffic hazards, parking lot, etc.)
(4) Moved to avoid wet terrain and possibly immobilize the drilling rig
(5) Moved sampling location closer to the possible contamination source
(6) Moved to avoid disturbing a riparian woodlot
(7) Moved location were a sufficient amount of aqueous sample could be collected
(8) Moved location to include stream's confluence with nearby stream receiving run off from study area
(9) Moved location were a sufficient amount of depositional material could be collected, also paced in location
(10) Moved sampling location down gradient of debris pile

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/9060	9060-09
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/SEC. 3.4.2.3	SWMU 16	6-09-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: "Cast High Explosives Fill Ground Water Sampling" Five monitoring wells were proposed for installation - However, six monitoring wells were drilled & installed

Reason for Change: Monitoring well 16MWT01 - upon completion of development (4-15-03) and purged (4-21-03) the well was sampled on 4-22-03 but only produced enough water for VOAs and was still dry on 4-23-03.

Recommended Disposition: Because of the extremely slow recharge rate of monitoring well 16MWT01 an additional well (16MWT06) was installed next to 16MWT01. Monitoring well 16MWT06 was installed on 4-24-03 to replace monitoring well 16MWT01. This had to be accomplished quickly to take advantage of the on site 45A track drilling rig - brought onsite to install 13MWT13. 6-09-03

Terry Rock
Field Operations Leader (Signature) Date

Approved Disposition:

Ralph Braunshi 6/10/03
Project/Task Order Manager (Signature) Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / N9060	9060-10
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/TABLE 3-2	SWMUs 13 & 16	6-09-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: TABLE 3-2 showed the Summary of Soil Samples to be collected at SWMUs 13 & 16.

Reason for Change: A shallow REFUSAL occurred at the following soil borings: 13SB14, 16SB03-10, 16SB14-16, 16SB20, 16SB21, 16SB31, 16SB35 and 16SB37. Thus resulting in the collecting of only the surface soils @ the above soil boring locations.

Recommended Disposition: NA

FOR FURTHER INFORMATION SEE the Boring Logs in Appendix A.

Tony Boyd — Field Operations Leader (Signature)

06-09-03 — Date

Approved Disposition:

Ralph Buccalo — Project/Task Order Manager (Signature)

6/10/03 — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/N9060	9060-11
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP/TABLE 3-11	SWMU 16	6-10-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: TABLE 3-11 SHOWED the SUMMARY OF SURFACE WATER Samples to be collected @ SWMU 16.

Reason for Change: The only SURFACE WATER locations with a sufficient AMOUNT OF SURFACE WATER AVAILABLE FOR COLLECTION OCCURRED @ 16SW01 (North Sump), 16SW02 (East Sump) & 16SW07 (West Sump).

Recommended Disposition: SURFACE WATER @ locations 16SW03-06 WERE NOT collected. Sampling locations 16SW03-06 ranged FROM completely dry to one location with less than ½" OF stagnet WATER FOUND in cuts.

Tony Agnel — Field Operations Leader (Signature)

6-10-03 — Date

Approved Disposition:

Ralph R Rachuba — Project/Task Order Manager (Signature)

6/10/03 — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279/N9060	9060-12
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP / TABLE 3-13	SWMUs 13 & 16	06-10-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: TABLE 3-13 SHOWED the SUMMARY OF SEDIMENT SAMPLES to be collected @ SWMUs 13 & 16. One extra sediment sample was collected @ SWMU 13 & three sediment sump samples WERE not collected @ SWMU 16.

Reason for Change: Location 13SD23 was added to check the drainage ditch @ the northern portion of SWMU 13. No sediment was found in any of the three sumps (16SD01, 02 & 07) @ SWMU 16 and therefor not collected. HOWEVER, A sediment sample (16SD02) was collected in the DRAINAGE ditch which formerly received discharge water from the EAST sump.

Recommended Disposition: Same as discussed above. REPLACED SUMP SAMPLE 16SD02 with sediment sample collected FROM AN Adjacent drainage ditch.

Terry Angel — 06-10-03
Field Operations Leader (Signature) — Date

Approved Disposition:

Ralph R. Rempfer — 6/10/03
Project/Task Order Manager (Signature) — Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE	0279 / N9060	9060-13
Project/Installation Name	CTO & Project Number	Task Mod. Number
QAPP / Sec. 3.5.12	SWMUS 13 & 16	6-10-03
Modification To (e.g. Work Plan)	Site/Sample Location	Date

Activity Description: Staff Gauge Installation and Estimation of Stream Flow. Ten staff gauges were installed @ SWMU 13. No staff gauges were installed @ SWMU 16 since no surface water flow was observed in any of the drainage ditches during the entire field activity.

Reason for Change: At SWMU 13 stream flow couldn't be physically measured using QAPP SOP CTO 166-21 due to nature of the streams & drainage ditches encountered @ SWMU 13. The physical aspects of the streams & drainage ditches included - heavy grass encroachment, extremely shallow water, rocks, narrow width, etc.

Recommended Disposition: All staff gauges were associated with culverts and the flow rate was estimated @ each of the 10 culverts selected as staff gauges. Only one round of staff gauges were taken since the field activities @ SWMU 13 didn't extend into the dry season.

Field Operations Leader (Signature) — Date: 6-10-03

Approved Disposition:

Project/Task Order Manager (Signature) — Date: 6/10/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other:

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NAVAL CRANE Project/Installation Name	279 9060 CTO & Project Number	9060-14 Task Mod. Number
QAPP/SECT. 3.5.5 Modification To (e.g. Work Plan)	SWMU 13+16 Site/Sample Location	6-13-03 Date

Activity Description: PACKER TESTING WAS NOT PERFORMED AT SWMU 13 OR SWMU 16

Reason for Change: IT WAS FOUND THAT PACKER TESTING WAS NOT NECESSARY SINCE OUR OBJECTIVE WAS TO INSTALL OUR MONITORING WELLS BASED ON FIRST WATER ENCOUNTERED, NOT A HIGH YIELDING ZONE.

Recommended Disposition: ACCEPT MODIFICATION AS NOTED.

Ty [signature]
Field Operations Leader (Signature) — Date: 6-13-03

Approved Disposition:

Ralph R Basenko
Project/Task Order Manager (Signature) — Date: 6/13/03

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

APPENDIX C.10.2
SWMU 13
FIELD TASK MODIFICATION REQUEST FORMS
ROUND 2

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NSWC CRANE Project/Installation Name	0279 / 9060 CTO & Project Number	#1 (ROUND 2) Task Mod. Number
QAPP Modification To (e.g. Work Plan)	SWMU 13 & 16 Site/Sample Location	136WT3501 - 12/10/03 136WT4101 - 11/23/03 Date 16GWT0801 - 12/6/03 16GWT1101 - 12/6/03

Activity Description: SEE SECTION 3.5.7 REGARDING "LOW-FLOW SAMPLING OF MONITORING WELLS"

Reason for Change: DUE TO EXTREMELY SLOW RECHARGE RATES THE USE OF BLADDER PUMPS IN SOME DEEP WELLS WAS ABANDONED. SEVERE DRAWDOWN OCCURRED DURING THE PURGE, THUS TAKING HOURS FOR LIFT OF RECHARGE. ADDITIONALLY, WELLS DRIED OUT MANY TIMES DURING SAMPLE COLLECTION - RENDERING BLADDER PUMPS USELESS.

Recommended Disposition: USED DISPOSABLE TEFLON BAILERS TO SAMPLE SELECTED DEEP WELLS (THOSE WITH EXTREMELY SLOW RECHARGE RATES). ADDITIONALLY, MINIMUM SAMPLE VOLUME WAS COLLECTED PER ANALYSIS AND THE PARAMETERS COLLECTED WERE PRIORITIZED.

Tony Boyd
Field Operations Leader (Signature)

MARCH 2, 2004
Date

Approved Disposition:

Ralph Rinaldi
Project/Task Order Manager (Signature)

3/2/04
Date

Distribution:

Program/Project File –
Project/Task Order Manager –
Field Operations Leader –

Other: _____

APPENDIX C.11.1
SWMU 13
EQUIPMENT CALIBRATION LOGS
ROUND 1

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & SMWU 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: PHOTOVAC

MANUFACTURER: U.S. ENVIRONMENTAL

SERIAL NUMBER: ED HK 321

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
3/25/03	ED HK321	B BAUCOM	0.0	0.0	100.0	100.0	00210-03	
3/26/03	"	"	"	0.0	"	100.0	"	
3/27/03	"	"	"	0.0	"	100.0	"	
3/28/03	"	"	"	0.0	"	100.0	"	
3/29/03	"	"	0.0	0.0	100.0	100.0	"	
3/30/03	"	"	"	0.0	100.0	99.9	"	
3/31/03	"	"	"	0.0	100.0	100.0	"	
4/1/03	"	"	"	0.0	100.0	100.0	"	
4/7/03	"	"	"	0.0	100.0	100.0	"	
4/8/03	"	"	"	0.0	100.0	100.0	"	
4/9/03	"	"	0.0	0.0	100.0	100.0	"	
4/10/03	"	"	0.0	0.0	100.0	99.9	"	
4/11/03	"	"	0.0	0.0	100.0	100.0	"	
4/12/03	"	T. ADAMS	0.0	0.0	100	100	"	
4/13/03	"	B BAUCOM	0.0	0.0	100	100	"	
4/14/03	"	"	0.0	0.0	100	100	"	
4/15/03	"	"	0.0	0.0	100	100	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & SMWU 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: PHOTOVAC

MANUFACTURER: U.S. ENVIRONMENTAL

SERIAL NUMBER: EO JK 303

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
3/25/03	EO3K303	B. BALKOVEC	0.0	0.0	100.0	100.0	00Z1003	25% 100 ppm
3/26/03	"	"	0.0	0.0	100.0	99.9	"	
3/27/03	"	"	0.0	0.0	100.0	100.0	"	
3/28/03	"	"	0.0	0.0	100.0	100.0	"	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: YSI 6920

MANUFACTURER: YSI

SERIAL NUMBER: 01L0707AC

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION						CALIBRATION CHECK						Calibration Standard (Lot No.)	Remarks and Comments
		PH	COND	ORP	DO	NA	NA	PH	COND	ORP	DO	NA	NA		
3/29/03	TR	7.0 4.0	1000 uS/cm	100 mV	CHECK	....	....					....	....	7.0 2800 8/23/03 1000 Lot 3393 Exp 12/1/03 4.0 2760 8/07/03 ORP 3119 5/6/03	
3/30/03	TR					....	....	OK	OK	OK		....	....		
4/10/03	TR	Recalibrate				....	....					....	....	SAME	Stands & Lot #'s Etc
4/11/03	TR	→				....	....					....	....	→ OK	Check Cali.
4/12/03	TR	→				....	....					....	....	→ "	" "
4/13/03	TR	→				....	....					....	....	→ "	" "
4/15/03	TR		CHECK		CALI	....	THIS morning will cali.					....	NEXT	shift	(OK)
4/21/03	TR	7.0 4.0	1.000 ms/cm	100 mV	8.78 OK	→						→		7.0 3106 4/22/04 1ms/cm = 3393 12/1/03 4.0 3129 5/05/04 ORP = same as above	
4/22/03	TR		CHECK		CALI	.... EVERYthing OK		→				→		Good	Same solutions as above
4/23/03	BB		CHECK		CAL	....	1630	EVERYTHING O.K.				....	....	"	
4/24/03	TR		"		"	....	1830			"	"	....	....	"	"
4/25/03	TR	→				....	....					....	....	→ "	"
4/26/03	TR	→				....	....					....	....	→ "	"
4/27/03	TR	→				....	....					....	....	→ "	"
4/28/03	TR	→				....	....					....	....	→ "	"
4/29/03	TR	→				....	....					....	....	→ "	"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: YSI 6920

MANUFACTURER: YSI

SERIAL NUMBER: 01L070TAC

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION						CALIBRATION CHECK						Calibration Standard (Lot No.)	Remarks and Comments
		PH	COND	ORP	DO	NA	NA	PH	COND	ORP	DO	NA	NA		
5/6/03	T.R.	7.0 4.0	1000 uS/cm	100 mV		----	----				changed membrane	----	----	7.0 3106 4/22/03 4.0 3129 5/15/03	Ins/cm = 3393 12/11/03 ORP: 3113 5/6/03
5/7/03	T.R					----	----					----	----	Cal. Check (OK)	
5/8/03	BB					----	----					----	----	CAL CHECK (OK)	
5/9/03	BB					----	----					----	----	CAL CHECK (OK)	
5/11/03	BB					----	----					----	----	CAL CHECK (OK)	
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
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						----	----					----	----		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: YSI 6920

MANUFACTURER: YSI

SERIAL NUMBER: 98H0359AD

Date of Calibration	Person Performing Calibration	INITIAL CALIBRATION						CALIBRATION CHECK						Calibration Standard (Lot No.)	Remarks and Comments
		PH	COND	ORP	DO	NA	NA	PH	COND	ORP	DO	NA	NA		
4/21/03	BB	7.0 4.0	1.00 ms/cm	100 mV	8.28 O.K.	----	----					----	----	7.0 3106 4.0 3124	4/22/04 1ms/cm = 3393 5/15/04 ORP = same as above
4/22/03	"	CHECK	CALIBRATE						EVERYTHING		O.K	----	----		
4/23/03	"	"		"		----		1215	"		"	----	----		
4/25/03	"	CAL	CHECK			1648			EVERYTHING		O.K.	----	----		
4/26/03	"	"		"		0750				"	"	----	----		
5/6/03	"	7.0 4.0	1.00 ms/cm	100 mV	9.61 O.K.	----	----					----	----	7.0 3106 4.0 3124	4/22/04 1ms/cm = 3393 5/15/04 ORP same
5/7/03	"	CAL		CHECK		0700	----		O.K.			----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		
						----	----					----	----		

12/4/03 AS ABOVE

12/4/03

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & SMWU 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: LA Motte 20/20

MANUFACTURER: LA Motte

SERIAL NUMBER: 3323-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
3/29	SAME	TL	0.0	0.0	0.0	0.0	NA	Standard supplied by
3/30	"	"	0.0	0.0	0.0	0.0	"	U.S. ENV.
4/1	"	"	0.0	0.0	0.0	0.0	"	
4/10	"	"	0.0	0.0	0.0	0.0	"	
4/11	"	"	0.0	0.0	0.0	0.0	"	
4/12	"	"	0.0	0.0	0.0	0.0	"	
4/13	"	"	0.0	0.0	0.0	0.0	"	
4/22	"	"	0.0	0.0	0.0	0.0	"	
4/23	"	"	0.0	0.0	0.0	0.0	"	
4/24	"	"	0.0	0.0	0.0	0.0	"	
4/25	"	"	0.0	0.0	0.0	0.0	"	
4/26	"	"	0.0	0.0	0.0	0.0	"	
4/27	"	"	0.0	0.0	0.0	0.0	"	
4/28	"	"	0.0	0.0	0.0	0.0	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & SMWU 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: LaMotte 2020

MANUFACTURER: LaMotte (U.S. Environ)

SERIAL NUMBER: 3332-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
4/10/03	3332-2402	B. BALKOUSE	0.0	0.0	10.0	10.0	NA	
4/11/03	"	"	0.0	0.0	10.0	10.0	"	
4/12/03	"	"	0.0	0.0	10.0	10.0	"	
4/13/03	"	"	0.0	0.0	10.0	10.0	"	
4/22/03	"	"	0.0	0.0	10.0	10.0	"	
4/23/03	"	"	0.0	0.0	10.0	10.0	"	
4/24/03	"	"	0.0	0.0	10.0	10.0	"	
4/25/03	"	"	0.0	0.0	10.0	10.0	"	
4/28/03	"	"	0.0	0.0	10.0	10.0	"	
4/27/03	"	"	0.0	0.0	10.0	10.0	"	
4/28/03	"	"	0.0	0.0	10.0	10.0	"	
4/29/03	"	"	0.0	0.0	10.0	10.0	"	
5/6/03	"	"	0.0	0.0	10.0	10.0	"	
5/7/03	"	"	0.0	0.0	10.0	10.0	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMU 13 & SMWU 16

PROJECT No.: N9060 CTO 0279

INSTRUMENT NAME/MODEL: 2020 TURBIDITY

MANUFACTURER: LA Motte

SERIAL NUMBER: 1749-1600

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
5/6/03	1749-1600	TR	0.0	0.0	0.0	0.0	NA	Standard supplied by U.S. ENV.
5/7/03	"	TR	"	"	"	"	"	" " "
5/8/03	"	TR	"	"	"	"	"	" " "
5/9/03	"	TR	"	"	"	"	"	" " "
5/10/03	"	TR	"	"	"	"	"	" " "

APPENDIX C.11.2
SWMU 13
EQUIPMENT CALIBRATION LOGS
ROUND 2

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: PID 2020

MANUFACTURER: Perkin Elmer

SERIAL NUMBER: ED EM 311

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
11.6.03	same	TL	—	—	99.4	100	00228.03	OK
11-7-03	"	RWL	—	—	91.8	100	"	OK
11-8-03	"	RWL	—	—	104	100	"	OK
11-9-03	"	RWL	—	—	105	100	"	OK
11-10-03	"	RWL	—	—	90.5	100	"	OK
11-10-03	"	MGL	—	—	94.5	100	"	OK
11-11-03	"	RWL			76.2	100		
11/17/03	"	SAG	—	—	93.5	100	"	OK
11/18/03	"	SG	—	—	104	100	"	OK
11/24/03	"	SG	—	—	98.5	100	"	OK
11/20/03	"	SG	—	—	98.9	100	"	OK
12/4/03	"	SG			96.4	100	"	OK
12/5/03	"	SG			98.9	100	"	OK
12/6/03	"	SG	—	—	98.5	100	"	OK
12/7/03	"	SG	—	—	96.0	100	"	OK

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: PHOTOVAC

MANUFACTURER: PERKIN ELMER

SERIAL NUMBER: EO MF 352

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
10/25/03	SAME	TR	—	—	94.8	100	00228-03	OK
10/27/03	E.O MF352	PWR	—	—	98.2	100	"	OK
11/3/03	"	MGC	—	—	98.4	100	"	OK
11/4/03	"							
11/5/03	"	TR	—	—	97.6	100	"	OK
11/10/03	"	PWR			90.5	100	"	OK
11/11/03	"	PWR			90.5	100		
11/[illegible]/03	"	MGC	—	—	98.5	100	"	OK
~~11/17/03~~	~~"~~	~~MGC~~						

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: PHOTOVAC PID

MANUFACTURER: PERKIN ELMER

SERIAL NUMBER: ED ~~PMF~~ ~~352~~ (TT) HE 339

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
10-21-03	EDMF352	FURAMSER	—	—	86.1	99.8	00228-03	
10-23-03	EDMF352	FUR	—	—	107	100	11	
10-24-03	ED HE339	FUR			105	100	11	
10-25-03	ED HE339	FUR			95.3	100	11	
10-26-03	ED HE339	FUR			102	100	11	
11-4-03	ED HE339	FUR			105	100	11	
11-5-03	11	TR	—	—	101	100	11	
11-6-03	11	TR	—	—	99.8	100	11	
11-7-03		MM	—	—	99.8	100	11	
11-8-03	11	FUR			9.1	100		
11-17-03	11	MM	—	—	5.6	100	11	
11-19-03	11	MM	—	—	99.0	100	11	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: LaMotte

MANUFACTURER: LaMotte

SERIAL NUMBER: 0920 4298

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
10/21/03	SAME	FW	0.0	0.0	0.0	0.0	NA-PROVIDED BY US ENV.	CHECKED TO STAND.
10/22/03	SAME	"	0.0	0.0	0.0	0.6	"	CHECKED TO Stand.
10/24/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/25/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/26/03	SAME	"	0.0	0.0	0.0	0.0	"	"
10/27/03	SAME	MJC	~~1.3~~ 0.0	0.0	.09	0.0	"	"
11/5/03	"	TR	—	—	0.0	0.0	"	"
11/6/03	"	TR	—	—	0.0	0.0	"	"
11/7/03	"	TR	—	—	0.0	0.0	"	"
11/8/03	"	FW	—	—	0.0	0.0	"	"
11/9/03	"	FW	—	—	0.0	0.0	"	"
11/10/03	"	TR	—	—	0.0	0.0	"	"
11/11/03	"	FW	—	—	0.0	0.0	"	"
11/18/03	"	QD	—	—	0.0	0.0	"	"
11/19/03	"	QD	—	—	0.0	0.0	"	"
11/20/03	"	QD	—	—	0.0	0.0	"	"
11/21/03	"	QD	—	—	0.0	0.0	"	"
11/21/03	"	QD	—	—	0.0	0.0	"	"
10/22/03	"	QD	—	—	0.0	0.0	"	"
11/23/03	"	QD	—	—	0.0	0.0	"	"
11/24/03	"	TR	—	—	0.0	0.0	"	"
11/25/03	"	TR	—	—	0.0	0.0	"	"
12/4/03	"	QD	0	0	0	0	"	"
12/6/03	"	TR	0.0	0.0	0.0	0.0	"	"
12/7/03	"	TR	0.0	0.0	0.0	0.0	"	"

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: LaMotte 2020

MANUFACTURER: LaMotte

SERIAL NUMBER: 3317-2402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
10/25/03	SAME	TR	0.00	0.00	0.00	0.00	NA - provided by US. Env.	(OK) → MONTHLY CHECK
10/26/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/27/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/28/03	SAME	MGC	0.00	0.00	0.00	0.00	"	" "
10/4/03	"	TR	—	—	0.00	0.00	"	" "
11/5/03	"	TR	—	—	0.00	0.00	"	" "
11/6/03	"	TR	—	—	0.00	0.00	"	" "
11/7/03	"	TR	—	—	0.00	0.00	"	" "
11/8/03	"	FW	—	—	0.0	0.0	"	" "
11/9/03	"	FW	—	—	0.0	0.0	"	" "
11/10/03	"	TR	—	—	0.0	0.0	"	" "
11/11/03	"	FW	—	—	0.0	0.0	"	" "
11/18/03	"	TR	—	—	0.0	0.0	"	" "
11/19/03	"	TR	—	—	0.0	0.0	"	" "
11/20/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/21/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/21/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/22/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/23/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/24/03	"	[illegible]	—	—	0.0	0.0	"	" "
11/25/03	"	[illegible]	—	—	0.0	0.0	"	" "
12/4/03	"	[illegible]	—	—	0	0	"	" "
12/5/03	"	[illegible]	—	—	0	0	"	" "
12/6/03	"	[illegible]	—	—	0	0	"	" "
12/7/03	"	[illegible]	—	—	0	0	"	" "
12/8/03	"	[illegible]	—	—	0	0	"	" "
12/9/03	"	[illegible]	—	—	0	0	"	" "

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 &16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: LA MOTTE / TURBIDMETER

MANUFACTURER: LA MOTTE

SERIAL NUMBER: 3106-1402

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
11/17/03	3106-1402	S.GRIER	0	—	0, 9.5	0, 10	N/A	
11/18/03	" "	" "			0, 9.8	0, 10	"	
11/19/03	" "	" "			0, 10.5	0, 10	"	
11/20/03	" "	" "			0, 9.6	0, 10	"	
11/21/03	" "	" "			0, 8.9	0, 10	"	
11/22/03	" "	" "			0, 9.6	0, 10	"	
11/23/03	" "	" "			0, 8.9	0, 10	"	
11/24/03	" "	" "			0, 9.6	0, 10	"	
11/25/03	" "	" "			0, 9.1	0, 10	"	
12/4/03	"	QJS	0	0	0	0.0, 10	"	
12/5/03	"	S.G			0.0, 9.9	0.0, 10	"	
12/6/03	"	S.G			0.0, 9.9	0.0, 10	"	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 02B0141

Date of Calibration	Person Performing Calibration	INITIAL READINGS						FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments	
		PH	COND	TURB	DO % mg/L	TEMP		PH	COND	TURB	DO	TEMP			
11/20/03	S GRIER	7.15 3.88	937.	N/A	~~N/A~~	N/A		7.00 4.00	1000.0	N/A	~~N/A~~	N/A	pH 7 - 3106 pH 4 - 3129	ORP 237 @ 18.0	(ok)
11/20/03	S. GRIER				88.7% 8.30 mg/L						97.9% 9.15 mg/L		SC - 3393 ORP - 030385		
11/21/03	S. GRIER	7.03 4.00	911.0		100.6% 8.59				1000.0						
11/22/03	S. GRIER	7.00 4.11	940.0		98.9% 8.63	N/A		7.13 4.04	1000						
11/24/03	QS	7.00 3.97	1035						1001					234.7 @ 18.0	(ok)
11/25/03	S GRIER	6.80 4.02	1018		98.6% 8.60			7.02 4.02	1000						
12/3/03	QS	7.07 3.98	1080		98.6% 8.62			7.00 4.00	1002		103.2 9.17			234.7 @ 18.0 234.7 @ 18.0	(ok)
12/4/03	S.G	7.06 3.99	1004												
12/5/03	SG	7.28 4.09	1.006		100% 8.70			7.09 4.01	1.006					ORP 256.5 @ 16.50	(OK)
12/6/03	SG	7.09 4.06	0.980		—			7.09 4.06	0.980		—			ORP 258.0 @ 17.76	(OK)
12/2/03	QS	7.02 4.01	1.001		—			~	—		—			OK 237.7 @ 19.7	(ok)
12/9/03	SG	7.24 4.16	998.0					7.29 4.12	998.0					2.34 @ 18.0	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99B1412

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
11/22/03	QS	6.96 4.07	958	NA	–	–	–	–	NA	–	–	PH7 3106 PH4 3129	ORP 233 @ 18.0 (OK)
11/23/03	QS	7.00 4.06	1020	NA	–	–	–	1000	NA	–	–	SC 3393 ORP 0311385	ORP 278.2 @ 18° 237.5 @ 18° (OK)
11/24/03	QS	7.04 4.15	937	NA	–	–	4.00	1000	NA	–	–	"	175.3 @ 17 279.0 @ 17
11/25/03	QS	6.89 4.47	1111	NA	–	–	7.00 4.00	1000	NA	–	–	"	310 @ 17° 235.4 @ 17° (ok)
12/3/03	QS	6.99 4.04	962	NA	160 @ 15.6°C	–	6.99 4.00	1001	NA	98.5 9.2	–	"	273.4 @ 17° 237.5 @ 17° (OK)
12/5/03	QS	6.97 3.88	1.02	NA	–	–	7.00 4.00		NA	–	–	"	236.5 @ 17.12° (OK)
12/6/03	QS	2.03 3.97	1.052				–	1.052	NA	–	–	"	ORP 240.6 @ 16.10 (OK)
12/7/03	–	–	–				–	–		–		→	Not used on 12/6/03
2/8/03	QS												

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 98F0478AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS						FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments
		PH	COND	TURB	DO	TEMP		PH	COND	TURB	DO	TEMP		
11/10/03	TR	7.91 3.63	1045	NA	—	—		7.00 4.00	1000	NA	—	—	PH 7 910G PH4 3129	ORP 243 @ 16.15°C (OK)
11/11/03	TR	7.01 4.04	944	NA	—	—		—	1000	NA	—	—	SC 3393 ORP 03013555	242 @ 17.88 (OK)
11/17/03	QD	7.08 3.97	1001	NA	114.8 @ 10.71	—		7.00 4.00	1000	NA	97.9 9.25	—		237 @ 18.5 (ok)
11/19/03	QD	7.08 4.04	987	NA	—	—		—	—	NA	—	—		236 @ 17.8 (ok)
11/20/03	QD	7.06 4.08	472	NA	—	—		—	—	N/A	—	—		237 @ 16.3 (ok)
11/21/03	QD	7.02 4.02	943	NA	—	—		—	—	NA	—	—		~~239 @ 18.0~~ (ok) QD 236 @ 17.9 (ok) GK
11/22/03	QD	7.07 4.00	~~935~~ 909	NA	—	—		—	1000	NA	—	—		236 @ 17.5 (ok)
11/23/03	QD	7.03 4.03	1025	NA	—	—		—	1000	NA	—	—		~~238.2 @ 18.5~~ QD 237.9 @ 18.5 (ok)
11/24/03	QD	7.01 4.04	.939	NA	—	—			1.015	NA	—	—		237.9 @ 17.8 (ok)
11/25/03	QD	7.01 3.98	977	NA	—	—			1.001	NA	—	—		GK 235.4 @ 17 GK
12/3/03	QD	6.98 4.07	.994	NA	85.3 9.24	—		7.00 4.00	1.001	NA	98.6 9.33	—		233.9 @ 17 237.5 @ 17 OK
12/6/03	SG	6.99 4.03	1040		—			6.99 4.03	1040	NA	—			264.8 @ 15.60°C OK
12/7/03	QD	7.02 4.01	1.012		—			—	—	NA	—	—		237.0 @ 19.0 (ok)
12/8/03	QD	7.03 4.02	.962		—			—	1000		—			239.3 237.5 @ 17.8 (OK)
12/9/03	QD	7.07 4.00	.874					—	1.002		—			235.7 @ 18.0 (OK)

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 9981412

Date of Calibration	Person Performing Calibration	INITIAL READINGS						FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments
		PH	COND	TURB	DO	TEMP		PH	COND	TURB	DO	TEMP		
10/25/03	TR	7.13	0.984	NA	98.2	—		7.00 4.00	1000	NA	100%	—	PH 7 = 3106 PH 4 = 3129	ORP CHECK = 231.7 @ 18.18°C (OK)
10/26/03	TR	3.91 7.13 3.90	0975	NA	98.4	—		7.00 4.00	1000	NA	100%	—	SC = 3393 ORP = 03J1305	242 @ 16.96 (OK)
10/27/03	TR	7.01 4.01	1002	NA	—	—		NA	1000	NA	—	—		243 @ 17.83 (OK)
10/28/03	TR	6.98 4.01	1063	NA	—	—		NA	1000	NA	—	—		236 @ 18.03 (OK)
11/03/03	TR	7.03 3.96	1075	NA	99.1% 8.71 mg/L	—		7.00 4.00	1000	NA	98.0% 8.61 mg/L	—		234 @ 19.81 (OK)
11/5/03	TR	6.99 4.02	1026	NA	—	—		—	1000	NA	—	—		238 @ 19.0° (OK)
11/6/03	TR	6.99 4.02	937	NA	—	—		—	1000	NA	—	—		240 @ 19.26 (OK)
11/7/03	TR	7.00 4.04	1006	NA	—	—		—	—	NA	—	—		244 @ 16.09 (OK)
11/8/03	TR	4.04	985	NA	—	—		—	—	NA	—	—		243 @ 14.60 (OK)
11/9/03	FW	7.05 4.06	1008	NA	—	—		—	—	NA	—	—		ORP ~~7.00 @ 15.02~~ (FW) ORP Calib 237 @ 15.5°C
11/10/03	TR	7.03 4.09	1015	NA	—	—		—	1000	NA (1000) (TR)	~~NA~~	—		237 @ 16.16°C (OK)
11/11/03	TR	7.06 4.08	996	NA	—	—		—	—	NA	—	—		235 @ 18.0 (OK)
11/17/03	TR	7.08 4.07	974	NA	75.0% 6.8 mg/L	—		7.00 4.00	1000	NA	97.8% 9.00 mg/L	—		237 @ 19.00 (OK)
11/19/03	TR	7.00 4.06	1015	NA	—	—		—	—	NA	—	—		237 @ 19.30 (OK)
11/20/03	QD	7.02 4.06	968	NA	—	—		—	—	NA	—	—		237 @ 18.00 (ok)
11/21/03	QD	6.98 4.04	964	NA	—	—		—	—	NA	—	—		239 @ 18.01 (OK)

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 13 & 16

PROJECT No.: N9060, CTO 0279

INSTRUMENT NAME/MODEL: YSI 650 MDS w/600XL SONDE

MANUFACTURER: YSI (02G1124 AH)

SERIAL NUMBER: 98F0478AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH	COND	TURB	DO	TEMP	FINAL READINGS PH	COND	TURB	DO	TEMP	Calibration Standard (Lot No.)	Remarks and Comments
10/21-03	FWR	4.05					4.00					pH 7 = 3106 pH 4 = 3129	INST. NOT USED THIS DATE
↓	↓	7.16	982	—	95.6%	—	7.00	1000	—	96%	—	SC = 3393 ORP = 03.11385	↓
10-22-03	TK				9.93 mg/L					9.93 mg/L			ORP CHECK 245 mV
10-23-03	FCW	7.00/4.00	~~1000~~ (FCW) 988	—			~~1000~~ (FCW)	1000	—				RECAL. COND. ORP 232.3 @ 18.55°C
↓													
10/24/03		7.02	959					1000					ORP 230 @ 17.45°C
↓		4.03	1010										ORP 231.5 @ 17.38
10/25/03		7.06 4.10											
10/26/03		7.07 4.06	990							9.50 mg/L			ORP 333.6 @ 16.16°C 334 @ 18.37
10/27/03		7.06 4.06	966					1000					ORP 334 @ 18.3°C
10/27/03	(NOT IN USE CAL OK)												
10/28/03		↓											
11/3/03	FCW	~~7.00~~ (FCW)	1.189	—	90.6% 8.03 mg/L	—	~~7.00~~ (FCW)	1.000	—	97.9% 8.56 mg/L	—	ORP	PH probe broke will recal. on 11/4/03
11/4/03	FCW	6.19 4.34					7.00/4.00					ORP 237.5 @ 20.32°C	NEW PH probe
11/6/03	FCW	7.11 3.71	0.938	—	—	—							ORP 242.8 @ 18.57
11/7/03	FCW	7.10 3.95	09.23				4.00	1.000					ORP 246.5 @ 14.43
11/8/03	FCW	7.35 3.63	1.050				7.00 4.00					ORP 243.6 @ 15.79°C	
11/9/03		7.37 3.62	1,017				7.00 4.00					ORP 246.7 @ 15.0°C	

APPENDIX C.11.3
SWMU 13
EQUIPMENT CALIBRATION LOGS
ROUND 3

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: PID / PHOTOVAC

MANUFACTURER: PHOTOVAC

SERIAL NUMBER: ED MF 336

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
9-12-04	ED MF 336	SJC	—	—	95	100	00250-03	EXP 2-17-05
10-17-04	"	TA	-	-	95.8	100	"	"
10-26-04	"	SJC	—	—	96	100	"	"
10-27-04	"	SJC	-	-	94.5	100	"	"
10-28-04	"	SJC	-	-	95	100	"	"
10-29-04	"	SJC	-	-	93.5	100	"	"
10-30-04	"	SJC	-	-	98	100	"	"
10-31-04	"	SJC	-	-	100	100	"	"
11-1-04	"	SJC	-	-	96.5	100	"	"
11-2-04	"	SJC	-	-	95	100	"	"
11-9-04	"	SJC	-	-	98	100	"	"
11-10-04	"	SJC	-	-	95	100	"	"
11-12-04	"	SJC	-	-	98	100	"	"
11-14-04	ED MF 352	TA	-	-	96	100	"	"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0134 AB

Date of Calibration	Person Performing Calibration	INITIAL READINGS					FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments
		PH 7	PH 4	COND	DO	ORP	PH 7	PH 4	COND	DO	ORP		
11/11/04	TR	7.01	3.99	1039	11.67 / 124.8%	17.5° / 236	—	—	1000	9.18 / 98.2%	17.5 / 240	PH-7 4110 PH 4 3390	OK
11/12/04	TR	7.04	3.99	980	8.49 / 87.9%	16.7 / 240	—	—	1001	9.37 / 98.1%	—	SC 1387 ORP 03K0667	"
11/13/04	TR	7.01	3.98	988	8.89 / 94.6	15.1 / 240.1	—	—	1000	9.22 / 99.2%	—		"
11/14/04	TR	7.00	3.98	1018	6.89 / 72.2	16.88 / 262	—	—	1001	9.51 / 99.7%	16.05 / 242.2		"
11/15/04	TR	7.02	4.02	992	12.83 / 136%	15.25 / 237	—	—	1001	9.37 / 99.5%	15.4 / 243		"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: YSI

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: OK ~~EK~~ 0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
9/28/04	SJC	7.07	3.95	982	8.44	18.34 240.6	7.01	3.99	1001	8.85	18.05 237.3	PH-7 4/10 PH 4 3390	OR
9/29/04	SJC	7.06	3.94	1031	8.79	18.35 238	7.02	4.00	999	9.21	18.39 237.6	SC 4367 ORP 03K0667	"
10/9/04	SJC	7.24	3.65	1006	10.03	20.31 248	7.00	4.00	1001	8.77	20.20 237.6		"
10/12/04	QS	7.32	4.05	1025	12.01	18.95 233.6	7.01	4.00	1000	8.98	19.82 237.6		"
10/13/04	QS	7.25	3.68	992	9.61	19.78 230.7	7.00	4.00	1000	8.81	19.79 237.5		"
10/15/04	TR	7.00	3.86	899	7.70 85.4	19.01 235	—	4.00	1000	8.65 96.0	—		"
10/26/04	TR	7.06	3.99	992	9.35 98.5	17.5°C 237.7	7.00	4.00	1000	9.30 98.0	—		"
10/27/04	TR	7.03	3.98	1053	7.58 80.3%	18.42 237	—	—	1000	9.13 97.8%	—		"
10/28/04	TR	7.01	3.95	1003	8.94 93.6	18.85 238	—	—	—	9.15 97.9%	—		"
10/29/04	TR	7.02	3.94	1060	10.69 111.6	20.89 233.8	—	—	1000	8.70 92.3%	—		"
10/30/04	TR	7.02	3.89	1008	9.58 105.3%	20.20 232.7	—	—	—	8.77 96.9	—		"
10/31/04	TR	6.99	3.93	937	10.72 111.3	17.09 236.6	—	4.00	1000	9.39 97.5%	17.12 237.4		"
11/1/04	TR	7.11	4.04	1004	9.03 94.7	17.81 239	7.00	4.00	—	9.15 97.2%	17.93 237.7		"
11/2/04	TR	6.98	3.97	1008	8.66 95.0	19.73 238.5	—	—	1000	8.87 97.3%	—		"
11/9/04	TR	6.96	3.91	986	14.09 159.7	20.02 236.2	7.00	4.00	1000	8.74 99.2%	20.00 237.3		"
11/10/04	TR	7.01	4.00	1009	71.6 6.79	15.54 241	—	—	—	9.18 98.8%	—		"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01K 0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
8/29/04	QD	7.21	3.67	979	7.21	23.56 238.9	7.00	4.00	983 995	8.27 48	23.64 237.7	ORP ~~021388~~ pH 4 3390	03K0667
8/30/04	QD	6.77	4.28	793	8.91	21.68 239.4	7.00	4.00	955	8.47	21.74 237.4	pH 7 3283 Sp. C. ~~4100~~	QD 4387
8/31/04	QD	6.99	3.37	631	9.61	21.85 238.5	7.00	4.00	967	8.51	21.83 237.6		
9/8/04	TK	8.04	3.50	951	-	-	7.00	4.00	1000	-	-		WELL DEV. ONLY
9/9/04	TK	7.27	3.85	967	9.20	20.20 240.0	7.00	4.00	1000	8.71	22.2°C 237.5		OK
9/10/04	TK	6.73	3.81	997	8.86	20.01 256	7.00	4.00	-	8.83	20.02 237.7		OK
9/11/04	TK	7.34	3.98	1024	8.64	20.31 244.9	7.00	4.00	1000	8.82	20.32 237.7		OK
9/12/04	TK	6.75	4.04	1001	8.92	19.66 215.4	7.00	4.00	-	8.70	19.74 237.4		OK
9/13/04	TK	7.18	3.68	1032	8.46	21.47 255.1	7.00	4.00	1000	8.49	21.44 238.1		OK
9/14/04	TK	6.97	4.08	995	13.00	20.84 228.7	-	-	-	8.48	20.70 238.4		
9/22/04	SC	6.90	4.54	984	6.02	18.5 225	7.00	4.00	998	8.93	19.94 236.8		OK
9/23/04	SSC	7.27	3.33	988	11.24	20.08 235.6	7.00	4.00	1000	8.99	20.41 237.4		OK
9/24/04	SSC	7.03	4.24	997	7.08	21.43 234.2	7.00	3.99	1000	8.67	21.24 237.4		OK
9/25/04	SG	7.02	4.07	1.016	11.70	20.94 263.6	7.00	4.00	1000	8.70	20.96 237.8		
9/26/04	QD	6.64	3.99	803	7.08	19.30 231.1	7.00	4.00	1000	8.86	19.34 237.6		
9/27/04	SSC	7.22	4.16	1274	7.20	18.76 216.7	7.00	4.00	1004	8.92	18.92 237.5		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0979

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/29/04	QD	~~3.99~~ 4.03	3.98	948	6.78	21.49 225	7.00	4.00	1000	8.65	21.34 234.7	pH 4 3390	
7/30/04	QD	7.01	3.97	1000	—	21.5 238.2	—	4.00	1001	—	—	pH 7 3223	
7/31/04	QD	7.02	4.06	1018	—	23.0 324.1	7.00	4.00	1000	—	22.8 232.6	SpCon 4100	
8/1/04	QD	7.10	3.99	980	—	22.62 234.1	7.00	—	1001	—	22.64 237.1		
8/17/04	QD	7.00	3.94	950	8.70	20.4 238.7	7.00	4.00	1001	8.78	244 237.5	ORP = 03K0667 exp 2/05	
8/24/04	QD	7.08	3.96	1042	5.55	23.7 497	7.00	4.00	1010	8.40	23.08 237.6		
9/22/04	QD	2.05	1.80	1837	6.07	20.17 189.4	6.98	3.99	922	8.91	20.12 232.4		
9/23/04	QD	6.40	~~4.05~~ 4.06	839	4.09	20.98 294.0	7.00	4.00	1000	8.76	20.96 237.2		
9/28/04	SJC	6.50	4.16	968	12.91	~~19.09~~ 175.3	7.01	4.00	1001	8.87	19.13 237.3		
9/29/04	SJC												

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K0055

Date of Calibration	Person Performing Calibration	INITIAL READINGS					FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments
		PH 7	PH 4	COND	DO	ORP	PH 7	PH 4	COND	DO	ORP		
8/30/04	QD	7.20	3.66	847	8.49	21.98 252.6	7.01	4.00	952	8.50	21.96 237.2	pH4 3390 pH7 3323	
8/31/04	QD	6.93	4.16	540	6.48	21.37 252.8	7.01	3.99	937	8.47	21.37 237.4	SpC 4387 ORP 03K0667	
9/22/04	QD	6.70	4.07	1113	11.66	19.01 178.5	7.02	3.99	1000	7.12	20.07 236.8		
9/23/04	QD	7.09	3.81	889	6.74	2096 373.1	7.02	4.00	999	8.90	20.79 236.1		
9/24/04	QD	7.02	3.73	1141	2.30	21.05 290	7.00	4.00	996	8.81	20.15 237.5		
9/25/04	QD	6.91	4.08	975	8.50	20.74 257.4	7.01	3.99	1000	8.78	20.66 237.4		
9/26/04	QD	7.03	4.00	1021	7.87	18.97 252.1	7.01	4.00	1000	8.75	19.12 237.9		
9/27/04	QD	7.17	3.82	989	6.92	19.83 213.6	7.00	4.00	1000	8.89	19.87 237.4		
9/28/04	QD	6.79	4.00	983	7.42	19.30 216.7	7.02	4.00	1000	8.78	19.29 237.4		
10/6/04	QD	7.21	3.94	941	7.80	16.77 224.9	7.01	3.99	1000	8.73	16.77 237.5		
10/7/04	QD	6.93	4.08	1044	7.77	17.49 120.8	7.00	3.99	1000	9.32	17.53 237.4		Changed DO membrane
10/8/04	QD	6.99	3.84	1040	8.36	19.86 271.5	7.01	3.99	1000	8.85	19.92 237.4		
10/9/04	QD	7.14	3.97	992	9.39	20.45 158.7	7.01	3.99	1000	8.86	20.41 237.1		
10/11/04	QD	7.05	3.74	992	8.81	17.85 261.8	7.00	4.01	1000	8.85	17.61 237.3		
10/12/04	QD	6.68	3.77	1016	10.27	18.31 197.1	7.00	4.00	1000	8.94	18.24 237.4		
10/13/04	QD	6.77	3.98	1025	9.61	19.78 250.7	7.01	4.00	1000	8.70	19.89 ~~237.7~~ 236.9	QD	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Turbidimeter/2020

MANUFACTURER: LaMotte

SERIAL NUMBER: 1760 - 1800

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7/23/04		QS	0	0	NS.8	10		
7/24/04		QS	1	1	9.2	10		
7/25/04		QS	0	0	9.6	10		
7/26/04		QS	0	1	10	1		
7/27/04		QS	0	1	10	1		
7/28/04		CCL	0	0	10	10		
7/29/04		CCL	0	0	10	10		
7/30/04		CCL	0	0	11	10		
7/31/04		CCL	0	0	11	10		
8/1/04		CCL	0	0	11	10		
8/17/04		QS	0	0	10	10		
8/24/04		QS	0	0	10	10		
8/25/04		QS	0	0	10	10		
8/26/04		QS	0	0	10	10		
8/27/04		QS	0	0	10	10		
8/28/04		QS	0	0	10	10		
8/29/04		QS	0	0	10	10		
8/30/04		QS	0	0	10	10		
8/31/04		QS	0	0	10	10		
9/22/04		QS	0	0	10	10		
9/23/04		QS	0	0	10	10		
9/24/04		QS	0	0	11	10		
9-25-04		QS	0	0	9.3	10		

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Turbidimeter

MANUFACTURER: LaMotte

SERIAL NUMBER: 3592 3502

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7-29-04		CCL	0	0	10	10	—	
7-30-04		CCL	0	0	12	10	—	
7-31-04		CCL	0	0	10	10	—	
8-1-04		CCL	0	0	10	10	—	
8-17-04		QM	0	0	9.5	10	—	
9-22-04		QM	0	0	11	10	—	
9-23-04		TK	0.3	0	10	10	—	
9-25-04		TK	0.0	0.0	10	10	—	
9-27-04		QM	0	0	10	10	—	
9-28-04		QM	0	0	10.15	10	—	
10-9-04		[illegible]	0	0	10	10	—	
10-12-04		QM	0	0	9.84	10	—	
10-13-04		QM	0	0	9.25	10	—	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Turbidimeter/2020

MANUFACTURER: LaMotte

SERIAL NUMBER: 4650 - 4300

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
9-25-04		[illegible]	0	0	10	10		
9-26-04		[illegible]	0	0	9.9	10		
9-27-04		[illegible]	0	0	10	10		
9-28-04		[illegible]	0	0	10	10		
9/29/04		SJC	0	0	10	10		OK
10-6-04		[illegible]	0	0	10	10		
10-7-04		[illegible]	0	0	9.95	10		
10-8-04		[illegible]	0	0	10	10		
10-9-04		[illegible]	0	0	10.10	10		
10-10-04		[illegible]	0	0	9.97	10		
10-11-04		[illegible]	0	0	10.05	10		
10-12-04		[illegible]	0	0	10	10		
10-13-04		[illegible]	0	0	9.87	10		
10-15-04		TR	0	0	10.34	10		OK
10-16-04		TR	0	0	10	10		"
10-26-04		TR	0	0	10.14	10		"
10-27-04		TR	0	0	10.07	10		"
10-28-04		TR	0	0	10.08	10		"
10-29-04		TR	0	0	10.09	10		"
10-30-04		TR	0	0	10	10		"
10-31-04		TR	0	0	10.08	10		"
11-1-04		TR	0	0	10.02	10		"
11-2-04		TR	0	0	10.11	10		"
11-9-04		TR	0	0	9.90	10		"
11-10-04		TR	0	0	9.98	10		"
11-11-04		TR	0	0	9.98	10		"
11-12-04		TR	0	0	9.92	10		"
11-13-04		TR	0	0	9.90	10		"
11-14-04		TR	0	0	9.98	10		"
11-15-04		TR	0	0	9.96	10		"

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Turbidimeter/2020

MANUFACTURER: LaMotte

SERIAL NUMBER: 4650 - 4300

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7-23-04		CB	0	0	10.14	10.0	—	
7-24-04		CB	—	—	9.5	10.0	—	
7-25-04		CB	0	0	9.6	10.0	—	
7-26-04		CB	0	—	9.8	10.0	—	
7-27-04		CB	0	—	10.0	—	—	
7-28-04		CB	0	—	10	—	—	
7-29-04		CB	0	—	10	—	—	
7-30-04		CB	0	—	10	—	—	
7-31-04		CB	0	—	10	—	—	
8-1-04		CCL	0	0	10	10	—	
8-14-04		CB	0	0	10	10	—	
8-15-04		TK	0	0	10.1	10	—	
8-17-04		CB	0	0	10.3	10	—	
8-24-04		CB	0	0	9.71	10	—	
8-25-04		CB	0	0	9.96	10	—	
8-26-04		CB	0	0	10.14	10	—	
8-27-04		CB	0	0	10.08	10	—	
8-28-04		CB	0	0	9.99	10	—	
8-29-04		CB	0	0	9.96	10	—	
8-30-04		CB	0	0	9.8	10	—	
8-31-04		CB	0	0	9.95	10	—	
9-8-04		TK	0	0	10.04	10	—	
9-9-04		TK	0	0	9.97	10	—	
9-10-04		TK	0	0	9.94	10	—	
9-11-04		TK	0	0	9.94	10	—	
9-12-04		TK	0	0	9.93	10	—	
9-13-04		TK	0	0	10.0	10	—	
9-14-04		TK	0	0	10.0	10	—	
9-22-04		CB	0	0	10	10	—	
9-23-04		TK	0	0	9.9	10	—	
9/24/04		CB	0	0	9.9	10	—	
9/25/04		TK	0	0	9.9	10	—	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: PID/ PHOTOVAC

MANUFACTURER: PHOTOVAC

SERIAL NUMBER: ED MF 336

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
7-9-04	ED MF 336	SJC	AS PER MANUFACTURER				ISOBUTYLENE 00237 EXP 11-25-04	
7-10-04	"	NA					NA	100 PPM
7-24-04	"	SJC	"	"	95	100	ISOBUTYLENE	
7-25-04	"	SJC	"	"	92	100	"	
7-26-04	"	SJC	"	"	98	100	"	
7/27/04	"	SJC	"	"	91	100	"	
7-28/04	"	SJC	"	"	90	100	"	
7-29/04	"	SJC	"	"	95	100	"	
7/30/04	"	SJC	"	"	96	100	"	
7/31/04	"	SJC	"	"	90	100	"	
8-10-04	"	SJC	"	"	98	100	"	
8-11-04	"	SJC	"	"	101	100	"	
8-12-04	"	SJC	"	"	102	100	"	
8-13-04	"	SJC	"	"	95	100	"	
8-14-04	"	SJC	"	"	—	100	"	
8-15-04	"	SJC	"	"	96	100	"	
8-16-04	"	SJC	"	"	95	100	"	
8/17/04	"	SJC	"	"	—	100	"	
8/26/04	"	SJC	"	"	94	100	LOT 00250-03 EXP 2/17/05	
8/27/04	"	SJC	"	"	—	100	"	
8/28/04	"	SJC	"	"	—	100	"	
8/29/04	"	SJC	"	"	95	100	"	
8/30/04	"	SJC	"	"	"	100	"	
8/31/04	"	SJC	"	"	"	100	"	
9/1/04	"	SJC	"	"	"	100	"	
9/2/04	"	SJC	"	"	"	100	"	
9/8/04	"	SJC	"	"	"	100	"	
9/9/04	"	SJC	"	"	"	100	"	
9/10/04	"	SJC	"	"	91	100	"	
9/11/04	"	SJC	"	"	95	100	"	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

INSTRUMENT NAME/MODEL: MiniRae 2000

SITE NAME: SWMUs 12, 13 &16

MANUFACTURER: RAE Systems

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

SERIAL NUMBER: 110-002635

Zero Air / Isobutylene

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
8/11/04	110-002635	CCL	0.4	0.0	—	100	002237	
8/12/04	"	CCL	0.9	0.0	—	100	"	
8/13/04	"	CCL	1.9	0.0	—	100	"	
8/14/04	"	CCL	0.8	0.0	—	100	"	
8/15/04	"	CCL	0.8	0.0	—	100	"	
8/16/04	"	CCL	0.5	0.0	—	100	"	
8/17/04	"	Tom Dickson	0.0/100.0	0.0/100	0.9/100	0.9/103	"	Bkgd 0.9
8/28/04	"	CCL	1.6	0.0	—	104	LOT 00260-03 EXP. 3/17/05	
8/28/04	"	CCL	0.8	0.0	—	100	"	"
8/29/04	"	CCL	0.5	0.0	—	100	"	"
8/30/04	"	CCL	0.5	0.0	—	100	"	"
8/31/04	"	CCL	0.6	0.0	—	100	"	"
9/1/04	"	CCL	0.4	0.0	—	100	"	"
9/2/04	"	CCL	0.5	0.0	—	100	"	"

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K0055

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/9/04	QS	~~6.86~~ 7.26 21.2	5.56	890	7.12	156.1 24.5°C	7.00	4.01	1000	7.12	237.2 24.5°C	pH 4 3390 pH 7 9223 SPC 9100	
7/26/04	QS	7.01	3.95	965	—	21.0 247.5	7.01	4.04	1000	—	237.4 21.10°		
7/27/04	QS	6.99	4.07	943	—	20.8 237.8	—	—	1000	—	—		
7/28/04	QS	7.02	4.06	1009	—	20.1 346.1	—	—	—	—	20.1 236.6		
7/29/04	QS	7.00	4.18	1055	~~6.78~~	21.33 269.3	7.00	4.00	1000	~~8.85~~	21.31 236.3		
7/30/04	QS	7.02	4.02	1005	—	21.1 238.1	—	—	—	—	—		
7/31/04	CCL	7.05	4.00	1002	—	23.47 262.1	7.00	4.00	1090	—	23.19 237.2		
8/1/04	QS	7.00	4.03	986	—	22.62 237.2	—	—	999	—	—		
8/14/04	QS	7.08	3.75	977	7.35	19.30 232.8	7.00	4.00	999	7.12	14.32 236.8		
8/17/04	QS	7.21	4.19	1037	5.45	20.35 236.1	7.01	4.00	1000	8.76	20.43 237.4	GYP 03K0667 exp 3/05	
8/24/04	QS	7.02	3.86	1028 ~~1035~~	4.46	23.47 215.6	7.00	4.00	~~1000~~ 1000	8.37	~~23.47~~ ~~215.6~~	23.43 237.4	
8/25/04	QS	7.07	4.06	1008	3.25	23.77 285.0	7.00	4.00	1000	8.25	23.78 237.4		
8/26/04	QS	6.72	4.28	1013	5.75	23.22 202.6	7.00	4.00	1000	8.41	23.15 237.4		
8/27/04	QS	7.01	4.23	1010	5.87	24.67 239.8	7.01	3.99	1000	7.66	24.71 237.4		
8/28/04	QS	6.95	3.96	1012	7.42	25.07 231.6	7.00	4.00	1000	8.39	25.03 237.4		
8/29/04	QS	7.12	3.83	1025	15.91	23.32 252.6	7.01	3.99	982	8.29	~~23.30~~ ~~252.6~~	237.4	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01C0134

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
7/23/04	QS	7.41	4.89	.883	7.47	23.90 242.5	7.00	3.99	1.000	8.24	23.90 237.8	7/23 ORP- 03J1385	
7/24/04	QS	6.15	4.12	972	—	—	7.00	4.00	1000	—	19.6 237.2	PH4- 3390	
7/25/04	QS	6.09	3.57	978	—	20.2 236.7	7.00	4.00	1001	—	—	PH7- 3223	
7/26/04	QS	7.54	3.51	955	—	21.2 243.3	7.00	4.01	1000	—	21.0 237.4	Sp.C.- 4100	
7/27/04	QS	6.61	4.07	983	—	20.1 236.7	7.00	4.01	1000	—	20.3 237.5		
7/28/04	QS	6.84	4.23	994	—	20.4 200.7	6.99	4.00	1000	—	20.4 237.8		
7/29/04	CCL	7.42	3.54	1026	—	21.65 248.5	7.00	4.00	1000	—	21.39 237.5		
7/30/04	CCL	7.48	4.13	1007	—	22.64 227.4	7.00	4.00	1000	—	22.65 237.6		
7/31/04	CCL	6.91	4.43	979	—	23.46 245.4	7.00	4.00	1000	—	23.45 237.4		
8/1/04	CCL	7.06	3.43	1012	—	22.79 240.5	7.00	4.00	1000	—	22.79 237.4		
8/15/04	TR	8.09	3.98	990	9.14	19.01 238.3	6.99	3.99	1000	9.02	18.77 237.6	8/15 PH7- SAME	mixed NEW Zobell sol
8/17/04	QS	6.95	3.71	999	8.62	20.94 231.4	7.00	4.00	1000	8.64	20.86 237.4	PH4- "	grab control FEB 15, 2005
8/25/04	QS	6.84	3.70	1058	0.4	23.87 257.7	7.00	4.00	1000	8.25	23.83 238.6	Sp.C- "	
8/26/04	QS	7.76	2.70	996	6.95	23.63 210.4	7.00	4.00	1000	8.44	23.65 237.7	ORP- 03K0667	
8/27/04	QS	7.17	3.76	993	8.47	25.12 273.0	7.01	4.00	1007	8.17	25.09 237.7		
8/28/04	QS	6.99	3.85	1025	8.27	24.93 199.3	7.00	4.00	1012	8.32	24.91 237.4		

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 12, 13 &16

PROJECT No.: N6878 & N7448, CTO 0357 & 0343

INSTRUMENT NAME/MODEL: Carbon Monoxide (CO) Monitor

MANUFACTURER: Industrial Scientific

SERIAL NUMBER: 9807008-381

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
08/16/04	See Above	Tom Dickson	0.0/35/50	0.0/35/50	0.0/35/48	0.0/35/48	00190-02/03/16/02	Spec Air

APPENDIX D
MISCELLANEOUS FIELD DOCUMENTATION

APPENDIX D.1.1
SWMU 13
SITE LOGBOOK
ROUND 1

NSWC CRANE

N9060

CTO 279

SWMU 13 & 16

LOG BOOK

1363

START : 2-11-03

END :

TETRA TECH NUS, INC.

Terry R. Rojahn
Biologist

661 Andersen Drive, Pittsburgh, PA 15220-2745
(412) 921-8857 ■ FAX (412) 921-4040
rojahnt@ttnus.com ■ www.tetratech.com

IF LOST
RETURN
TO :

NSWC CRANE

PROJ. NO = 9060
SWMUS = 13 & 16
PROJECT TOM = RALPH BASINSKI
Assit. TOM = TOM JOHNSTON
FOL = TERRY ROJAHN
GEOLOGIST = BOB BALKOVEC

TUES. 2-11-03

Work continued from Page

- TRAVEL DAY -

1350 Hrs - ARRIVE @ BLDG 3245 AFTER RECEIVING BADGE @ MAIN GATE

- PREP. to lay out Monitoring Well & DPT Locations
- T. BRENT out of office
- CALL OFFICE talk to TOM JOHNSTON

1505 Hrs - LOCATE SWMU 16 - NEED ACCESS CLEARENCE FROM MIKE ROACH Ext. 3546

1530 Hrs - RETURN to BLDG 3245 - MEET W/ T. BRENT TOM will contact & get clearence @ SITES/SWMUS 13 & 16 FOR tomorrow

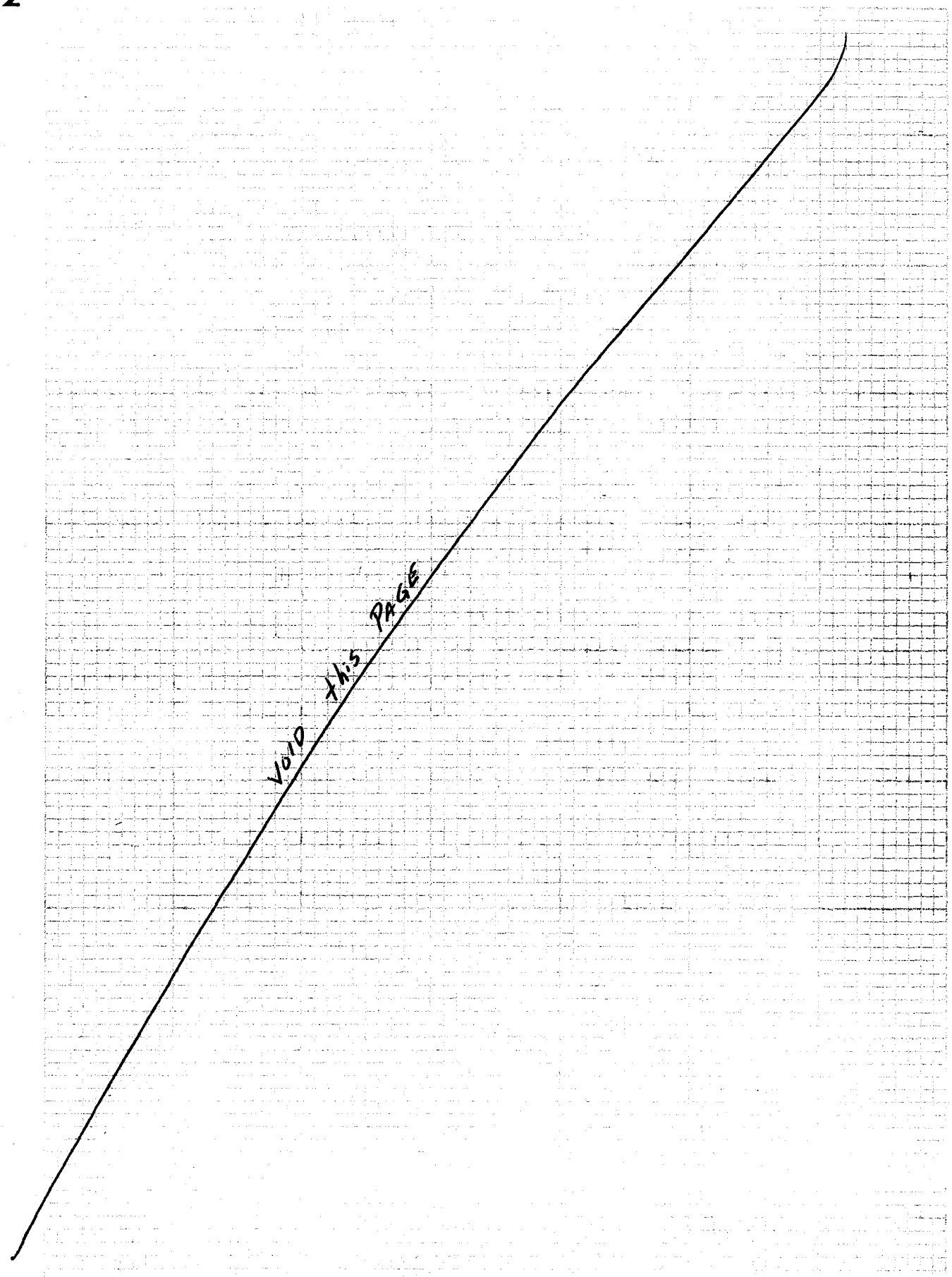
1550 Hrs - MEET with PUBLIC WORKS

- MARK locations in WHITE
- contact PW when finished locating borings & MWs
- Check back via phone FEB 24 → 27 - talk to DONNA (812) 854 6903

1610 Hrs - LEFT CENTER

1730 Hrs - SHOP FOR SUPPLIES - STAKES & PK NAILS

END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WED. 2-12-03
Work continued from Page

0700Hrs - Arrive @ BLDG #3245
Wait for word from Army Environmental on security issues @ both SWMUs
Army contact is Doug Johnson X 1481

0835Hrs - Got go ahead from Mr. Johnson to access SWMUs 13 & 16 this date

- @ SWMU 13 to inform Mr Marvin Kluesner X 1790 before entery area around BLDG 165
- Need to inform Mike Dages X-1472 to access BLDG 146
  Jeff Franklin - Supervisor
  (TL) ~~Dor~~ Mike Roach - Production Super X-3546

SEE Doug Johnson's FAX - Pages 4→6 (X-1481)

0845 Hrs - Arrive @ SWMU 16

- Cannot be around BLDG 147 during defuser operations - Included are locations 165B04,05, 16MWT04 & 165W/SD03
- Check in w/ guard & Jeff Franklin
- Located sampling locations until 1300Hrs

1315Hrs - Check in w/ T. Brent - Regarding Boiler Removals @ BLDG #s 171 & 166

- 1400Hrs - T. Brent & T. Rojahn reconed Boiler removal areas
- T. Rojahn - made sketches for R. Basinski to use to place boring locations - SEE SKETCHES ON PAGES - 7 & 8 & PHOTOS ON P. 11

1605Hrs - Finish sketches @ BLDS 171 & 166

1615Hrs - Arrive @ BLDG. #146 - talk to Jeff Franklin

- Defuser down - Finish location of Boring sites near defuser
- Jeff said Defuser will be down 2/13/03 so T.R. could have free access

1700Hrs - Left BLDG 146 Area

SIGNATURE Ty Roach DATE 2/12/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

4

Brent Thomas J CNIN
From: Johnson, Douglas G [JohnsonD@crane.army.mil]
Sent: Wednesday, February 12, 2003 10:09 AM
To: Brent Thomas J CNIN
Subject: FW: TTNUS ACCESS

Importance: High

Here are the rules of engagement. Main issue is to ensure coordination with the area supervisors before beginning operations. I should have covered that requirement a little more clearly. Also, another rule that is not listed but is very important - POVs are not allowed inside red flagged areas (denoting explosives operations). It's easier to phone the supervisors ahead of time, as the supervisors are normally within the red-flagged area and are not easily accessible if you're driving a POV.

I can help in coordination with the production folks if needed. Current supervisor @ 146 is Mike Dages (X-1472), and supervisor at B-165/MFB is Marvin Kluesner (X-1790). The head Production Supervisor is Mike Roach (X-3546).

In March, we'll have a short sit-down with the crew to go over the Safety and Security requirements. Shouldn't take too long, but should help in eliminating any problems during their work.

-----Original Message-----

From: **Clinton, Leah K**
Sent: Wednesday, February 12, 2003 9:55 AM
To: Voorhies, John D; Johnson, Douglas G; Baker, Sheryl G; Roach, Michael D; Flynn, Thomas R
Cc: SS Personnel
Subject: RE: TTNUS ACCESS
Importance: High

I believe we've coordinated this as much as possible given the short notification.

Here's the plan for this week:

1. MEA will notify people assigned access control duties. Although the contractor must check in, access will be authorized without an escort.
2. Doug Johnson will:
   a. Coordinate access for Friday, 14 Feb
   b. Make sure the contractor is made aware of the contractor's responsibilities (3 below).
3. The contractor will:
   a. Stop and identify himself to the person performing access control.
   b. Check in with the area supervisor immediately upon entry if the area is in operation and comply with all instructions/prohibitions given to him by the supervisor concerning safety and security.

Here's the plan for the longer term operation planned for mid-March:

1. Doug Johnson will:
   a. Make arrangements to provide the Key/Lock Officer with a copy of the contract or scope of work.
   b. Sign for all controlled contractor core keys
   c. Issue controlled keys to the contactor on DA Form 5513-R
   d. Make sure the contractors are made aware of their responsibilities.
   e. Oversee work and make sure the contractor turns the keys back in immediately upon completion of the work and prior to authorization for release of payment.

2. The Key/Lock Officer will:
   a. Install controlled contractor core locks on 145/146 area and MFB
   b. Provide assistance to Doug Johnson on proper issuance of keys to the contractor
   c. Remove the controlled locks once all keys have been returned by Doug Johnson.

3. The contractor will:
   a. Strictly control keys and immediately turn the keys back in once the contract work has been completed.
   b. Stop and identify himself to the person performing access control.

If gates are locked and nobody is at the guard house, the contractor is responsible for securing the gate behind him (coming and going). NOTE:

Locks must be relocked in their specific original order.

   c. Check in with the area supervisor immediately upon entry if the area is in operation and comply with all instructions/prohibitions given to him by the supervisor concerning safety and security.

4. MEA will notify people who are assigned access control duties. Although the contractor must check in, access will be authorized without an escort.

---Original Message---

From: **Johnson, Douglas G**
Sent: Tuesday, February 11, 2003 3:33 PM
To: Clinton, Leah K
Subject: FW: TTNUS ACCESS

Leah,

TetraTech is an environmental contractor that does corrective action work for Crane Navy. They are wanting to work on flagging, soil sampling, and drilling for studies at B-146 and Mine Fill B to determine levels of contamination. These actions are part of the overall Crane site cleanup effort.

Since we're at Bravo +, what is the best way to get TetraTech access to work in those areas and what level of supervision will they need? The scope of the operations is listed in Tom Brent's e-mail below. Terry Rojahn is at Crane currently, and would like to begin the flagging operations. The soil boring and drilling operations should not begin until March.

Let me know your thoughts on this issue.

Thanks,

Doug Johnson
Environmental Protection Specialist
SJMCN-SF
Crane Army Ammunition Activity
(812)854-1481
DSN 482-1481

---Original Message---

From: **Brent Thomas J CNIN** [mailto:brent_t@crane.navy.mil]
Sent: Tuesday, February 11, 2003 3:14 PM

ed to Page

SIGNATURE

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE 2/12/03 DATE

6

To: Johnson, Douglas G
Subject: TTNUS ACCESS

Doug,

Terry Rojahn from Tetra Tech NUS needs access to B146 area & MFB to put in pin flags to obtain a PW digging permit. This will take about 3 days. Furthermore, he has a rented vehicle & would very much like to get this into the 2 sites (after all, MFB is a BIG place). Let me know what you can work out.

Just so you know, Tetra Tech will be mobilizing a full field crew about mid-March w/drill rigs to collect soil boring samples and install wells. I'll let you know more as soon as I find out details. Please let me know what we need to do to make this happen at these 2 sites.

Thanks,
Tom

TITLE

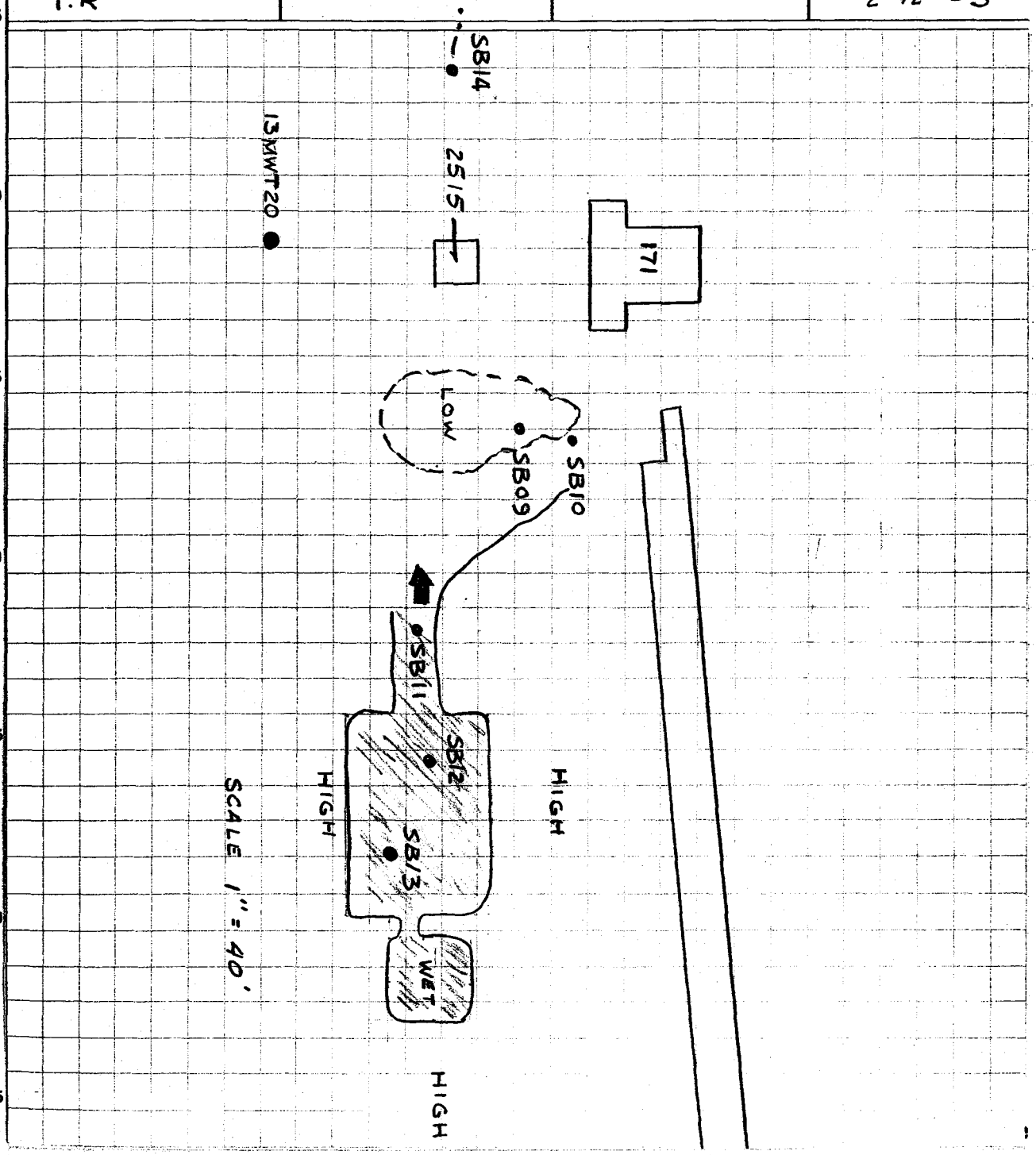
PROJECT NO. 9060
BOOK NO. 1363

CLIENT	JOB NUMBER
CRANE	9060

SUBJECT: SOIL REMOVAL NEAR BLDG 171

BASED ON	DRAWING NUMBER
FIELD MEASUREMENTS	

BY	CHECKED BY	APPROVED BY	DATE
T.R			2-12-03



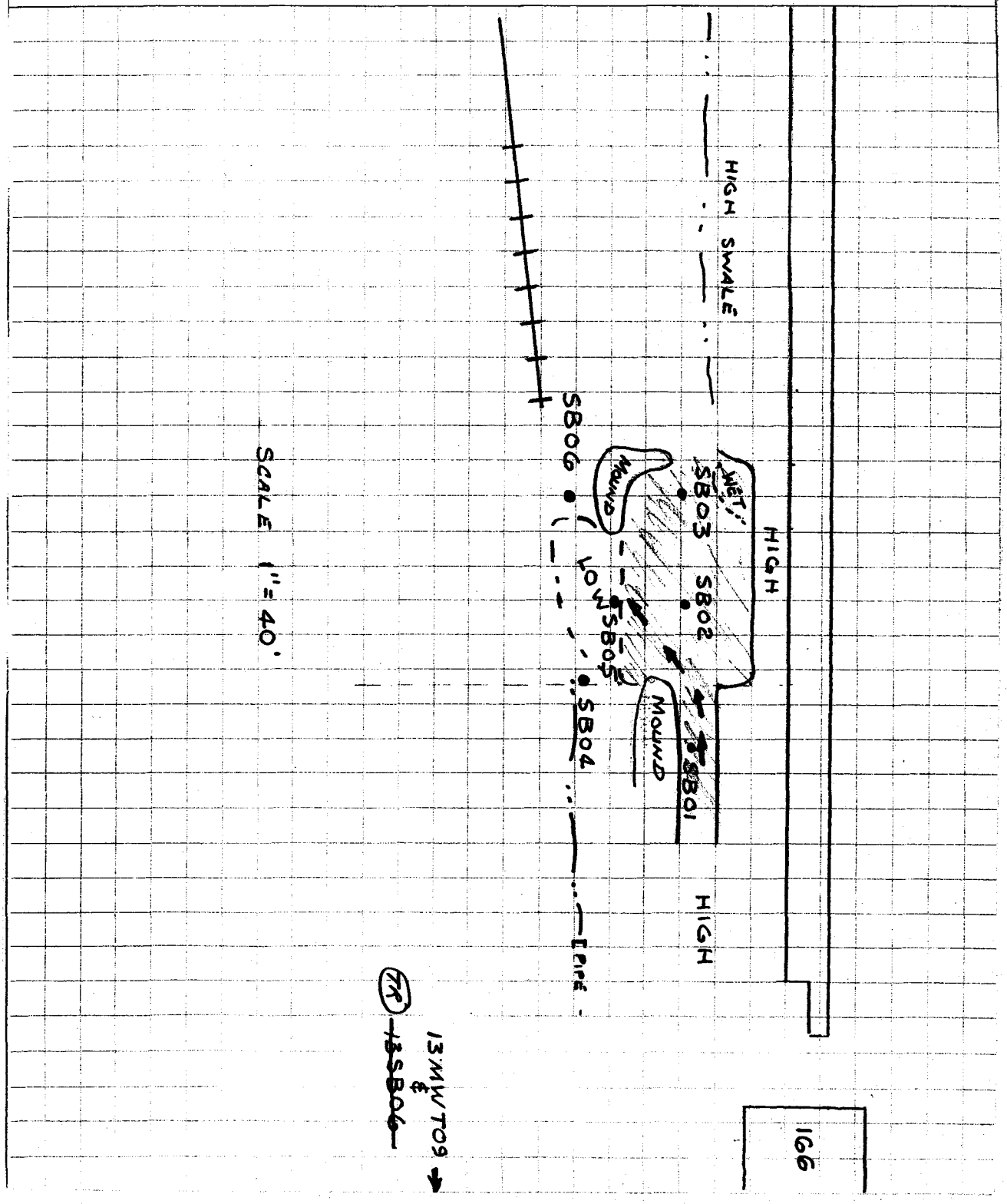
SIGNATURE: Tom Rogers — DATE: 2/12/03

DISCLOSED TO AND UNDERSTOOD BY — DATE — WITNESS — DATE

8

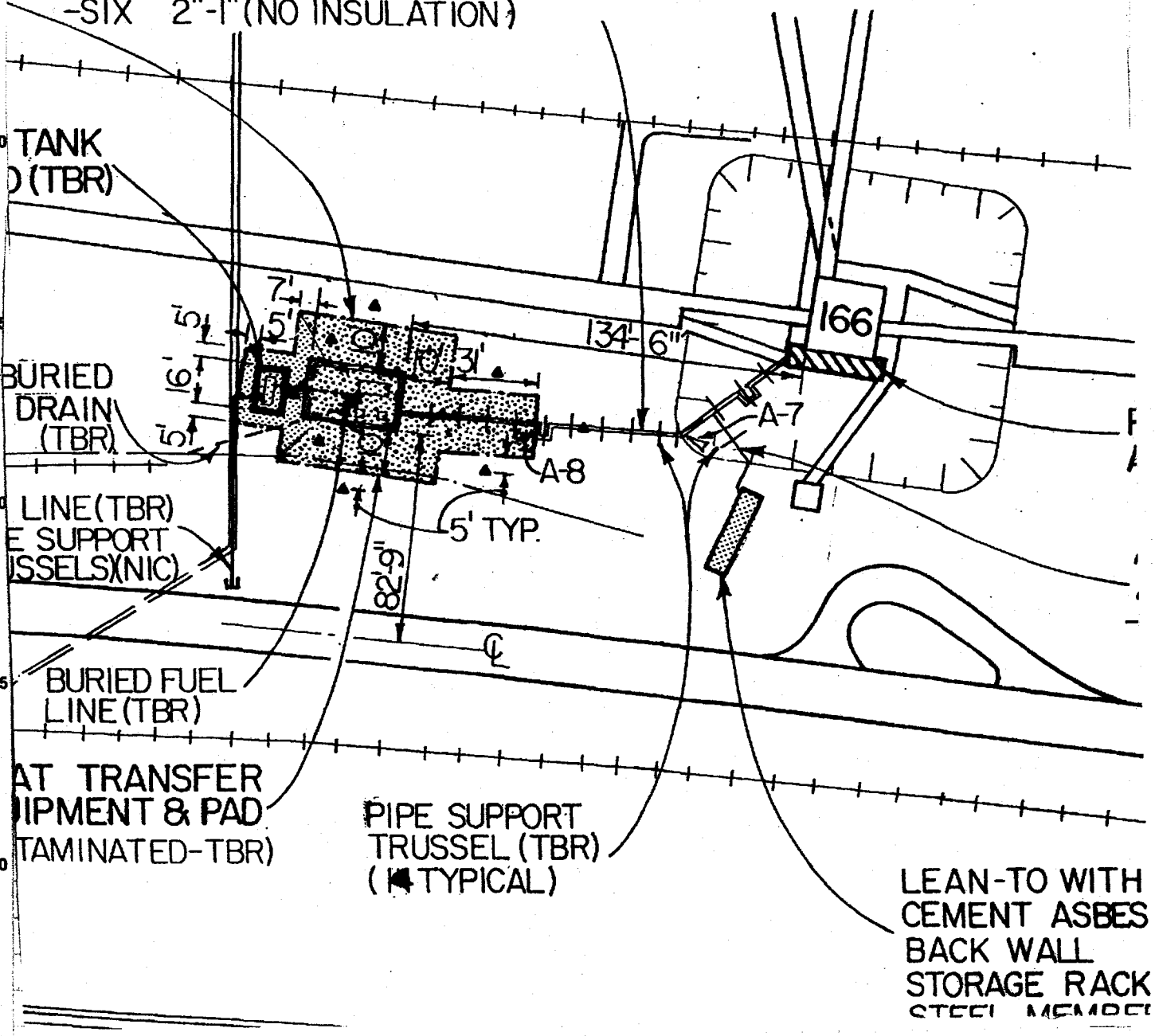
CLIENT	JOB NUMBER
CRANE	9060
SUBJECT	
SOIL REMOVAL NEAR BLDG 166	
BASED ON	DRAWING NUMBER
FIELD MEASUREMENTS	

BY	CHECKED BY	APPROVED BY	DATE
T.R.			2-12-09



ND ELECTRICAL CONDUITS (TBR)
APPROX. 5-6 FT. ABOVE GRADE,
-TWO 3" (PCB CONTAMINATED WITH
FIBERGLASS & METAL JACKET INSULATION)
-SIX 2"-1" (NO INSULATION)

DRAWING No.
5491



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SIGNATURE Tony Nagel **DATE** 2/12/03

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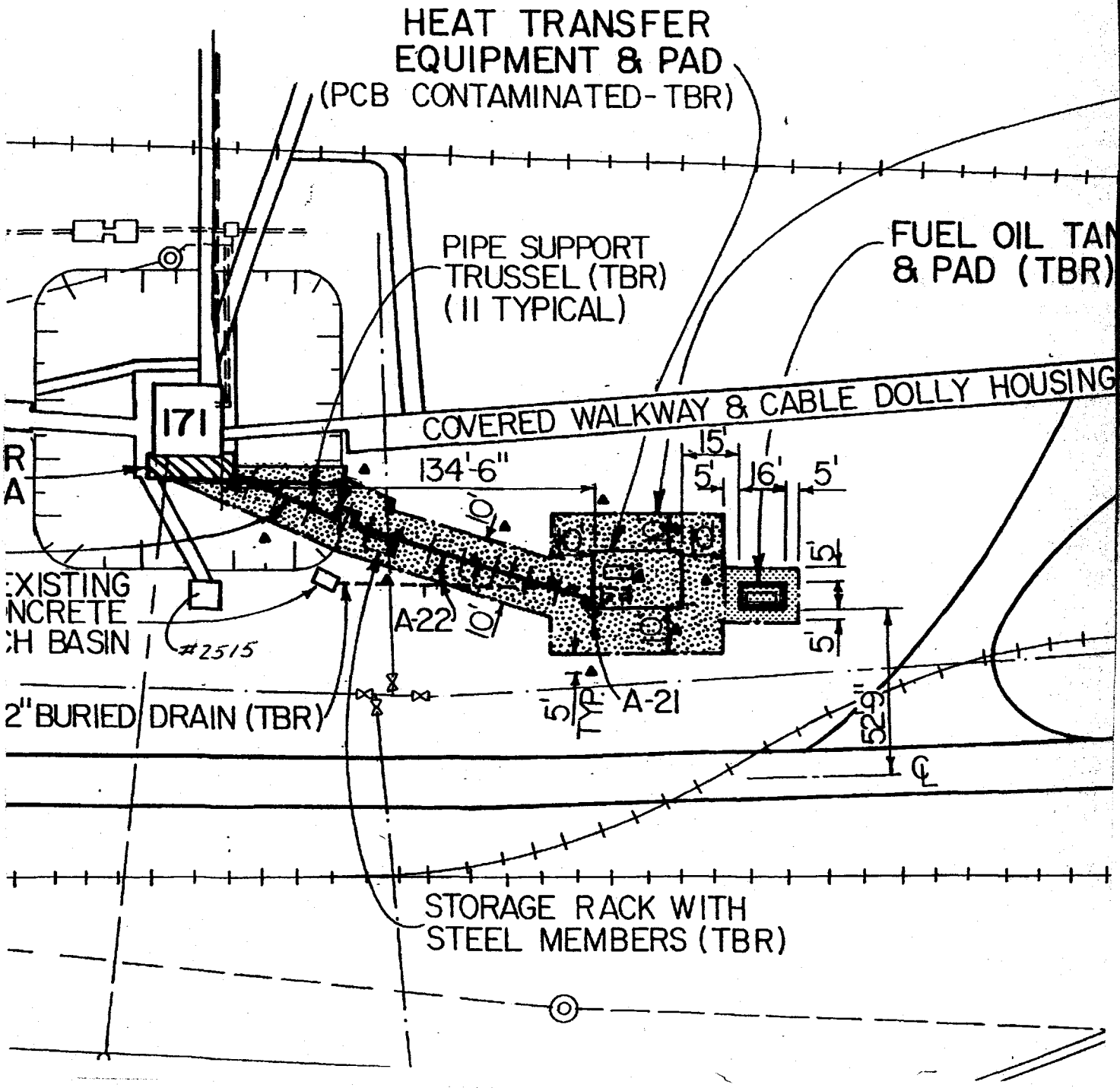
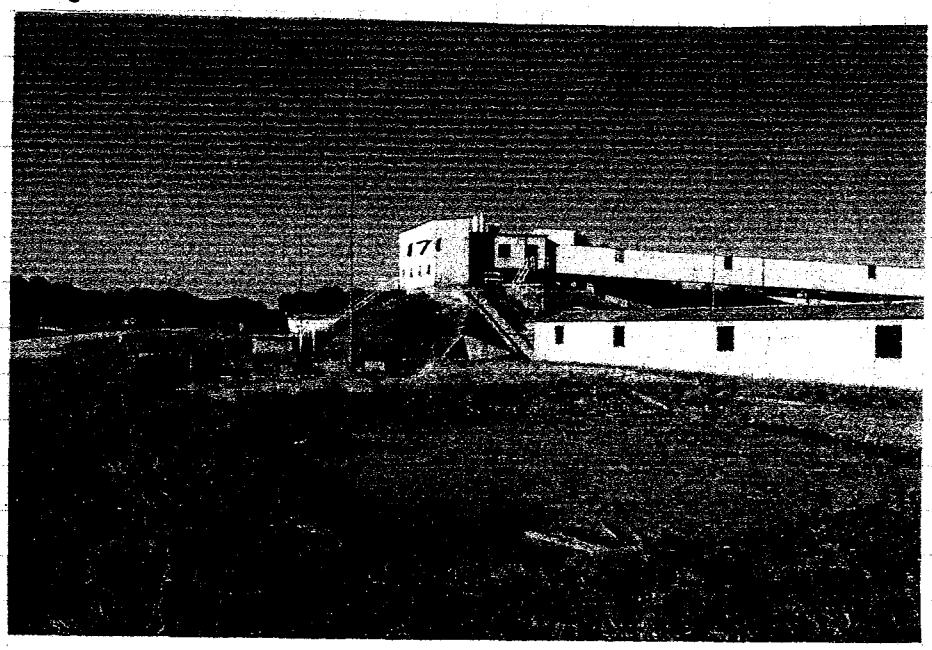
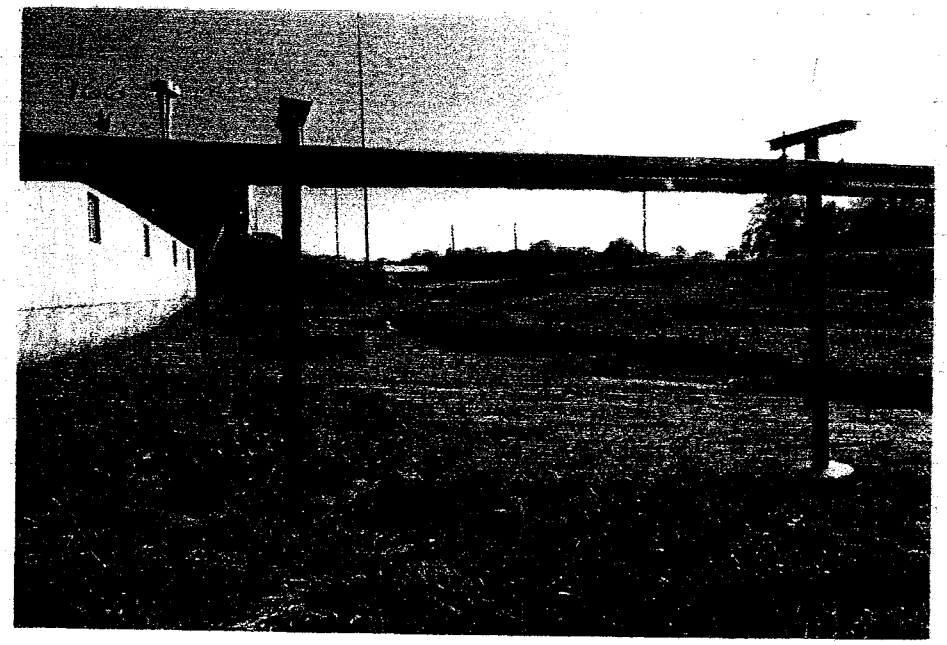

HEAT TRANSFER
EQUIPMENT & PAD
(PCB CONTAMINATED - TBR)
PIPE SUPPORT
TRUSSEL (TBR)
(11 TYPICAL)
FUEL OIL TAN
& PAD (TBR)
COVERED WALKWAY & CABLE DOLLY HOUSING
171
134'-6"
15'
5'
16'
5'
5'
5'
5'
A-22
A-21
#2515
EXISTING
NCRETE
H BASIN
2" BURIED DRAIN (TBR)
52'9"
℄
STORAGE RACK WITH
STEEL MEMBERS (TBR)

Work continued from Page



24



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SIGNATURE

DATE 2/12/03

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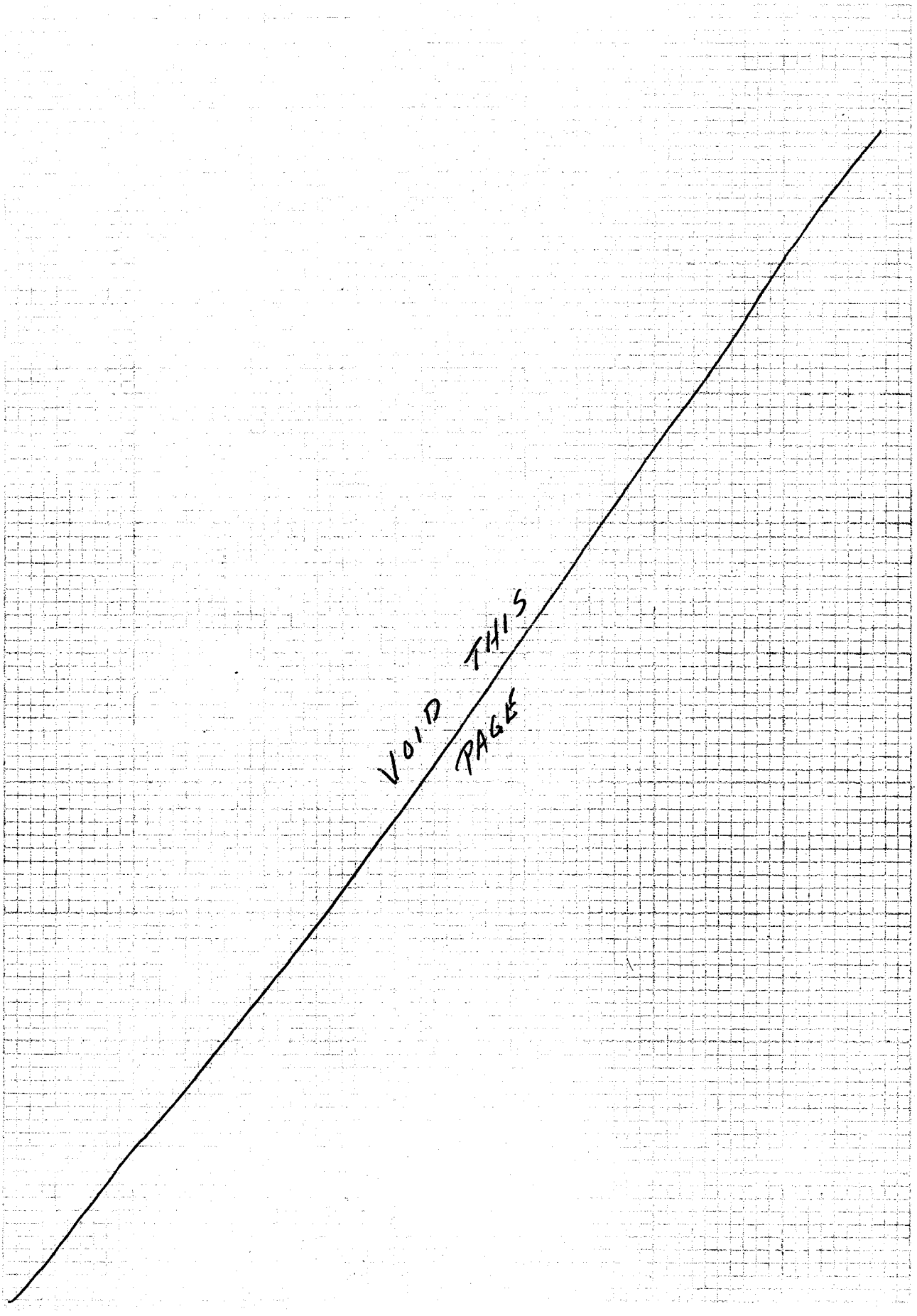
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THURS. 2/13/03

Work continued from Page

0710 Hrs - Arrive @ BLDG 3245
- PREP DRAWING # 5491 OF BLDGS 171 & 166 to FAX to R. BASINSKI
- FAX DRAWING # 5491 to RALPH
- TALKED to RB, SENT up CONFERENCE CALL FOR 1430 Hrs

0805 Hrs - Arrive @ SWMU 16 - PARK outside FENCE/gates lock - will stake out borings outside South END OF site
- Staked out 13 locations
- CHECK Existing well KEY # 34567
- CHECK locations OF SUMPS & proximity OF SUMPS to FENCE FOR WELL stake out - SUMPS INSIDE fence site MAP SHOWS them on the outside

1030 Hrs - Arrive @ BLDG # 3245
- CALL MR KLUESNER FOR ACCESS to SWMU 16 BLDG 165 - BLDG SHUT DOWN FOR MAINTENCE tomorrow - will have FREE ACCESS - NEED to call tomorrow FOR ACCESS through gate

1050 Hrs - Arrive @ SWMU 13 - locate well sites

1410 Hrs - LEFT FOR BLDG. # 3245

1420 Hrs - Arrive @ BLDG # 3245
- CONFERENCE call with R. Basinski, T. Dent Bill Gates Doug Johnson, Tim Johnston, V. Plachy Matt Cockran & B. BALKOVEC; SEE FAX PAGE 14
- Address SAMPLING locations @ BLDGS 171 & 166
- " moving MW locations @ SWMUS 13 & 16
- " site ACCESS ISSUES & ON going operations

1550 Hrs - Locate SB01 → 06 & 09-14 @ SWMU 13 w/ T. Brent then continue to map ABOVE locations & locate MW sites outside FENCE

1700 Hrs - LEFT SECURED FENCED AREA

1745 Hrs - FINISH locating 13MWT13, 14 & 19

1755 Hrs - LEFT CRANE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogers DATE 2/13/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

14

Brent Thomas J CNIN

From: Basinski, Ralph [BasinskiR@ttnus.com]

Sent: Thursday, February 13, 2003 9:56 AM

To: Johnston, Tom; Cochran, Matthew; Plachy, Valerie; 'Bill Gates'; Brent Thomas J CNIN CNIN

Subject: NSWC Crane SWMUs 13 and 16 Sampling Locations / Access Issues

When: Thursday, February 13, 2003 2:30 PM-3:30 PM (GMT-05:00) Eastern Time (US & Canada).
Where: Main Conference Room

~~*~*~*~*~*~*~*~*~*

Terry Rojahn is currently conducting the utility clearance site visit. He has identified several issues. These include

1] Inadequate # of samples for PCBs at therimonal boilers at MFB

2] Access issues for several monitoring locations at SWMUs 13 and 16

3] General access issues due to ongoing operations and heightened security.

It may be necessary to add or move sample locations. A conference call will be held among Bill Gates, Tom Brent, Terry Rojahn, Ralph B, Tom Johnston, and Valerie P. At the end of the conference call we hope to have determined the locations of additional samples and whether any sample locations have to be moved. Also any modifications to the QAPP (Submittal of the revisions to the QAPP is being held up until it is determined whether any additional modification must be made to the QAPP).

Field sketches made by Terry are attached for use in the meting.

<<Field Sketch for PCB Samples MFB.pdf>>

FRI 2/14/03

Work continued from Page

0700 Hrs - Arrive @ BLDG # 3245
Paperwork & wait for D. Johnson to deliver
Key to access SWMU 16

0805 Hrs - T. Brent received key to access gate to
BLDG 146 - went w/ T.B. to BLDG 146
Tom unlocked gate & returned to BLDG 3245
T.B. located sampling sites for wells next to
East & West sumps, etc. @ SWMU 16

0905 Hrs - Return to BLDG # 3245 - inform T. Brent of
my return so that he could secure gate @ BLDG 146

0920 Hrs - Arrive @ SWMU 13 - check in with Mr Kluesner
- Locate 13 monitoring well sites
- Photo Boiler removal areas near BLDGs 171 & 166

1125 Hrs - Finish @ SWMU 13 Check out w/ Mr Kluesner

1205 Hrs - Arrive @ Public Works
- Adjust maps to reflect changes in well locations
- Add soil boring locations for BLDGs 171 & 166
- Adjust Dig Permit Request to reflect the
addition of 6 more soil borings @ SWMU 13

1238 Hrs - Arrive @ BLDG # 3245
- Demob SUV & clean
- Prep. to depart to Airport
- Check out w/ T. Brent

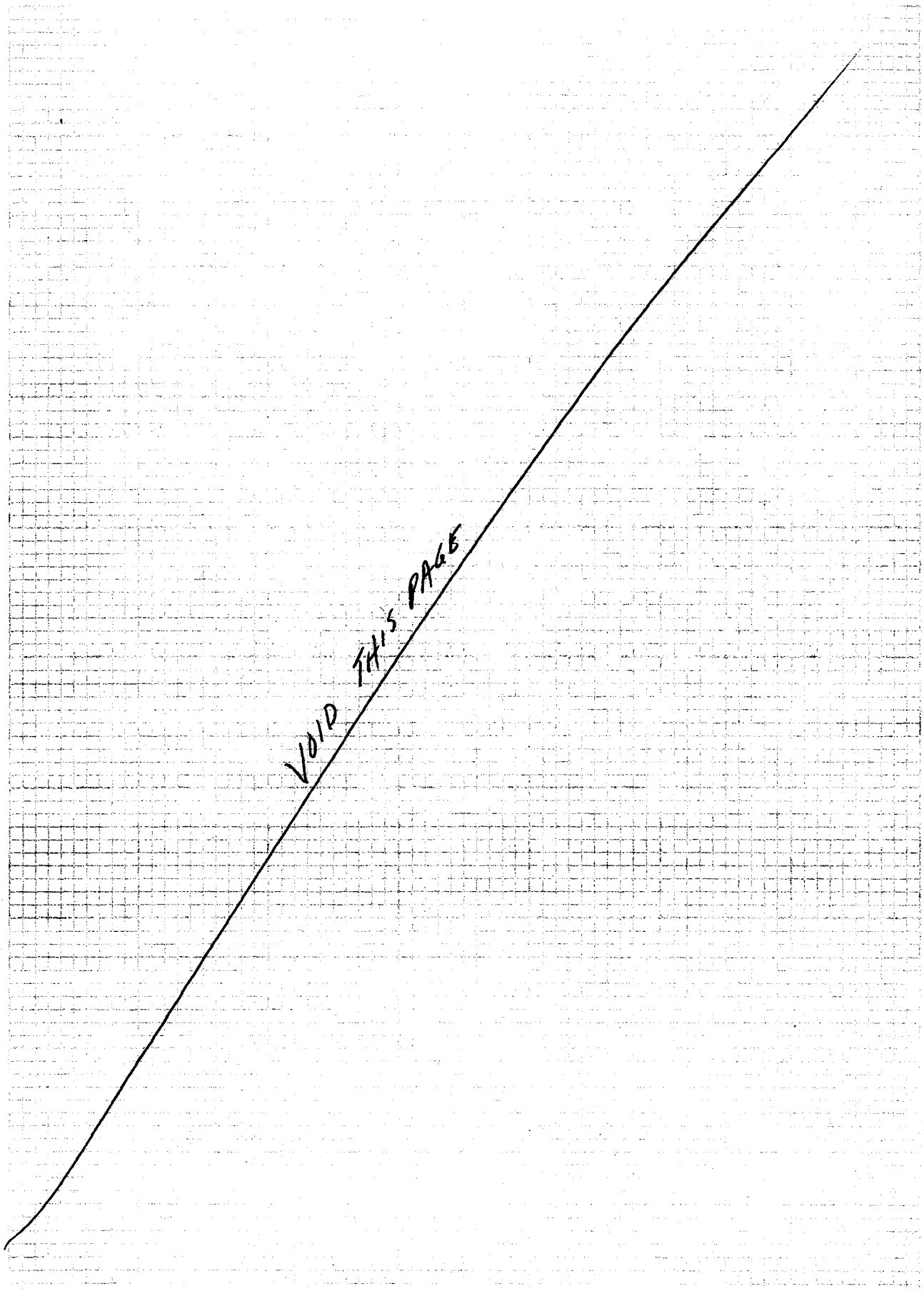
1335 Hrs - Left Crane → Remainder of day TRAVEL

END

Work continued to Page

SIGNATURE Tony Brent DATE 2/14/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE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MON 3/24/03

Work continued from Page

TRAVEL DAY

1325 Hrs - ARRIVE @ MAIN GATE (Bloomington) obtain badges - MATT COCHRAN, BOB BALKOVEC & T. ROJAHN

1338 Hrs - ARRIVE @ BLDG 3245 (FIELD OFFICE) START OPENING BOXES & COOLERS TO ORGANIZE EQ. & SAMPLE CONTAINERS

1430 Hrs - PICK UP DIG PERMIT FOR SWMU 16 PROBLEM W/ SWMU 13 PUBLIC WORKS HAVING TROUBLE GETTING ON-SITE.

1500 Hrs - RETURN TO BLDG 3245 - DRILLERS ARRIVED
TIM BOEHMER - FOREMAN
DAVE SCHRECENGOST - DRILLER
JON KEIFER - HELPERS
CHAD MAHAFFY -
TONY MAYRER -
DRILLERS ORGANIZE SUPPLIES

1600 Hrs - H&S MEETING

1715 Hrs - FINISH H&S MEETING
PREP. EQ FOR DPT WORK TOMORROW
LEAVE MESSAGE FOR R. BASINSKI ON DAY'S EVENTS

1755 Hrs - LEFT BASE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 3/24/03

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ON SITE

T+NUS - M. COCHRAN, BOB BALKOVEC, T. ROJAHN

B-M - T. BOEHMER, D. SCHRECONGOST, J. KEIFER, C. MAHAFFY, T. MAYNOR & J. AKERS

TUES 3/25/03 SUMMARY

KICK OFF MEETING W/ T. BRENT, C. FREEMAN & ARMY

RECEIVE KEY TO SWMUS 16 & 13

RECEIVE DIG PERMIT FOR SWMU 13

GAVE MSDS to JEFF AKERS

SAMPLE BORINGS

135B01 → 135B06

INSTALL - 13MW116 SEE N.B. # 2555

LOGS GENERATED

LAUCKS - 0963 & 0964

TRIANGLE - 0965

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TUES 3/25/03

Work continued from Page

AM Weather mild & sunny PM mild w/ period of heavy rain start ~1400 Hrs

0700 Hrs - Arrive @ BLDG 3245
Prep. to sample W/ DPT @ SWMU 16

0800 Hrs - Arrive @ Kick off meeting w/ Tom Brent & C. Freeman; Army represented by Frank Mitchell & Mike Roach (x3546)
They presented maps w/ limited access do to material handling. Also, received 3 keys (T. Brent, B. Balkcom & T. Rojahn) for access to S. Gate @ SWMU 13 & Gates @ SWMU 16
Others @ meeting included T. Boehmer & D. Schrecengost of B-M & M. Cochran, B Balkcom & T. Rojahn of TtNUS
No access to SWMU 16 until Thursday 3/27/03
Have to switch focus from SWMU 16 to SWMU 13

0840 Hrs - stop at Public works to try to hurry up SWMU 13 dig permit - Donna very helpful will call gas co. & us when permit is finished
1200 - 1300 Hrs

0910 Hrs - Arrive @ SWMU 13 to show MW locations to B-M (T.B. & D.S.) & TtNUS (M.C. & B.B.)
Select location 13MW15 to start when dig permit is obtained - meanwhile will start set up of drilling rig

1130 Hrs - Lunch

1200 Hrs - Prep. to sample @ SWMU 13
Pick up Dig Permit

1230 Hrs - Arrive @ Boring locations near BLDG 166
Begin sampling @ 1240 Hrs End @ 1420
See CoCs 0964, 0963 & 0965

1500 Hrs - Return to BLDG 3245 for packing & paperwork

1800 Hrs - Left Site

1830 Hrs - Drop off samples ship to Lancas on FED. EX AirBill # 8316 7332 7269

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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CREW:
TETRA TECH - M. COCHRAN, B. BACKOVEC & T. BJAHN
B-M - D. SCHREGENGOST, J. KEICER, C. MAHAFFEY,
T. MAYCER & J. AKERS.

SUMMARY WED 3/26/03

INSTALLED: 13 MWT 17 & 18 SEE NB #2555

SAMPLED SOIL BORINGS - 135B07 &
135B09 → 135B13

ALSO, COLLECTED RINSATE & SOURCE BLANKS
FOR TAP WATER & DI

COFCS GENERATED
LANCKS - 0968, 0970
TRIANGLE - 0966

DI IS NERL REAGENT GRADE WATER
NERL DIAGNOSTICS
14 ALMEIDA AVE
E. PROVIDENCE, RI 02914
LOT # 01Q7313
EXP DATE 01-2004

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED 3/26/03

Work continued from Page Am sunny & mild pm - same

0650 Hrs - Arrive @ BLDG 3245
Prep. to sample @ SWMU 13
0730 Hrs - Arrive @ SWMU 13 - set up to sample Soil Borings
M.C & T.R sampled 135809 → 135813
SEE CoFCs 0966 & 0968
1000 Hrs - Finish sampling @ SWMU 13
1015 Hrs - Return to BLDG # 3245
- FAX CoFCs to Laucks
- " " " OFFICE
- Call T. Patton order soil auger & bucket bits to sample @ 135814 - Refusal w/ DPT
- Called office left message w/ A. Basinski
1200 Hrs - Lunch
1230 Hrs - Return to BLDG # 3245
- Prep. to collect Source Blanks & Rinsate
SEE CoFC # 0970
- M.C. & B.B. Collect samples @ 135807
- T.R. Collected S.Blanks & Rinsates
- Package samples for shipment on
CoFCs 0966 & 0965 for Triangle &
0968 & 0970 for Laucks
1740 Hrs - Left Base for FED. EX. Drop off the following:
Triangle samples on AB# 8316 7332 7247
Laucks samples on AB# 8316 7332 7258
1830 Hrs - Arrive @ Motel

END

Work continued to Page

SIGNATURE [signature] DATE 3/26/03

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CREWS - SAME AS 3/26/03 P 20

THURS. SAMPLE SUMMARY 3/27/03

INSTALLED @ 13MWT 10, 12 & 16 SEE NB # 2555

SAMPLED SOIL BORINGS @ 165801 → 11, 14-17 & 41

CODES GENERATED

LAUCKS @ 0959 & 0960

TRIANGLE @ 0962

SCIENTIFIC SINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

THURS. 3/27/03

Work continued from Page

AM SUNNY & MILD PM - SAME

0700 Hrs - Arrive @ BLDG # 3245

0730 Hrs - Try to Access 2nd Gate @ BLDG 146 Contractor lock not in place yet - Return to BLDG 3245 Informed C. Freeman - She will take care of the problem (called Frank Mitchell)

0810 Hrs - Access 2nd Gate - Maintenance opened Gate M.C. & T.C. Collected soil samples @ 165B01 → 07 & 165B41 Water level @ sump near 165B14 @ 4' w/ T.D @ 8'

1130 Hrs - Lunch

1200 Hrs - Return to BLDG 3245 Refrigerate samples; check in @ office

1310 Hrs - Return to SWMU 16 Collected soil samples 165B08 → 11 & 165B14 → 17

1615 Hrs - Secured 2nd gate w/ Contractors lock Return to BLDG #3245 Package samples taken this date on COFCs 0959 & 0960 for shipment on FED. EX. AIRBILL # 8316 7332 7236

1830 Hrs - Drop off samples @ FED. EX.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE		DATE
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CREW - SAME AS 3/26/03

J. AKERS & C. MAHAFFY LEFT FOR HOME @ THE END OF DAY.

FRI. 3/28/03 SUMMARY

INSTALLED - 13 MWT 11, 21, 22, 25 & 26. SEE NB 2555

SAMPLED - 21 SOIL BORINGS SEE P. 25

SUMP @ SWMU 16 (165840) - WATER @ 5'
TD = 8'

COCS GENERATED

LAUCKS: 0961, 0972, 0981

TRIANGLE: 0967 & 6971

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

FRI 3/28/03

Work continued from Page

Weather Partly cloudy & windy / cool 50's

0700 Hrs - ARRIVE @ BLDG. 3245
PREP to SAMPLE Soils

0745 Hrs - Arrive @ SWMU 16 set up to sample soils
SAMPLE 16SB 12, 13, 31, 30, 29, 22 & 25 SEE CoC 0972
SAMPLE 16SB 25, 24, 23, 18, 19, 21, 27 & 28 SEE CoC 0961
SAMPLE 16SB 28, 26, 32, 37, 38, 39 & 40 SEE CoC 0981

1500 Hrs - FINISH Collecting soils AND LEAVE SWMU 16

1510 Hrs - ARRIVE @ BLDG # 3245
PACKAGE & SHIP SAMPLES FOR LAUCKS LAB
Collected on Above CoCs

1730 Hrs - LEAVE BASE FOR FED. EX.

1800 Hrs - DROP OFF SHIPMENT @ FED. EX ON AB#
8316 7332 7225

1020 Hrs - SENT FAX to Hugh Prentice OF LAUCKS - W/ CoCs - SAMPLES Collected this date - FOR SAT. Pick up.

END

SIGNATURE

DATE 3/28/03

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DATE

WITNESS

DATE

CREW - THNUS - M. COCHRAN, B. BAIKOVEC & T. ROJAHN
B-M - D. SCHREGENGOST, J. KELFER & T. MAYREE

SAT: 3/29/SUMMARY

INSTALLED: 13MWT 01, 02 & 05

SAMPLE: SURFACE WATERS
135W01-07, 09 & 10
135D01 - 10, 17, 18, 22 & (23) ADDED

CofCs GENERATED
LAUCKS: 0973, 0980, 0975 & 0978

SCIENTIFIC SINDERY PRODUCTS, CHICAGO 60606 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

SAT 3/29/03

Work continued from Page

Weather Cloudy & cold 30's

0650 Hrs - Arrive @ BLDG # 3245
Prep for surface water & sed. sampling
Checked BLDG 3260 for water quality eq.
Found only Cal. solutions & Turbidity Meter
0815 Hrs - Checked @ BLDG 41 for Peristaltic Pump & YSI - Found @ signed Form
0855 Hrs - Returned to BLDG 3245
Calibrated YSI
Finish Prep for sampling surface waters & sediments
1000 Hrs - Arrive @ SWMU 13
Sample: 13SD22, 01, 02 & 23; and 13SW01 & 02
1200 Hrs - Break for Lunch
1300 Hrs - Return to BLDG 3245
Prepare Bottle sets for remainder of day's sampling effort
1400 Hrs - Arrive @ SWMU 13
Sample: 13SW/SD 03, 04, 05, 06, 07, 09 & 10 & 13 SD 08, 17 & 18
1800 Hrs - Complete sampling this date
1810 Hrs - Arrive @ BLDG 3245
Pack away & secure samples
1900 Hrs - Left Site for Hotel.
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE		DATE
Tony Hoyt		3/29/03
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CREWS : SAME AS ON P. 26

SUN : 3/30/03 SUMMARY

INSTALLED : 13MWT01, 03, 04 & 08; SEE NB 2555

SAMPLED : SURFACE WATER - 13SW12 & 13

SEDI - 13SD11 → 16, & 19 → 21

SOIL - 13SB08 - SS & SB

COCS GENERATED

LAUCKS : 0980, 0978 & 0979

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

SWH 3/30/03

Work continued from Page

Weather Cloudy & Cold 30°s

0650 Hrs - Arrive @ BLDG # 3245
PREP. to SAMPLE SW/SD @ SWMU 13

0900 Hrs - Arrive @ SWMU 13
SAMPLE Locations
13 SW/SD 11 - Dry collect SD only
13 SW/SD 12 & 13
13 SD 14 → 16 & 21

1200 Hrs - Return to BLDG # 3245 - LUNCH

1235 Hrs - RETURN to SWMU 13
SAMPLE LOCATIONS 13 SD 20 & 19

1335 Hrs - RETURN to BLDG # 3245
PAPERWORK & SAMPLE Handling

1840 Hrs - LEAVE BASE FOR Hotel
Stop FOR GAS & SUPPLY PURCHASE

2120 Hrs - FAX OFFICE FAI. SHIPMENT COCs
0961, 0972 & 0981

END

Work continued to Page

SIGNATURE Tony Lyon DATE 3/30/03

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CREWS : SAME AS ON P.26

MON 3/31/03

INSTALLED 13MW T 14 & 19

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

31

MON. 3/31/03

Work continued from Page

WEATHER: mostly SUNNY & 40's

0650 Hrs - Arrive @ BLDG # 3245
PAPERWORK & PACKAGING
CHECK IN @ OFFICE, ~~Fax~~ CoCs to Ed Sedlmyer for distribution

1400 Hrs - CHECK Drilling Locations W/ Tom Brent for restoration & REVEGETATION; Relocate 13MWT20 & 09 to DPT locations.
CHECK IN W/ OFFICE (ED) checked w/ Laucks on to SAMPLE tomorrow
CHECK SWMU 16 - SW locations dry; ~~key~~ (R) BLUE Lock on Back Gate for ACCESS to EXISTING WELLS & SW/SDs
Return to BLDG - SECURE OFFICE; pick up SAMPLES.
Rig stuck @ 16MWT13; will have to Relocate and INFORM PLH.

1700 Hrs - LEFT BASE FOR SAM'S CLUB & LOWES - FOR SUPPLIES, stakes & ~~cold tar~~ (R) cold tar to patch Borcholes in Asphalt @ SWMU 16

1845 Hrs - Return to Hotel.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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SIGNATURE

DATE 3/31/03

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WITNESS

DATE

CLEWIS: SAME AS P. 26

INSTALLED: 13MW T09, 20, 23 & 24

SAMPLED: SW/SD @ SWMU 16

SEE CORCS 0983 & 0982

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

TUES.

Work continued from Page

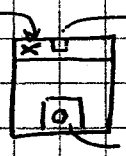
Sunny & 70's

0650 Hrs Arrive @ BLDG 3245

Rec'd to sample SW/SD @ SWMU6

Talk to Tom regarding sump next to BLDG. 188

SAMPLE behind divider



0815 Hrs - TALK to MEAN. to bring dozer through North gate - He okay'd

0830 Hrs - Check in w/ drill crew

0930 Hrs - Access dozer to 13MWT09 w/ boards on road crossings

0947 Hrs - Talked to Donna @ PW about moving 13MWT13 - she will get it cleared will talk to her on Monday

1000 Hrs - Return to BLDG # 3245

Called F. Mitchell regarding work @ BLDG 146

NEXT WEEK - He said it looks good through May

however there is work sch. @ BLDG # 145 so

He would have to talk to Mike Roach to see if

that would impact us - he would get back to Tom B.

1020 Hrs - Arrive @ SWMU 16

SAMPLE 165D11, 02, 10, 04 & 05

1135 Hrs - Break for Lunch

1200 Hrs - Return to BLDG Pick up Additional supplies

1215 Hrs - Arrive @ SWMU 16

Sample 165008, 09, 06, 03 & 165W0101

1505 Hrs - Arrive @ BLDG # 3245 prep. samples for shipping on COC's 0982 & 0983

1730 Hrs - Drop of Samples on Fed Ex. AB# 8316 7332 7199

END

Work continued to Page

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DATE 4/1/03

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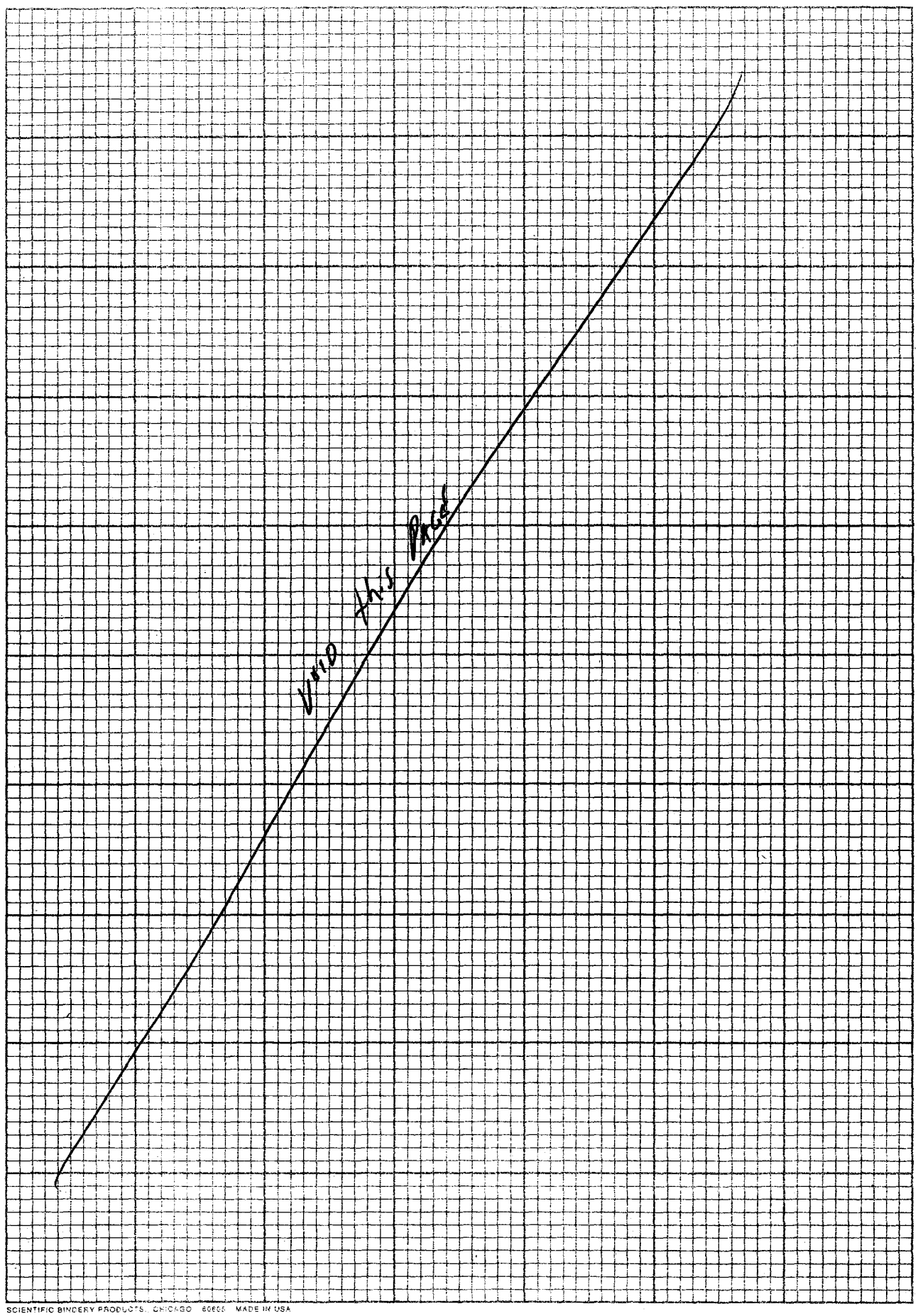

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED APRIL 2, 2003

Work continued from Page

0700Hrs - Arrive @ BLDG #3245
General House Cleaning @ BLDG 3245
FAX C of C 0982 & 0983 to LAB & OFFICE
0915Hrs - Left Base For Airport
END

5
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25
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35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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DATE 4/4/03

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TtNUS - B. BALKOVEC & T. ROJAHN
B-M - D. SCHRECENGOST, Jon Keifer, J. AKERS, T. Mayer
& C. MAHAFFY

MON 4/7/03 SUMMARY

- TRAVEL DAY
- Installed: 13MWT06 SEE NB 2555
- SAMPLED: Rinsates RB040703O1 @1615 SS. mixing Bowl
  RB040703O2 @1630 ~~ss. trowel~~
- ~~A/80 on site survey crew~~ (TJ)

MON 4/7/03

Work continued from Page Cool & Overcast

TRAVEL DAY

1245 Hrs - Arrive @ BLDG # 3245
Organize NSWC delivered coolers & Eq. SHIPMENTS

1330 Hrs - Check in @ PW - OK to install 13 MWCT 13

1345 Hrs - Check in @ main gate for picture badge - cannot get picture badge - but will receive a laminated temp badge check back MON or Thurs.

1410 Hrs - Return to BLDG # 3245 - check on operations @ BLDG 265 M Kluesner said may be finish operations @ 1630 Hrs. but Check @ BLDG 165 first.

1440 Hrs - Check on Drillers - gone to Escort dozer pick up to SWMU 13 - D.S. Arrived

1510 Hrs - RETURN to BLDG 3245
PREP LABELS FOR RINSATES

1615 Hrs - Collected Rinsate of S.S. Mixing bowl RB04070301 w/ Reagent Grade H_2O by NEKL Lot# 0109313 Exp. 01-2004

1630 Hrs - Collected Rinsate of Disposable Plastic Trowels RB04070301 w/ SAME Reagent Grade H_2O as above

- Labeled & Tag Rinsate containers & SECURE IN Frig
- Prep for Surveyors to Arrive tomorrow

1900 Hrs - LEFT SITE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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Crews
T+NUS & B-M same as on p 36
B.T.E.R - M. Cooper & Corey Allen

4-8-03 Summary
Installed - 16 MW T-01 see NB 2555'
See pages 40 & 41 for rules to access MFB
JK & CM - worked on well pads @ SWMU 13
Surveyors - Locate SW/50 @ SWMU 13 outside Fence

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

TUES. 4/8/03

Work continued from Page

Cool & OVERCAST

0655 Hrs - ARRIVE @ BLDG #3245
PREP. FOR SURVEYORS

0730 Hrs - SURVEYORS ARRIVE - MATT Cooper & Corey Allen
GIVE H&S TRAINING W/ Work Permit
SHOW SURVEYORS SWMU 13

1000 Hrs - SURVEY CREW TO WORK OUTSIDE OF MFB SED/SW LOCATIONS - GOT DRILLING CREW INSIDE SWMU 16

1025 Hrs - MEET W T. BRENT - SAID SOMEONE SAW SOMEONE W/ A GPS INSIDE BUFFER ZONE @ BLDG 165 - CHECK IN W/ Mr. KLEESNER - HE DIDN'T KNOW ANYTHING ABOUT IT. ALSO CHECKED W/ GUARD AT North GATE

1105 Hrs - MEET W/ LEAH CLINTON (HEAD OF SECURITY)
WORKED OUT GROUND RULES FOR SUBS ACCESSING SWMU 13 - SHE WILL GET E-MAIL TO T. BRENT.

1130 Hrs - UNLOCK GATE @ SWMU 16 TO LET DRILLING CREW OUT FOR LUNCH

1200 Hrs - LUNCH

1300 Hrs - MEET W/ SURVEY CREW & DRILLING CREW TO DISCUSS ACCESS RULES @ SWMU 13

- WAIT FOR E-MAIL FROM LEAH CLINTON
- TALLY SOIL SAMPLES TAKEN & APPROPRIATE DUPS & MS/MSDs NEED TO TAKE @ SWMU 16
- PREP. COCs FOR TOMORROW & CHECK IN W/ OFFICE
- RECEIVE E-MAIL FROM CRIS FREEMAN & LEAH CLINTON

1700 Hrs - LEFT BASE

END

SIGNATURE D Rigal DATE 4/8/03

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Freeman Christine D CNIN
From: Freeman Christine D CNIN
Sent: Tuesday, April 08, 2003 4:18 PM
To: 'ClintonL@crane.army.mil'
Cc: Brent Thomas J CNIN; 'Johnson, Douglas G'; Mitchell Frank CNIN
Subject: RE: Contract Work in MFB

Leah,
Code 095 acknowledges receipt of your instructions (Tom had to leave for the day). The contractors will receive a copy of this email.

The following are the names of the contractors conducting work in MFB:

TtNUS:

Robert Balkovec
Terry Rojahn
Bowser-Morner:

Dave Schrecengost
Tony Mayrer
Jon Keifer
Jeff Akers
Chad Mahaffy
Bledsoe Tapp & Riggert, Inc.:

Matthew Cooper
Corey Allen

Thank you for you assistance.

----Original Message----

From: **Johnson, Douglas G [mailto:JohnsonD@crane.army.mil]**
Sent: Tuesday, April 08, 2003 15:53
To: Freeman Christine D CNIN
Subject: FW: Contract Work in MFB
Importance: High

----Original Message----

From: **Clinton, Leah K**
Sent: Tuesday, April 08, 2003 3:45 PM
To: 'brent_t@crane.navy.mil'; Mitchell, Frank E; Johnson, Douglas G; Wininger, Terri L; Roach, Michael D; Baker, Sheryl G; Kluesner, Marvin J; Voorhies, John D; Guard Supervisors
Cc: Helms, Mark E; Shearin, Walter F; Meals, Sterling W; Thomas, Norman R; XO; SS Personnel
Subject: Contract Work in MFB
Importance: High

BACKGROUND: TTNUS (contractor) is currently performing work in the MFB > area. We must make sure that:

- access controls are maintained in all of our operational areas
- contractors are granted the necessary access in order to perform > requested work and that access is consistent with safety and security requirements

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60606 MADE IN USA

Work continued from Page

- contractors are made aware of and comply with key and access control requirements
- persons performing access control (both CAAA guards and in-house personnel) are given the proper guidance necessary to adequately perform their duties

TTNS employees or other contractors performing work in the area shall:

- provide the name(s) of the contract employees or a list of supervisors who can "vouch" for the identity of the contract employees (so we may provide this information to the guard force).
- check in and out with the guard/access control person prior to entering and upon leaving MFB (the guard is located at the gate nearest bldg 165). Contractors are not required to check in/out if a guard is not/no longer on duty (e.g., after hours or on weekends when there are no operations in the area).
- call the bldg 165 supervisor (854-1790) to notify him/her that contractors will be working in the area and to obtain any approvals/prohibitions concerning movement in/around/behind the general area of bldg 165 (as provided by Mr. Mike Roach on a color-coded map). For convenience, the guard will make the phone in the guard house available for this purpose. The contractor shall not go in/around/behind bldg 165 without specific approval in advance by the bldg 165 supervisor. Approval shall be obtained on a case-by-case basis.
- go around to the opposite gate and enter the area (nearest bldg 174) (where a contractor cored lock has been installed). The contractor shall secure the gate behind him/her. The contractor shall not permit anyone other than his/her own employees to enter the area at the same time (i.e., no "piggybacking").
- exit thru the same gate he/she entered, secure the gate behind him/her; and "check out" thru the gate guard.
- control keys assigned to them. Making duplicates is unauthorized.
- turn in all keys immediately upon completion of requested work.

ALL: Similar written/detailed instructions must be provided to all contractors working in our areas and coordinated with all parties concerned. I will be happy to provide you advice and assistance if you are preparing similar instructions for contract work being performed in your area of responsibility.

Mr. Brent: Please acknowledge receipt and provide the names of the contract employees who can enter our areas on an unaccompanied basis (e.g., a roster that we can furnish to the guards so we know who is working for TTNS on this project or a list of supervisors who can "vouch" for TTNS employees)

Leah Clinton
CAAA Security Officer
DSN 482-3960
(812) 854-3960

"Only Our Best For the World's Best"

Work continued to Page

SIGNATURE [signature] DATE 4/8/03

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Crew same as on p. 40

4/9/03 Summary

Installed - 16 MWT 04 & 05

Sampled - 16 SB 26, 32, 33, 34 & 36
Collected RB040903 01

JK & CM - worked on well pads @ SWMU 13

Surveyors - Locate SW/SD & SBs @ SWMU 16

Poured 1 pad by hand @ SWMU 13
Late inside Bubble Zone.

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WEO 4/9/03

Work continued from Page

Cold 40's & overcast.

0655 Hrs - Arrive @ BLDG 3245
Give Drillers E-Mail from Ms Clinton
Discuss said E-mail on pp 40 & 41

0740 Hrs - Arrive @ North Gate MPB talk to Guard leave copy of E Mail - Let Guard know that J. Keiser & C. Mahaffy will be working inside

0755 Hrs - Let J.K & C.M inside MPB From S. Gate

0810 Hrs - Return to BLDG 3245 - meet w/ Surveyors
• Recon swmu w/ survey crew

0845 Hrs - Return to BLDG # 3245
Discuss well installation @ 13MW13 w/ T. Bicat - may have to block Main Road.

0915 Hrs - Set up @ swmu 16 to sample soil
Collect samples @ 16SB 26, 32, 33, 34 & 36

1130 Hrs - Finish soil sampling Break for Lunch

1210 Hrs - Return to BLDG # 3245
• Collect Rinsate From core sleeve (KB04090301) @ 1230 Hrs
• Prep samples collected for shipment to Lancks on COCs 0984 & 0986 via FED. EX. AB# 8316 7332 7063
• Clean up

1800 Hrs - Left Site

1830 Hrs - Drop off samples @ FED EX.
B. Balkovec remained on site to oversight drillers working on pad inside the BLDG 165 Buffer Zone

End

Work continued to Page

SIGNATURE

DATE 4/9/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW
TINUS - B. BALKOVEC & T. COLAHAN
B-M - D. SCHEECENGOST, JON KEIPER & T. MAYER

4/10/03 SUMMARY

INSTALLED - 16MWT03

SAMPLED - 13SB14 & 09
16SW02 & 07

DECIDE ON INSTALLATION OF 13MWT13 W/ TRACK RIG WEEK OF 4/21. @ ORIGINAL SITE.

MFB BUFFER ZONE OPEN SAT & SUN
CHECKED W/ MR KLUESNER

POUR PADS @ SWMU 13 - 16 MON

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

THURS. 04/10/03

Work continued from Page

Mild & Sunny

0700 Hrs - Arrive @ BLDG # 3245
Fax CoCs from Yesterday to E. Seelmyer
Prep to sample E. Sump (16SW02); Check in @ OFFICE

0835 Hrs - Arrive @ SWMU 16
Collect MS/MSD @ E. Sump (16SW02) @ 0850 Hrs

0955 Hrs - Leave SWMU 16 for BLDG 3245
Label & Tag Containers From 16SW0201 & secure in Frig

1105 Hrs - Lunch

1135 Hrs - Return to BLDG - Rest. to sample soils @ SWMU 13
Collect samples @ 13SB14 & 09 w/ B. Ballhouse

1320 Hrs - Arrive @ SWMU 16
Collect W. Sump sample (16SW01 & Dup)

1450 Hrs - Return to BLDG # 3245
Prep samples for Shipment on
CoCs 0987 & 0969 for Laucks &
CoC 0985 for Triangle

1900 Hrs - Drop of Samples @ Fed Ex
AB# 8316 7332 7166 to Laucks
AB# 8316 7332 7177 to Triangle

1915 Hrs - Return to Hotel

End

SIGNATURE			DATE 4/10/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

CREW - SAME AS PAGE 44

04/11/83 SUMMARY

INSTALLED Monitoring WELL 16MWT02 SEE NB #2565

DEVELOPED & INSPECTED 3 WELLS @SWMU 16

WES-14-4-83
WES-14-3-83
WES-14-5-83

Drillers - Also, dug out pads @ SWMU 16
Painted 11 wells & Bollards @ SWMU 13
& Hand poured pad @ 13MWT09

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

Fri 04/11/03

Work continued from Page — Mild & Sunny Temp 60's

0650 Hrs - Arrive @ BLDG #3245
Fax CoCs to Ed Sedlmyer
Clean up office area
Decon Whale Pumps
Prep Vehical for well Development
Call Ed Sedlmyer

1010 Hrs - Get Extended Pass from main Gate w/ B.B.

1030 Hrs - Return to BLDG 3245 - Give Tom list of weekend works for weekend work Letter

1055 Hrs - Lunch

1130 Hrs - Return to BLDG #3245
Call in Hrs to office
Call Denny - Straw supplier; he will see how much he has (bail count) and get back to me

1210 Hrs - Start surging @ WES-14-4-83
Develope / purge From 1224 to 1255 Remove 24gals
Final Turbidity = 8 NTUS; Well Inspection @ 1300 Hrs

1315 Hrs - Return to BLDG #3245
Decon whale pump & pick up for purge H2O containers

1400 Hrs - Start surging @ WES-14-3-83
Purge From 1416 Hrs - 1501 Hrs; Dry out 3 times
Removed 10 gal. Final Turbidity = 32 NTUS
Well Inspection Completed @ 1506

1515 Hrs - Start surging @ WES-14-5-83
Purge From 1523 to 1602 Hrs; almost dry out @ 1548
stop to let well recharge (Turbidity was on the rise)
Allowed well to Recharge & turbidity dropped to RNG
Removed 34 gals; Finish Well Inspection @ 1607

1620 Hrs - Return to BLDG #3245
Dump Purge Water & Decon WHALE Pumps
Check YSI Calibration; B.B. Checking on Drillers @ SWMU 13.

1800 Hrs - Left Base

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Rogt — DATE 4/11/03

DISCLOSED TO AND UNDERSTOOD BY — DATE — WITNESS — DATE

CREWS - SAME AS P. 44

Summary 4/12/03

Drilling - Installed 12 Pads & Painted Bollards
& Protective Casings

All pads poured & Painting Completed
@ Both SWMUs

40 WELLS Developed @ SWMU 13
13MW17 - 26, 06, 18, 15, 10 & 11

SAT. 4/12/03

Work continued from Page

Mild & Sunny Temp 70's

0635 Hrs - Arrive @ BLDG # 3245
DEI to Dev. wells while drillers prep to pour pads - Cement truck due @ 0700 Hrs.

0700 Hrs - Arrive @ S. Gate
Wait for drillers to arrive w/ concrete truck

0730 Hrs - No drillers yet - They Arrived @ 0755 Hrs to pour pads
Will set up @ 13MWT26 @ South Gate to Develope

0735 Hrs - Start surge @ 13MWT26 - Dry out 4 times
Start Purge Time = 0745 Hrs Vol. Purged = 4 gal
End Purge Time = 0947 Hrs Final NTUs = +1000 V. slow recharge

0900 Hrs - Start surge @ 13MWT08 Dry out 4 times
Start Purge = 0905 Vol. Purged = ~1.8
End Purge = 1013 Final NTUs = +1000

1035 Hrs - Start surge @ 13MWT10 Dry out 3 times
Start Purge = 1044 Vol. Purged = 7 gal
End Purge = 1127 Final NTUs = +1000

1143 Hrs - Start Surge @ 13MWT15 Dry out 3 times
Start Purge = 1146 Vol Purged = 9 gal
End Purge = 1235 Final NTUs = +1000

1245 Hrs - Break for Lunch

1330 Hrs - Get Gas

1355 Hrs - Return to BLDG 3245 ; Decon Pumps & dump Dev. H2O

1450 Hrs - Surge 13MWT10 Purged Dry 3 times
Start Purge = 1515 Vol Purged = 7 gal
End Purge = 1604 Final NTUs = +1000

1620 Hrs - Start Surge @ 13MWT11 Purged Dry 3 times
Start Purge = 1629 Vol Purged = 8 gal
End Purge = 1723 Final NTUs = +1000

1745 Hrs - Return to BLDG # 3245
Decon Pumps & Dump Dev. H2O

1830 Hrs - Leave Base

END

Work continued to Page

SIGNATURE T. Agel DATE 4/12

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREW: B. Balkovec & T. Conlon
Drilling crew left this date ~ 0840 hrs

Summary 4/13/03

WELL ID	START PURGE	END PURGE	VOL. PURGED	TIMES DRIED OUT
13MWT01	0850	1003	7 gal	5 Times (BB)
13MWT03	0851	0932	4 gal	3 Times (TC)
13MWT02	1005	1101	4.5 gal	3 Times (TC)
13MWT07	1116	1205	8 gal	3 Times (BB)
13MWT05	1123	1205	4 gal	3 Times (TC)
13MWT08	1358	1445	12 gal	3 Times (TC)
13MWT04	1356	1456	4 gal	3 Times (BB)
13MWT12	1511	1551	5 gal	3 Times (TC)
13MWT16	1517	1605	4 gal	3 Times (BB)

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

Sun 4/13/03

Work continued from Page

Weather - Mill & Sunny high 60's & 70's F

0720 Hrs - Arrive @ BLDG # 3245
Prep. Vehicles for Well Development; Cal. Instruments
Drillers Prep to Leave Base - complete all related
paperwork; get gate Key; Etc.

0830 Hrs - Arrive @ SWMU 13
Develope 13MWT01, 03, 02, 07 & 05 (See Page 58)

1220 Hrs - Arrive @ BLDG # 3245
• Dump Purge H_2O & Decon Water & Pumps

1245 Hrs - Lunch

1310 Hrs - Prep. Vehicles for return to develope Wells

1325 Hrs - Development @ SWMU 13
13 MW T 08, 04, 12 & 16

1615 Hrs - Finish Clean up @ SWMU 13

1625 Hrs - Return to BLDG # 3245
• Clean Offices (4 rooms & Hall way)
• Decon Water Pumps & Dump Purge Water
• Unload Vehicles

1715 Hrs - Left Base for Hardware Store

1830 Hrs - Left Manards - Purchased PE tubing Fastners
tamper, rake etc. For Well development & SSHS
restoration work

END

Work continued to Page

SIGNATURE Tim Mc

DATE 4/13/03

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**

SUMMARY 4/14/03

WELL ID	START PURGE	END PURGE	VOL PURGED	TIMES PUMPED WELL DRY
13MWT17	0825	0847	14gal	—
13MWT21	0908	0947	10	3
13MWT22	1008	1046	4.5	3
13MWT25	1100	1133	2.5	3
13MWT24	1255	1337	7.5	3
13MWT23	1353	1432	5.5	3
13MWT20	1450	1531	5.0	3
13MWT09	1547	1633	17.0	3
13MWT19	1654	1735	6.0	3

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

MON 4/14/03

Work continued from Page

0653 Hrs - Arrive @ BLDG #3245
- Prep Vehicles for Well Dev.
- Call Matt Cooper (Surveyor) to come later - after 13MW13 is installed
- Call T. Patton - track missing bladder tool & order Peristaltic pump.
- Call. PID - see P. 52 for wells developed @SWMU's

1150 Hrs - Lunch

1215 (Hrs) - Return to BLDG #3245
Call office - no answer
Make Reservations for return trip 4/21-30/03

1235 Hrs - Return to SWMU 13
See P. 52 for wells developed

1745 Hrs - Finish Clean up at SWMU 13 Return to BLDG #3245
Clean EQ & Dump Purge H2O

1800 Hrs - Leave Base

END

Work continued to Page

SIGNATURE [signature] DATE 4/14/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUMMARY 4/15/03

WELL ID	START PURGE	END PURGE	VOL. PURGE	TIMES PURGED WELL DRY
13MW1T14	0809	0852	10.0 gal	3
16MW102	0929	1010	4.5 gal	3
16MW103	1025	1109	6.0 gal	3
16MW105	1245	1402	21.0 gal	3
WES-14-01-83	1246	1340	10.0 gal	1
16MW104	1425	1508	9.0 gal	3
16MW101	1525	1605	1.5 gal	3
WES-14-02-83	1623	1718	20.0 gal	3

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TUES. 4/15/03

Work continued from Page

0655 Hrs – Arrive BLDG #3245
- CHECK IN W/ T. Brent - update on Progress & Bobcat stands up.
- Cal. Instruments & CHECK YSI
- Prep. Vehicles for well DEV.
- Order 2ND Turbidity meter from T. Python

0800 Hrs – Arrive @ SWMU 13 for 13MWT14 Development

0915 Hrs – Arrive @ SWMU 16 DEV. 16MWT02 & 03

1130 Hrs – Arrive @ BLDG. #3245
- Empty Purge H2O
- Pick up Batteries for YSI (showing low battery)

1200 Hrs – Lunch

1230 Hrs – Return to SWMU 16
DEVELOPE 16MWT01 - 05; WES-14-01 & 02

1725 Hrs – Finish Clean up @ SWMU 16

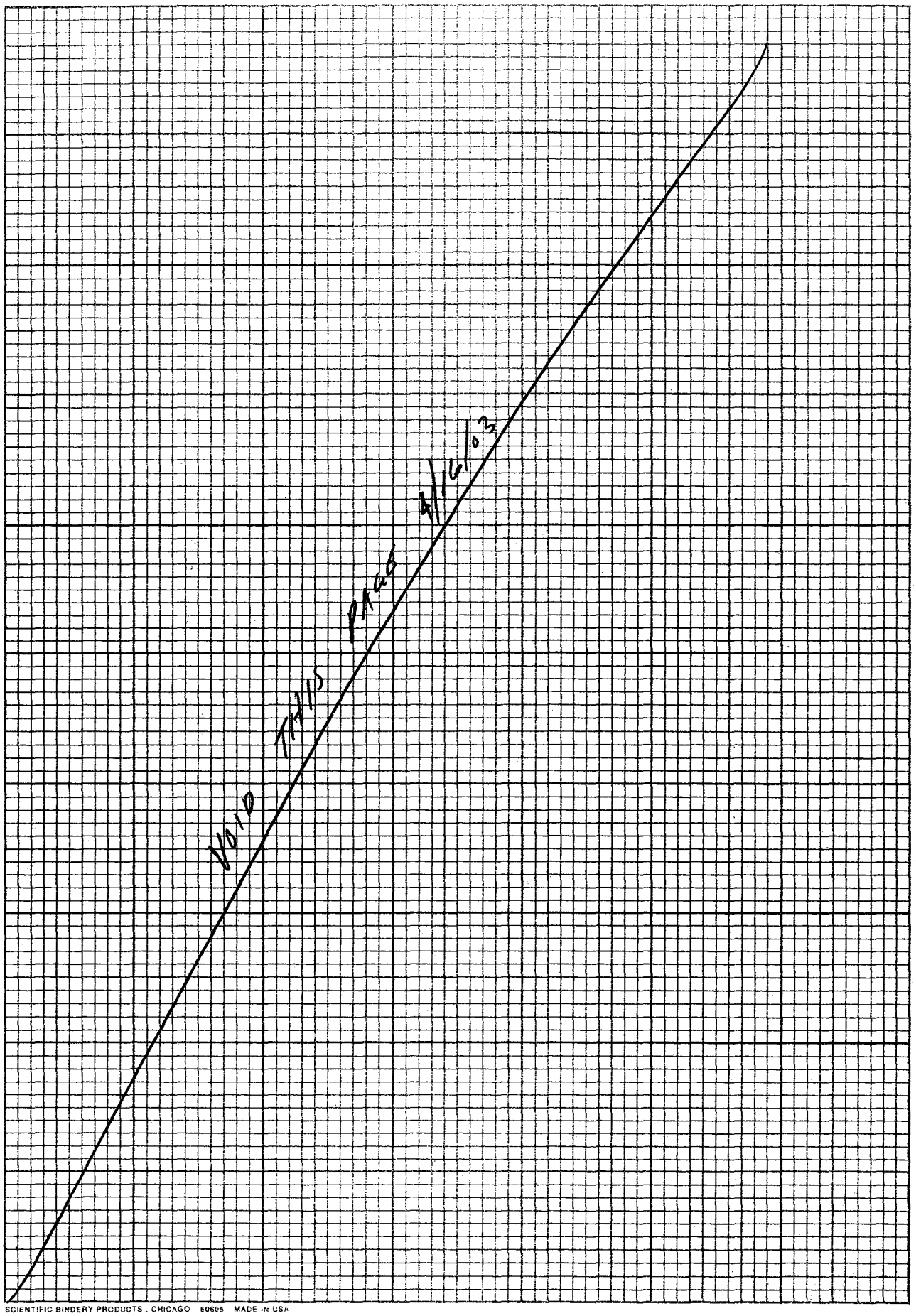
1730 Hrs – Return to BLD # 3245
- Dump Purge H2O
- Clean Instruments
- Paperwork
- Check in w/ R. Basinski @ office

1815 Hrs – Left Base

END

Work continued to Page

SIGNATURE			DATE
			4/15/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE



SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

WED 4/16/03

Work continued from Page

0655 Hrs - Arrive @ BLDG # 3245
- Decon whale pumps & bucket bits
- Called Denny & set up straw delivery for Wed.
- Clean up office space
- Pull together paper work to take to P.H. office

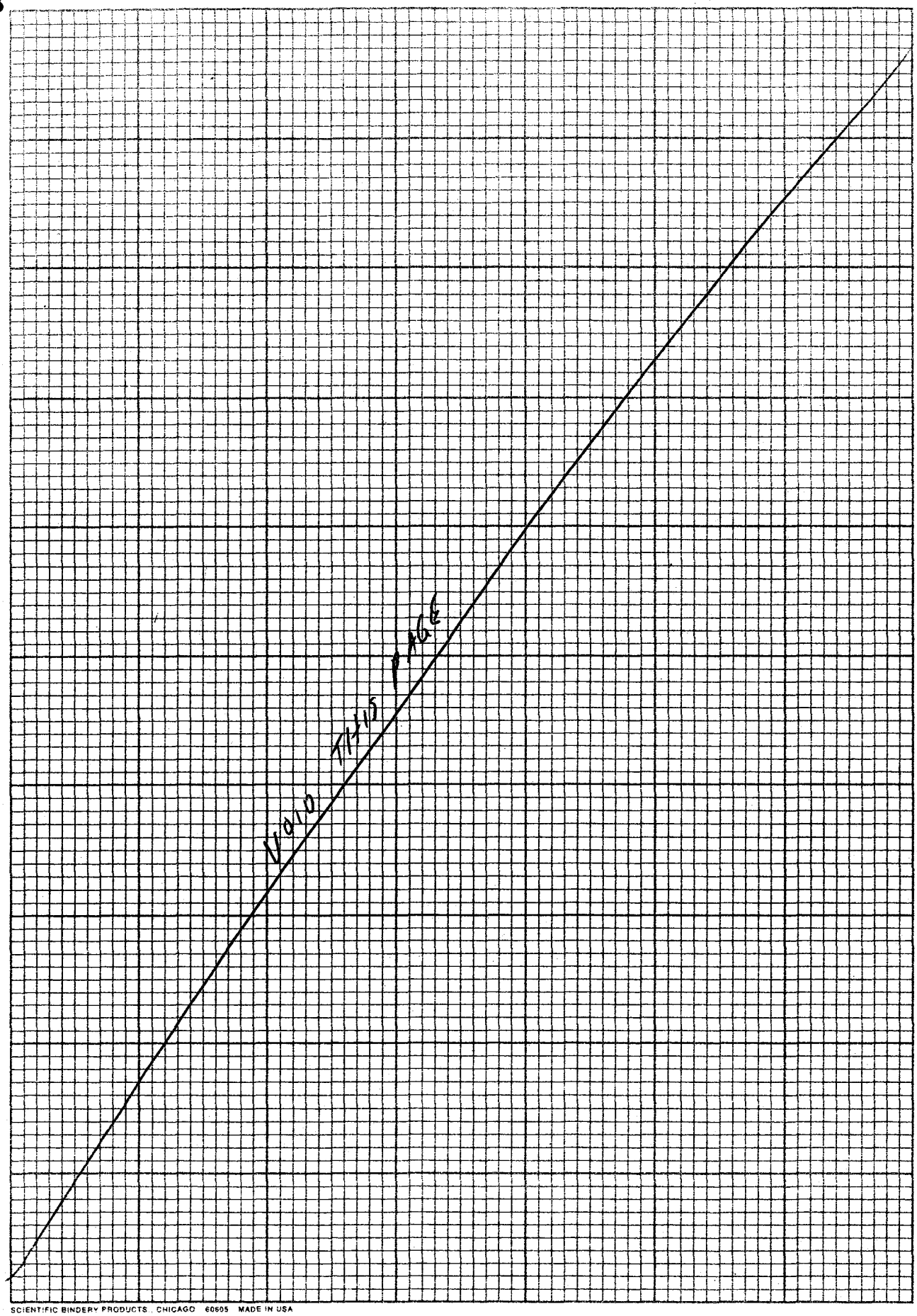
0850 Hrs - Left Base

Remainder of day = Travel
Made stop @ Enterprise in Martinsville, IN and reserved a pick up truck for the week of May 5th.

END

Work continued to Page

SIGNATURE		DATE
		4/16/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE



SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

Work continued from Page

5

10

15

20

25

30

35

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

CREW: Bob Balkovec & Terry Rojahn

Mon 4/21/03

WELL ID	TIME	W.L.
WES-14-01-883	1505	31.49
02	1445	14.75
03	1457	19.98
04	1500	27.61
05	1502	33.47
13 NWT01	1512	25.61
02	1450	8.33
03	1453	27.88
04	1510	11.04
05	1455	30.66

Weather: Cool & Overcast

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

MON 4/21/03

Work continued from Page

TRAVEL DAY

1000 Hrs - Arrive Indy Airport
1115 Hrs - Check in @ Hotel
1145 Hrs - Pick up supplies @ Sams Club & Lunch
1300 Hrs - Arrive @ BLDG #3245
CHECK IN W/ T. BRANT
Calibrate YSI's prep. to purge 16 MW TO1
1445 - 1512 Hrs - Take Round of water levels @ SWMU 16
1515 Hrs - Purge 16MWTO1
Dry ~ 5 min. purge 1.1 L see Low Flow Purge Data Sheet
1550 Hrs - Return to BLDG #3245
PREP. SAMPLE SETS; Check in @ OFFICE W/ T. JOHNSTON
Go over well development sheets - determine which
WELLS to purge via bladder or peristaltic pump.
1700 Hrs - LEFT BASE
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
Tony Nash			4/21/03
DISCLOSED TO AND UNDERSTOOD BY	**DATE**	**WITNESS**	**DATE**

TUES 4/22/03 SUMMARY

WELL ID	START PURGE	END PURGE	SAMPLE TIME	
16GWT0101	*	*	0900	
16GWT0201	0828	0945	0946	
16GWN0501	0900	1040	1045	MS/MSD
16GWT0401	1243	1435	1437	
RB042203O1	—	—	1630	Teflon & Silicon Tubing Rinsate for Peristaltic Pump

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TUES 4/22/03

Work continued from Page

Weather - Cool & Mostly Cloudy

0650 Hrs - Arrive @ BLDG 3245

Pick up Sample Groundwater

0745 Hrs - Arrive @ SWMU 16

See Page 62 & CoC # 0988

1600 Hrs - Return to BLDG # 3245

Call Office - Check in w/ T. Johnston

Call Denny Wagner - Set up Steam Cleaner for tomorrow 0700 Hrs

Collect Rinsate Blank - RB042203 01 (Tubing)

Check Calibration on YSIs

1730 Hrs - Leave Crane

END

Work continued to Page

SIGNATURE			DATE
T. Johnston			4/24/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

WED 9/23/03 Summary

Well ID	START PURGE	END PURGE	Sample Time
16GW0401	0723	0810	0811
16GW0101	0750	1122	1130

Installed : 13MWT13 see WO #23350 for Details

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

WED 4/23/03

Work continued from Page AM - Cold & Partly Sunny, PM Sunny & Mild

0630 Hrs - Arrive @ BLDG # 3245

Prep. to sample groundwater

0702 Hrs - Arrive @ BWMU 16

SEE PAGE 64 & CoC # 0988

1515 Hrs - Arrive @ BLDG #3245

- Paperwork & Package Samples on CoC # 0985 for Shipment via FED EX AB# 8316 7332 7155
- Decon Bladder Pumps
- Check in w/ T. Johnston
- Check Calibration on YSIs

1700 Hrs - Left Base for FED EX

1730 Hrs - Drop off Samples (7 coolers) @ FED EX.

END

THURS. 4/24/03 SUMMARY

WELL ID	START PURGE	END PURGE	SAMPLE TIME	COMMENTS
RB04240301	NA	NA	0830	RINSATE OF BLADDER PUMP & TEFLON TUBING
16GW0201	1041	1200	1201	
16GWT0501	1045	1255	1300	ALSO FD04240301
16GW0301	1433	1630	1632	

INSTALLED 2ND WELL @ LOCATION 16MWT01 TO REPLACE DRY WELL

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

THURS. 4/24/03

Work continued from Page

WEATHER - Mostly Cloudy & 50's

0630 Hrs - Arrive @ BLDG #3245
Prep. to meet Denny Wagner

0650 Hrs - Arrive @ Crane Gate meet w/ D. Wagner
Escort him to SWMU 13 @ 0715
• Unload straw @ SWMU 13

0748 Hrs - Return to BLDG #3245; Rec'd TB0424030 1 @ 0800 Hrs
Prep. to sample groundwater @ SWMU 16
Collect Pump & Teflon Tubing Rinsate @ 0830 Hrs
T. Johnston call wants to install deeper well @ 16MWT01 - ORIGINAL WENT dry

1000 Hrs - Arrive @ SWMU 16
CHECK Location for NEW WELL 16MWT01
Sample Groundwater SEE P. 66 & COC #0991

1718 Hrs - Return to BLDG #3245 B.B. still @ 16GW03 01
• Paperwork
• Cali. YSI
• Dump Purge H2O
• Decon Bladder Pump
• B.B. Arrive @ 1845 Hrs

1910 Hrs - Leave BLDG #3245

END

Work continued to Page

SIGNATURE

DATE 4/24/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

FRI. 4/25/03 Summary

WELL ID	Start Purge	END Purge	Sample Time	Comments
RB04250301	NA	NA	0810	Rinsate of Peristaltic AE tubing & Silicon Tubing
13GWT2601	0804	1020	1022	
16GWT0301	0940	1130	1135	
13GWT2101	1237	1345	1346	Dup of RB04250301
13GWT2501	1110	1210	NA	Pumped Dry

Drillers - Pour pad @ 16MWT06 and Demob

16MWT06 - Located next to Dry well 16MWT01.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

FLD. 4/25/03

Work continued from Page Periods of Heavy Rain & Cool (50's)

0630Hrs - Arrive @ BLDG 3245
- Prep. to Sample Groundwater @ SWMU 16
- Call Surveyors - inform them that all work have been completed - they will check their schedual
- Called T. Johnston w/ 9/24/03 summary
- Called in Hours to L. Yeager

0740Hrs - Check in w/ RAM @ Break BLDG. for BLDGs 145 & 146 OK to work @ SWMU 16 today

0745Hrs - Return to BLDG #3245 to wait for drillers
- Moore work inside gate @ BLDG 146 s. gate is locked - need to wait on drillers to give them access to SWMU 16 to pour work pad
- Collect Rinsate Blank for PE tubing & Silicon for SWMU 13 @ 0810 Hrs

0840Hrs - Drillers Arrive

0845Hrs - Arrive @ SWMU 16
- Drillers to pour pad @ NEW 16MW03 (Finish @ 1010Hrs)
- T.R. set up @ 16MW03 with Tent (RENAMED 16MW06)
  Start Purge @ 0940 Hrs
  END Purge @ 1130 Hrs
  Sample Time @ 1135 Hrs

1605Hrs - Return to BLDG #3245 to package samples for shipment via FED EX (AOF 8316 7332 7144); samples on COC #0991.

1730Hrs - Left Base

1800Hrs - Drop off samples @ FED. EX.

1816Hrs - Pick up supplies @ Lowes

1845Hrs - Return to Motel

END

Work continued to Page

SIGNATURE [signature] DATE 4/25/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SUN 4/27/03 Summary

B.B Sampled 13GWT0201, 1001 & 1101
Finished sampling 13GWT0201

T.R. Finished sampling 13GWT0501, started sampling 13GWT0601 & Purged/sampled 13GWT0701 & 13GWT1201

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

SAT 4/26/03

Work continued from Page

AM - Cool & Sunny PM - Mild & Sunny

0630 Hrs - Arrive @ BLDG # 3245
Prep. to sample Groundwater; Check YSI Cal.

0730 Hrs - Arrive @ SWMU 13

WELL ID	Start Purge	END PURGE	SAMPLE TIME	COMMENTS
13MWT06	0745	0843	NA	Pumped Dry
13MWT03	0745	1145	1146	
13MWT01	0912	1022	1024	
13MWT05	1117	1349	NA	Pumped Dry
13MWT25	NA	NA	1230	Purged 4/25/03
13MWT02	1246	1535	1536	
13MWT08	~~1343~~ 1412	1542	1545	

1638 Hrs - Return to BLDG # 3245
Pick up well dev. supplies

1700 Hrs - Start well development @ 16MWT06
Start Purge = 1700 Hrs
END Purge = 1746 Hrs
Vol. Purged = 13.5 gal
Pumped Dry 3 times

1805 Hrs - Return to BLDG # 3245
Prep to Leave Base

1836 Hrs - Left Crane

END

SIGNATURE [signature] DATE 4/26/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SEE SAMPLE SUMMARY FOR 4/22/03 ON PAGE 70

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

SUN. 4/27/03

Work continued from Page

0730 Hrs - Arrive @ BLDG #3245
Rec'd. to sample groundwater, Check YST Cal.
0815 Hrs - Arrive @ SWMU 3
0835 Hrs - Start sampling 13GWT06 + Extremely slow Recharge
0910 Hrs - Start sampling 13GWT05
0955 Hrs - Finish " "
1020 Hrs - Start purge @ 13MWT07
1200 Hrs - Start sampling 13GWT0701
1305 Hrs - Start purge @ 13MWT12
1710 Hrs - Start sampling 13GWT1201
1815 Hrs - Pump down 13MWT06 into Explosives Container
1835 Hrs - Return to BLDG # 3245
- Secure Samples in Frig
- Clean & mop office areas
1930 Hrs - Leave Base
END

Work continued to Page

SIGNATURE [redacted] DATE 4/27/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Surveyors - Matt Cooper & Corey Allen
FINISH surveying @ SWMUs 13 & 16

SAMPLE Summary 4/28/03

WELL ID	Start Purge	END Purge	SAMPLE TIME	Comments
13GWT0901	0740	0910	0911	Collected Dup
FD042803G	↓	↓	0000	DUP OF ABOVE
16GWT0601	0835	0930	0932	SEE Comments on P.75 may have to resample/collect additional sample; well ID may change
13GWT2401	1311	1455	1456	
13GWT2001	1205	1605	1606	

NSWC Crane, IN

Bledsoe Tapp & Riggert - Surveyors Daily Sign-In

(± 2hr Drive / Prep. Time Per Day)

MC

DATE	NAME (print)	TIME IN	TIME OUT	TOTAL HOURS *	SITE/S WORKED ON
4/8/03	Corey Allen	7:00	4:45	12	#13
4/8/03	Matt Cooper	7:00	4:45	12	#13
4/9/03	Matt Cooper	7:30	1:00	7.5	#16
4/9/03	Corey Allen	7:30	1:00	7.5	#16
4/28/03	Matt Cooper	8:00	7:30	11.5	#13 + 16
4/28/03	Corey Allen	8:00	7:30	11.5	#13 + 16

** Include total daily hours to be charged (travel, time on site, etc.)*

Sites = SWMU 13 – Mine Fill B
SWMU 16 – Cast High Explosives Fill/B146 Incinerator

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON 4/28/03

Work continued from Page

Weather - Mostly sunny & 60's Late Afternoon Rain

0630 Hrs - Arrive @ BLDG # 3245
Prep to sample groundwater

0815 Hrs - Arrive @ SWMU 16 - 2ND WELL @ Location 16MWT01
Start Purge @ 0835 (Surveyors Arrive @ 0850 Hrs left them in gate)
END " @ 0930
Start Sampling @ 0932 - still draw down in well but will sample anyway to obtain groundwater incase well dries out and doesn't recover in tight formation as did the 1st well installed @ this location.
WELL DRY @ 1015 Hrs

1035 Hrs - Arrive @ BLDG # 3245
Prep. to sample GW @ SWMU 13

1100 Hrs - Arrive @ SWMU 13
Let surveyors into area (MFD)

1130 Hrs - Set up @ 13MWT20
Problem w/ BLADDER pump (water siphoning out of flow cell and back into well - switched to peristaltic Pump)
Start purge @ 1205 ; @ 1345 B.B. took over @ well - T.R. returned to BLD # 3245 to package samples for shipment.

1400 Hrs - Arrive @ BLDG # 3245
- Package samples for shipment on CofCs 993 & 992
- T. Johnston called - spoke with him regarding the disposition of the 1st well @ location 16MWT01 & what to ID the 2nd well @ same location - will talk again tomorrow @ 0830 CT.

1745 Hrs - LEFT BASE FOR FED. EX.

1815 Hrs - Delivered samples under CofCs 0992 & 0993 to FED EX. (AB # 8316 7332 7133)
B. Balkovec - stayed @ site w. surveyors to secure buffer AREA around BLDG # 165
left site ~ 1900 Hrs

Work continued to Page

SIGNATURE			DATE
			4/28/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Sample Summary 4/29/05

WELL ID	Start Purge	END Purge	Vol Purged	Comments
13GWT1401	0755	0925	0926	
13GWT2501	—	—	—	Collect Additional Vol.
166WT0601	—	—	—	Collect Additional Vol.

Also. Developed 13MWT13, see p. 77 for Details.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

Tues - 4/29/03

Work continued from Page

0636 Hrs - Arrive @ BLDG #3245
Fax CofCs 992 & 993 to OFFICE & LAB
Paperwork; Organize files
Check Cal.'s on YSI
0830 Hrs - Conference call w/ T. Brent, T. Johnston (ED Geologist) & T. Kinnan
0950 Hrs - Arrive @ SWMU 16
16MWT06 - W.L. @ 26.95
16MWT01 - W.L @ 25.70
Start Sampling 16MWT06 @ 1002 Hrs
Dry @ 1037 ~3L collected VOCs & ~2.5L of Glass Bottles
1040 Hrs - T. Brent arrived @ SWMU-16 - showed existing wells needing work; and discussed 16MWT01 & 06
1120 Hrs - Left SWMU 16, Arrive BLDG #3245
1135 Hrs - Lunch @ CAF.
1210 Hrs - Return to BLDG #3245
- Call T. Johnston - ok to ship samples collected 4/29/03 @ 16MWT06 w/ today's collection
- Prep. to develope 13MWT13
1250 Hrs - Arrive @ 16MWT06
- Start Development 1308 hrs
END Development 1353 hrs; Vol. Purged 17gals
- Removed pad forms @ 13MWT13, 19 & 19 then went to ~~gate #1~~ (Tee) S. gate @ MFB and someone by passed our lock - Informed security @ N. Gate
1430 Hrs - Arrive @ Bldg #3245; Told T. Brent about the lock
Remainder of DAY - Package samples for shipment and clean-up; Prep. Turbidy Meter (malfunctioning) For shipment to U.S. ENV.
1645 Hrs - Left Base
1715 Hrs - Arrive @ FED. EX.
SHIP SAMPLES ON CofC #0994 on AB #8316 7332 7122
SHIP TURBIDITY METER on AB #8316 7332 7111

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/29/03

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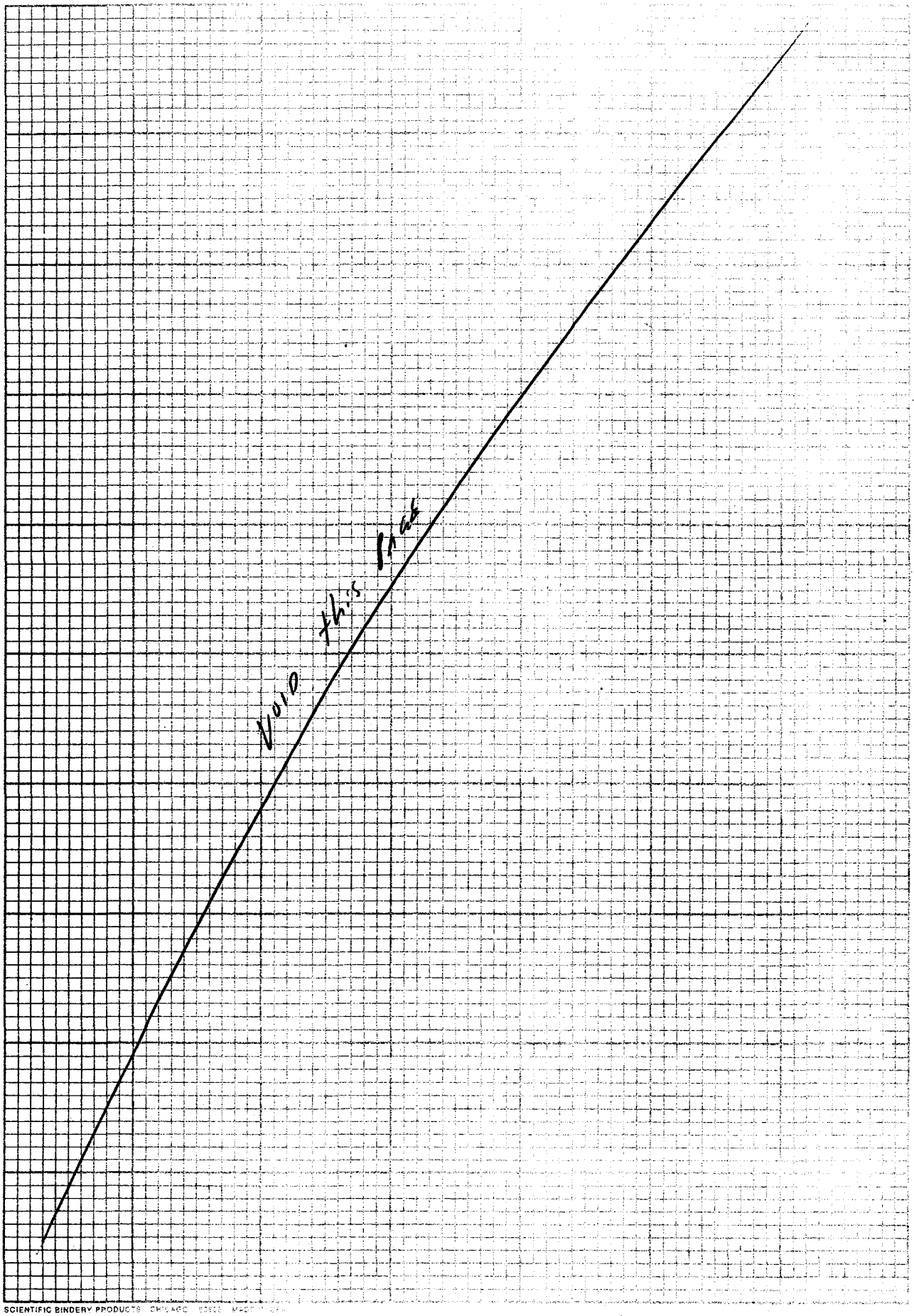

SCIENTIFIC BINDERY PRODUCTS CHICAGO BOSTON

WED. 4/30/03

Work continued from Page

0640 Hrs - Arrive @ BLDG # 3245
Fax C.o.C.s to OFFICE & LAB (0994)
CLEAN OFFICE AREA (wipe); Prep. Paperwork to return to Pit.
CLEAN out VEHICALES
0755 Hrs - Leave OFFICE (BLDG 3245) for Airport
0820 Hrs - Stop @ ABELLS Nursery - check on bulk for soil
#35/YD, will load pick ups.
1030 Hrs - Arrive @ Airport
Remainder of day travel
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 4/30/03

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MON 5/05/03

WELL ID	TIME	W. L.	
WES-14-01-83	1757	31.00	
02	1551	14.23	
03	1443	18.80	
04	1437	26.80	
05	1800	32.59	
16MWT 01	1422	25.19	
02	1433	6.55	
03	1430	27.20	
04	1426	8.05	
05	1428	29.77	
06	1420	22.33	
13MWT 01	1730	6.21	
02	1732	17.15	PATCH NEEDED @ stick up
03	1728	8.79	Ballards NEED lopped OFF
04	1737	12.98	
05	1733	5.42	
06	1720	15.11	
07	1741	3.12	
08	1738	3.17	
09	1650	7.74	
10	1636	13.65	
11	1638	7.87	
12	1639	7.88	
13	1610	3.62	
14	1612	13.25	
15	1631	12.88	
16	1629	8.49	
17	1628	8.70	
18	1633	19.06	
19	1615	8.31	
20	1646	4.22	
21	1626	7.69	
22	1624	7.44	
23	1645	7.45	
24	1642	8.45	
25	1622	16.00	
26	1619	9.10	

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

MON. 5/05/03

Work continued from Page

Hot & Sunny (Low 90°s)

TRAVEL DAY

1515 - ARRIVE @ BLDG #3245 ; AFTER TRIP TO LOWE'S PICK UP HARDWARE FOR WELL

- PREP. TO TAKE WATER LEVELS & REPAIR EXISTING WELLS @ SWMU 16

1415 Hrs - ARRIVE @ SWMU 16

- COLLECT WATER LEVELS
- REPAIR WELLS WES-14-04-03 NEW pad
  WES-14-03-03 FIX CAP FOR locking
- REPAIR 165807 w/ cold patch others REPAIRED by M. Cuckovic

1554 Hrs - LEAVE SWMU 16

1556 Hrs - STOP @ BLDG 3245 FOR Drinking water

1607 Hrs - Check in @ N. Gate SWMU-13 (MF8)

13MW25T

Start Purge @ 1702

END Purge @ 1708 (Dried out WELL)

Pumped ~1gal

13MW06

Start Purge @ 1720

END Purge @ 1724 (Dried out well)

Pumped ~1.5gal

1747 Hrs - FINISH W.Ls @ SWMU 13

1755 Hrs - ARRIVE @ SWMU 16

Returned to get two wells that were in need of equalibration

Lids on to tight @ WES-14-01 & 05-83

1800 Hrs - ARRIVE @ BLDG #3245

CLEAN UP & UN load Pick up Truck

1825 Hrs - LEFT BASE

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Terry Clark

DATE 5/5/03

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B 100 P ©

Sample Summary 5/06/03

Well ID	Start Purge	End Purge	Sample Time	Comments
13GWT1601	0748	0840	0842	
13GWT2301	0840	1240	1242	
13GWT1801	0938	1340	1342	
13GWT2201	1400	1540	1542	
13GWT1501	1445	1700	1702	
13GWT2501	Repurged	5/5/03	→	added to sample collected 5/6/03 @ 1430 Ammonia & Nitrates
13GWTOGA1-F	Repurged collected	5/6/03 Filtered	Metals @ 1735 Hrs	5/6/03

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TUES 5/06/03

Work continued from Page

WEATHER Mostly Sunny Temp. 80°F

0640 Hrs - Arrive @ BLDG # 3245
Prep. to sample groundwater
Load Pick up
Calibrate YSI & LaMotte
0815 Hrs - Arrive @ SWMU 13
0840 Hrs - Begin Purge @ 13MWT23
End Purge @ 1240 Hrs ; Vol purged = 22.1L
1242 Hrs - Sample 13GWT2301
1400 Hrs - Begin Purge @ 13MWT22
End Purged @ 1540 Hrs ; Vol. purged = 10.6L
1542 Hrs - Sampled 13GWT2201
Removed pvd forms @ 13MWT22 & 23
1650 Hrs - Check in on B.B. - get sample log sheets - start sample summary on page 82
1720 Hrs - Remove Form @ 13MWT16
1736 Hrs - Sampled Filtered Metals @ 13MWT06
1750 Hrs - Return to BLDG # 3245
Secure samples in Frig.
Clean up
Unload Pick-up Truck
Leave messages for Both Ralph & Tom on progress made today & yesterday
1830 Hrs - Left Base

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Samples Summary 5/7/03

Well ID	Start Purge	End Purge	Sample Time	Comments
13GWT1301	0730	0945	0947	Also DUP FD0507030 01
13GWT1701	0750	1020	1022	MS/MSD
* 13GWT2501	—	—	1300	*Filtered Metals Only
13GWT1901	1155	1345	1347	
* 13GWT0601	—	—	1700	*Ammonia & Nitrate only

* Slow Recharge wells purged dry 5/5/03

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED 5/7/03

Work continued from Page

Weather overcast to rain (Heavy @ times)

0640 Hrs - Arrive @ BLDG #3245
PREP. to Sample Groundwater
Check YSI METER

0730 Hrs - Arrive @ SWMU 13 - 13MWT17
Start Purge @ 0750 Hrs
END Purge @ 1020 Hrs. Vol. Purged = 15.2 L
Start Sampling @ 1022 13GWT1701

1300 Hrs - Sampled Filtered Metals @ 13GWT2501

1335 Hrs - Returned to BLDG #3245
Unloaded Pick up Truck

1400 Hrs - Lunch

1495 Hrs - Return to BLDG #3245

- Called Ralph B. & Tom J. gave them progress Report.
- Paperwork & Prep. Samples For Shipment to FED. EX. on Air Bill 8316 7332 7074 & COC # 6995

1630 Hrs - LEFT BASE FOR FED. EX

1700 Hrs - Drop of :
Samples to Lancks on AB# 8316 7332 7074
EQ. to U.S. ENV on AB# 8316 7332 7100

B.B. REMAINED @ site to SAMPLE FOR Ammonia & Nitrate @ 13MWT06 (Inside Bunker on BLDG # 265)

END

Work continued to Page

SIGNATURE Tom Jack

DATE 5/7/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Day Summary 5/8/03

Surface water samples collected - 13SW0801 & 13SW1101

Well Sites Restoration Locations completed:

13MWT 21, 17, 16, 12, 11, 25(OK), 26, 22 & 15

Start Restoration @ 13MWT 18 & 24

Ship samples on CofC #0996

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

THUR 5/8/03

Work continued from Page

Weather - Mostly Cloudy & 60's

0700 Hrs - Pick up computer disk & Drinking Water @ Wal-Mart

0745 Hrs - Purchase SEED & a yard of Top Soil @ ABELL NURSERY

0815 Hrs - Arrive @ BLDG #3245

- B.B. Check Cali. on YSI
- Prep. to do site restoration @ SWMU-13 & TMI and Surface Water Sampling @ Location 8 & 11

0840 Hrs - Check SURFACE WATER locations @ SWMU 16 AFTER YESTERDAYS RAIN - locations NOT conducive to SAMPLING (DRY)

0855 Hrs - Return to BLDG #3245

0910 Hrs - Collected 13SW0801

0935 Hrs - Collected 13SW1101

0950 Hrs - BEGAN Site Restoration

DID 13MWT 21, 17, 16, 12, part of 11, 25 (OE) & 26

1145 Hrs - LEFT SWMU 13 FOR LUNCH; B.B. stayed @ SWMU 13

1210 Hrs - ARRIVE @ BLDG #3245

Check In w/ R. BASINSKI

1250 Hrs - LEAVE BLDG FOR ABELL'S NURSERY

1410 Hrs - Return to SWMU 13

Restored 13MWT 11, 15 and part of 18

B.B. Restored 13MWT 22

1630 Hrs - Return to BLDG #3245

Prep. samples for SHIPMENT on COC #0996

1715 Hrs - LEFT BASE FOR FED. EX

1745 Hrs - Drop of SAMPLES at FED. EX AIR BILL #8316 7332 7985

END

Work continued to Page

SIGNATURE		DATE
		5/8/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

SAMPLE SUMMARY 5/09/03

SLUG TESTING FINISHED @
13MW17, 11, 26 & 15

RESAMPLED SVOCS @ 13MW09 & 20

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

FRI. 5/9/03

Work continued from Page

0630 Hrs - Arrive on Base
- B.B. check cali. on YSI
- FAX CoC to OFFICE & LAB
- PREP. to Collect Groundwater Samples

0750 Hrs - Arrive @ 13MWT09 after check in w/ N. Gate Guard
Start Purge @ 0818
END Purge @ 0958
Sample Time @ 1000 for 13GWT0902 & FD05090301

13MWT20
Start Purge @ 1103
END Purge @ 1503
Sample Time @ 1505 for 13GWT2002

1545 Hrs - Finish @ SWMU 13 - Arrive @ BLDG #3245
Packaging & Paperwork
Unload Pick up

1635 Hrs - Left Site for FED. EX.

1700 Hrs - Drop off Samples on CoC # 0989 & FED. EX.
AB# 8316 7332 7096

1715 Hrs - Arrive @ ABECC Nursery
Purchase 1 yard of Top Soil

1805 Hrs - Arrive @ BLDG #3245
Park Pickup inside Port & Ride Back
to motel w/ B.B.

END

Work continued to Page

SIGNATURE [signature] DATE 5/9/03

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Summary 5/10/03

BB SLUG TESTED: 13MWT08, 14 & 20 & started 13MWT02

Restored the following locations 13MWT01 → 08 and
Finished restoration @ 13MWT[illegible]

Purchased 2 yards (2 trips) of Topsoil & 50lbs
Bag of Seed.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

LOCATION	W.L	TIME
13MWT01	5.82	1359
02	17.10	1350
03	8.88	1401
04	12.75	1449
05	4.13	1505
06	15.62	1402
07	3.10	1500
08	2.92	1448
09	7.40	1405
10	13.11	1443
11	7.78	1458
12	7.58	1457
13	3.18	1516
14	13.08	15.14
15	12.63	1432
16	8.61	1425
17	8.09	1423
18	19.04	1436
19	6.80	1529
20	4.00	1410
21	7.34	1421
22	7.25	1420
23	7.17	1412
24	8.23	1413
13MWT 25	16.61	1417
SG 01	1.73	1354
02	3.64	1355
03	1.96	1517
04	2.38	1518
05	3.89	1520
06	2.37	1523
07	1.50	1414
08	5.05	1419
09	4.15	1429
SG 10	4.78	1455
13MWT 26	8.93	1415

~FLOW RATES

- 01: < 1 gpm
- 02: 1-5 gpm
- 03: 1-5 gpm
- 04: 1-5 gpm
- 05: < 1 gpm
- 06: < 1 gpm
- 07: < 1 gpm
- 08: 5-25 gpm
- 09: 5-25 gpm
- SG 10: 20-50 gpm (CANNOT GET TO WEIR DOWNSTREAM OF GAUGE TO MEASURE FLOW) + BANK TO STEEP & SLIPPERY

SUMMARY 5/11/03

TR & ECO ASSESSMENTS @ SWAMPS 13 & 16

RESTORE - 16 MWT 01, 06 & 05
13MWT 24 & BEGIN @ DECLN AREA

BB = SLUG TEST
16 MWT 02, 04 & 05
CONTINUED @ 13MWT02
RESAMPLE WELLS:
16 MWT 06
WES-14-02-03

TR/BB = ROUNDUP W.L. @ SWAMP 13

SCIENTIFIC BINDERY PRODUCTS CHICAGO MADE IN USA

SAT. 5/10/03

Work continued from Page Mostly Cloudy 70's & Humid

0650 Hrs - Arrive @ Site (BLDG #3245)
Call Security & BLDG #265
Also, track Package shipped 5/8/03 - (OK)

0720 Hrs - Arrive @ SWMU 13
Restore 13MWT06, 03 & 01

0930 Hrs - Left Base for ABELLS Nursery

1003 Hrs - Purchase Bulk Top Soil 1 yard @ Nursery

1045 Hrs - Return to SWMU 13
Spread Soil @ 13MWT05 & 08 (07 OK)

1200 Hrs - Heavy Rain Brake for Lunch

1245 Hrs - Return to SWMU 13
Seed & Hay @ 08; ABB will seed &
Hay 13MWT04 while T.K. picks up Seed & Soil

1430 Hrs - Left Site for Seed & Soil

1510 Hrs - Arrive @ Good Earth (ABELLS out of Top Soil)

1552 Hrs - Arrive @ ACELLS for SEED

1640 Hrs - Return to SWMU 13
Finish Hay & Seed @ 13MWT18

1736 Hrs - Return to BLDG #3245
Clean Up - will pick up supplies this evening

1800 Hrs - Left Site

END

Work continued to Page

SIGNATURE Tony Kopek DATE 5/14/03

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TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

SUN 5/11/03

Work continued from Page Mostly Cloudy, 70's & Windy

0645 Hrs - Arrive @ ~~SWMU~~ TA BLDG #3285
Call Security for work @ BLDG 148 & MFB

0710 Hrs - Site Restoration @ SWMU-16
Restore 16MWT01 & 02 & 05

0930 Hrs - Start Eco. Assessment
Take 15 Photos & Cover Type Area

1145 Hrs - Finish Eco. Assement @ SWMU-16

1150 Hrs - Return to BLDG #3285 for Lunch

1220 Hrs - Arrive @ SWMU-13
Restoration @ 13MWT24
Start Eco. Assessment

1350 Hrs - Start Water Levels & Staff Gage Measurements
SEE P. 92; Pick up Farm Lumber

1525 Hrs - END Water Levels. - Resume Eco Assessment
Take Photos 16 → 33

1730 Hrs - Complete Eco. Assessment
BEGIN RESTORATION @ DECON AREA
SPREAD SEED & Hay

1810 Hrs - Return to BLDG #3285
Drop off Lumber in Area Behind BLDG #3285
Prep. to Leave

1845 Hrs - Left Site

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] **DATE** 5/11/03

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MOON 5/12/03 Summary

B.B. Finished Sleg Test @ 13MWT02

B.B/TR Restoration @ Decon Area, 13MWT10, 14 & 19

TR Restoration @ 13MWT20

DEMOB for 9060

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON 5/12/03

Work continued from Page

0715Hrs - Arrive @ Wal Mart - Purchase Hack saw for Mustard Gas Site & drill bit

0740Hrs - Arrive @ Good Earth for 1 yd of top soil

0801 Hrs - Left " "

0845Hrs - Arrive @ BLDG #3245
SEND Faxes to LAB & OFFICE
Some OFFICE CLEAN up
Check in w/ Tom Brent

0930Hrs - Arrive @ 3WMU 13 - Detour on Rte 45
Restart - 13 MWT 10, 14, 19, 20 & Decon

1445Hrs - Return to BLDG #3245
Meet w/ Tom Brent to store core boxes & straw bails

1600Hrs - Return to BLDG #3246 after storage of straw

1630Hrs - Arrive @ Mustard Gase Site
Attempt to drill holes for Well Pt. DITOR - drill not heavy duty enough for the task - put Pt. inside well lid; cut grounding rod @ Mustard Gas site flush w/ ground.

1530Hrs - Return to BLDG #3245 for Demob
- Prep. samples on CoC # 0997 for shipment
- Prep. EQ. for shipment to Pitt Warehouse & U.S. Environmental on FED EX AB# 8243 8234 9739 & 8243 8234 9740 Respectively
- Clean & mop office space
- Inventory EQ. & Supplies
- Clean out Pick up truck

2030 Hrs - Left site for Motel

Note: B.B. Left site @ 1800Hrs to Drop of Samples and EQ @ FED. EX. (Sample on AB# 828074028890)

Work continued to Page

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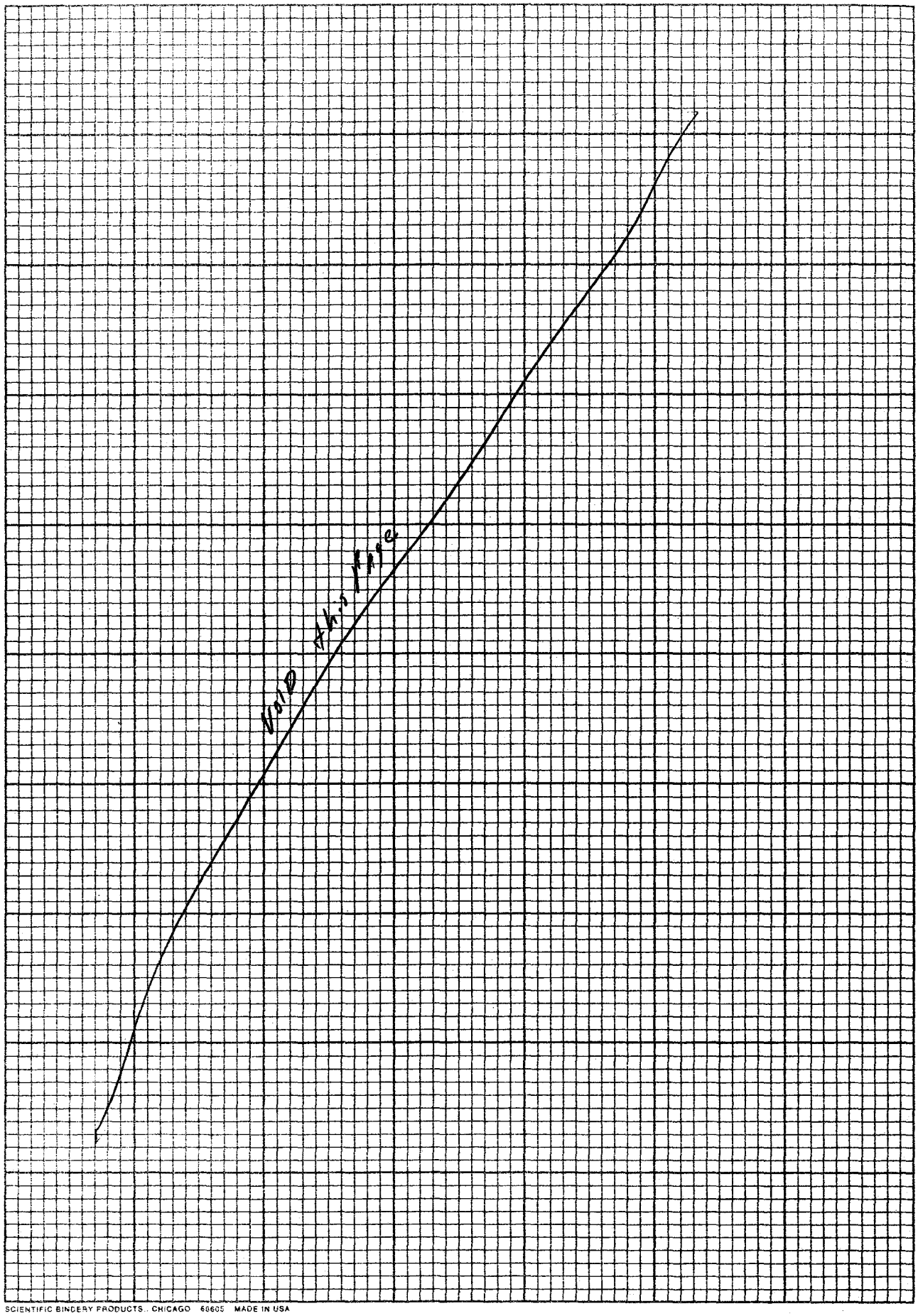
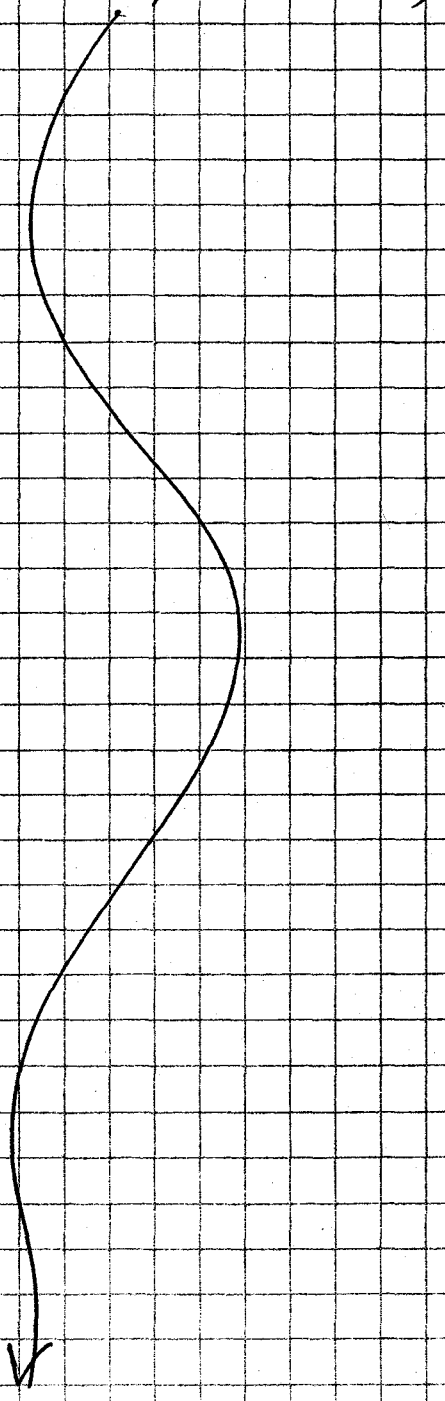


SCIENTIFIC BINDERY PRODUCTS.. CHICAGO 60605 MADE IN USA

Work continued from Page

TRAVEL DAY (only)



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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

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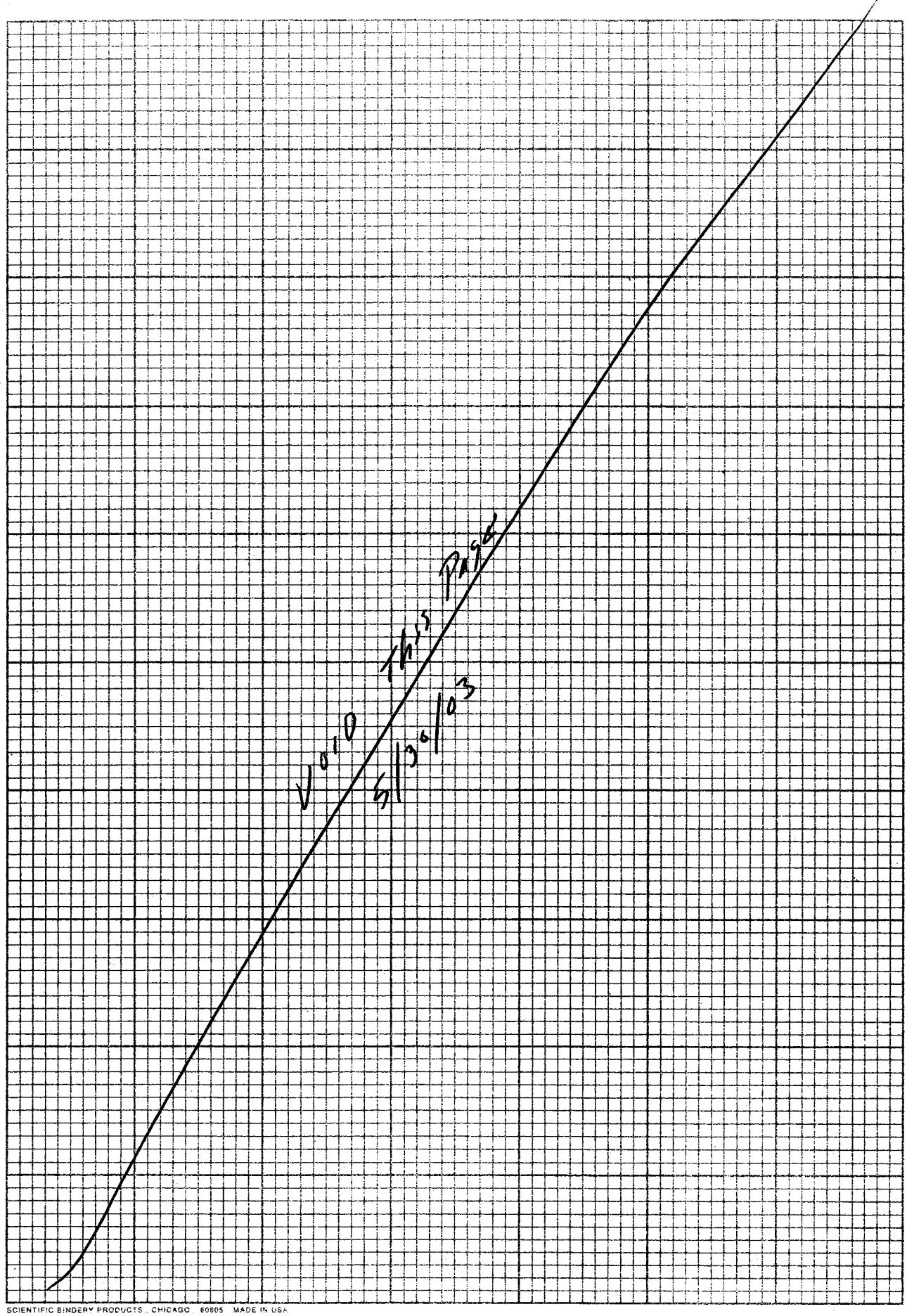

SCIENTIFIC BINDERY PRODUCTS . CHICAGO . 60605 MADE IN USA

FRI - 05/30/03

Work continued from Page

Weather : 75°F & SUNNY (ON SITE WORK @ SWMU-7 FRR)

1640 Hrs - LEFT BLDG FOR SWMU 16

WELL ID	W.L.	TIME
WES-14-01-83	31.00	1714
WES-14-02-83	14.56	1654
WES-14-03-83	19.83	1710
WES-14-04-83	27.27	1718
WES-14-05-83	33.05	1716
16MWT01	22.70	1656
16MWT02	12.18	1706
16MWT03	28.07	1704
16MWT04	13.14	1659
16MWT05	30.39	1701
16MWT06	15.92	1658

1730 Hrs - RETURN to BLDG # 3245

END

SIGNATURE

DATE 5/30/03

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APPENDIX D.1.2
SWMU 13
SITE LOGBOOK
ROUND 2

From: Rojahn, Terry
Sent: Wednesday, October 15, 2003 4:07 PM
To: 'Tom Brent'
Cc: Basinski, Ralph
Subject: RE: Bowser Morner personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

Tom, the following personnel from Bowser Morner need clearance, however not all of them will be starting work on October 20, 2003:

Tim Boehmer	Dayton, OH
Ken Boehmer	Dayton, OH
John Davis	Dayton, OH
Jon Keifer	Dayton, OH
Maynard Laati	Dayton, OH
Dennis Sinic	Dayton, OH
Robert Trader	Dayton, OH
Todd Wollenhavpt	Dayton, OH
Nick Post	Dayton, OH
Tony Mayrer	Dayton, OH
Joshua Dean	Toledo, OH
James Walsh	Toledo, OH

All the above are US citizens.

Just a heads up...you should be receiving a lot of coolers and equipment over the next few days.

-----Original Message-----
From: Basinski, Ralph
Sent: Wednesday, October 15, 2003 2:34 PM
To: 'Tom Brent'
Cc: Rojahn, Terry; Cochran, Matthew; Wudkwych, Frank; Ramser, Fred; 'Bill Gates'; Goldman, Mary Lou
Subject: TtNUS Personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16 starting October 20, 2003

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec

All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers has been made to Bowser-Morner. Terry Rojahn is in contact with the driller and will send an e-mail to you with the list of drillers and their home office locations.

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

Work (

Basinski, Ralph

From: Basinski, Ralph
Sent: Tuesday, October 07, 2003 2:30 PM
To: Cochran, Matthew; Rojahn, Terry; Schubert, Jeff
Cc: 'Bill Gates'; 'Tom Brent'; Johnston, Tom; Goldman, Mary Lou
Subject: Access for Fieldwork at SWMUs 13 & 16

Terry, Jeff, and Matt

Tom and Bill informed me of the following.

SWMU 13 – No operations will be occurring that will limit access. Follow the procedures developed last time in regards to access.

SWMU 16 - Operations will be occurring. The Army has agreed to limit operations to Monday through Thursday on alternate weeks. SWMU 16 cannot be accessed during that time. No operations will occur on Friday, Saturday, and Sunday. SWMU 16 is fully accessible during that time. Please note that the Army is working the 4-10s in order to accommodate our fieldwork at SWMU 16. Therefore, we need to make sure that any schedule changes are communicated to the Tom and the Army as soon as known. Also, we should inform Tom as soon as our work at SWMU 16 is complete so that the Army can revert to their normal schedule.

Ralph

-----Original Message-----
From: Basinski, Ralph
Sent: Tuesday, October 07, 2003 1:57 PM
To: 'Tom Brent'
Cc: 'Bill Gates'; Johnston, Tom; Cochran, Matthew; Rojahn, Terry
Subject: Fieldwork at SWMUs 13 & 16

Tom

As you are aware we are scheduled to be in the field starting October 20, 2003 at SWMUs 13 and 16. Currently we are in the office mobilization and planning phase.

During the last field event we ran into access issues at SWMUs 13 and 16 due to operations occurring at these facilities. Can you find out anything about the operations schedules from October 20 through mid-December. This information would be useful for planning purposes.

Also, during the last field event, security / access procedures were established for TtNUS and subcontractor staff. Was anything written regarding these procedures? If something written is available, please provide a copy or call me to discuss.

Ralph

SIGNATURE | DATE

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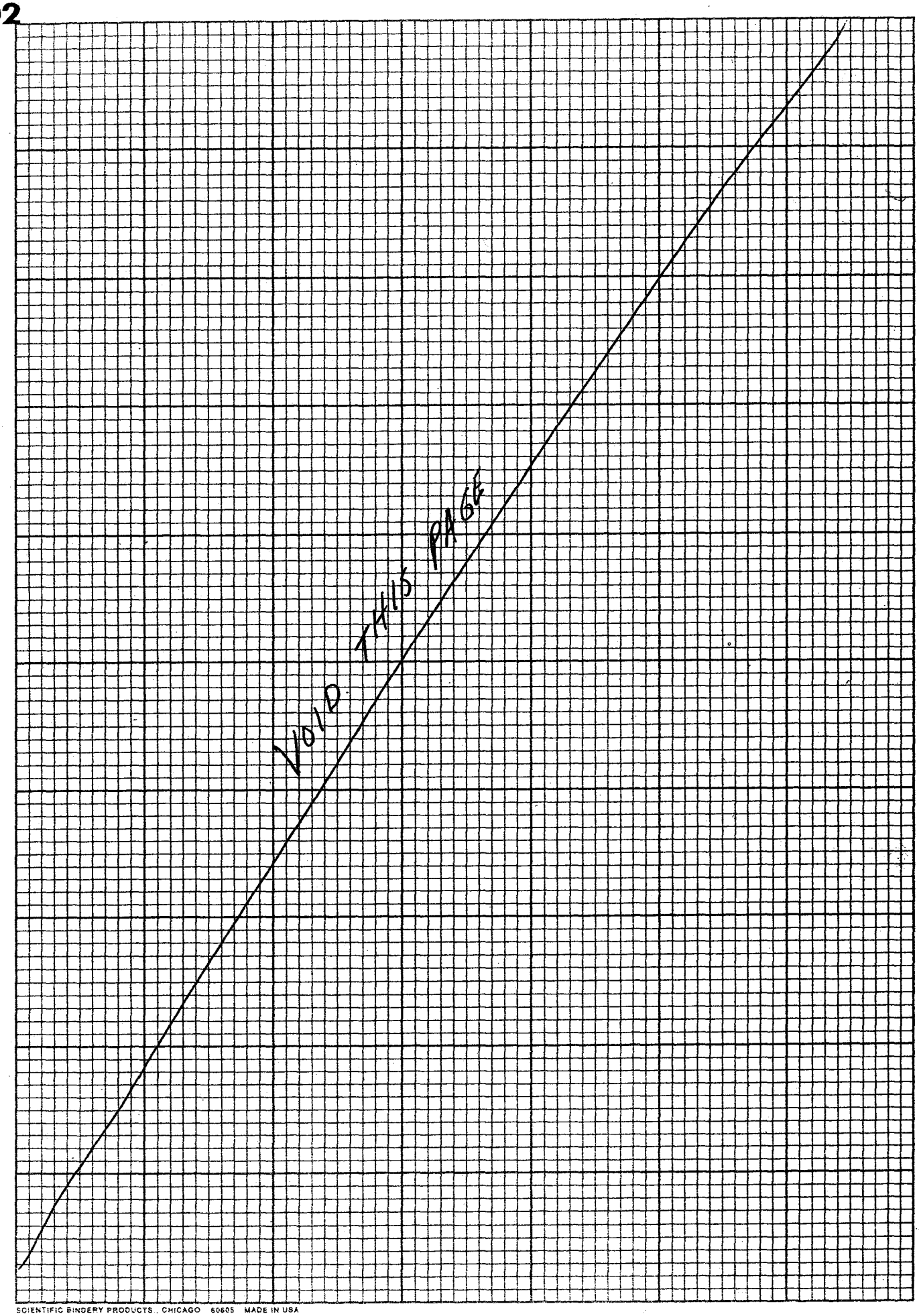

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

Monday 10-20-03

Work continued from Page

0700 Hrs - Arrive @ Pitt Airport
TRAVEL DAY

1300 Hrs - Arrive @ NSWC CRANE
OBTAIN BADGE

1315 Hrs - Arrive @ BLDG 3245
OPEN & BEGIN to ORGANIZE EQ & SUPPLIES
SHIPMENT
MISSING SOME RENTAL EQ. - BLADDER PUMP,
(2) M-SCOPES, (1) YSI etc.

1400 Hrs - DRILLERS ARRIVE - UNLOAD SUPPLIES & EQ

1415 Hrs - T.R. & F.R. ARRIVE @ PUBLIC WORKS
OBTAINED Dig PERMITS
1) WEST SIDE OF SWMU 13 MINE FILL B
~10 WELLS CLEARED FOR DRILLING
2) MUSTARD GAS SWMU 1 Complete Site

1445 Hrs - RETURN to BLDG. #3245
MEET W/ DRILLERS JON KEIFER, DENNIS SIMIC &
TODD WOLLENHAUPT - NEEDED to GET
BADGED @ Bloomington Gate

1520 Hrs - DRILLERS RETURN - go to check out drilling
LOCATIONS W. OF MINE FILL B

1650 Hrs - RETURN to BLDG #3245
PAPERWORK, PREP FOR H&S MEETING FOR TOMORROW

1745 Hrs - LEFT BASE

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10/20/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

10/21/03

BOWSER MORNER

- RECEIVE HES TRAINING
- RECON WELL LOCATIONS W OF MINE FILL B
- PURCHASE SUPPLIES FOR DECON PAD
- BUILD DECON PADS
- OBTAIN 20 SLOT SCREENS
- TRACK DOWN BULLDOZER TO CONSTRUCT ROADS TO WELLS @ MINE FILL B (W. SIDE)

SAMPLING:

- CONDUCTED SEER SEARCH W SIDE OF MINE FILL B - SEER 135P04 FOUND
- CONDUCTED TRENCHING ACTIVITIES - MC & EVI

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE

TUES. 10-21-03

Work continued from Page

0655 HRS - ARRIVE @ BLDG #3245
H&S SITE SPECIFIC TRAINING

TH NUS

BOWSER MORNER

MATT COCHRAN MC
FRED RAMSER FR
FRANK WUDKWYCH FW
T. ROMANA T.R

TIM BOEHMER (TB)
JON KEIFER (JK)
TODD WOLLENHAUPT (TW)
DENNIS SIWIK (DS)

- EQUIPMENT INSPECTION
- GO OVER WORK PERMITS

0910 Hrs - T.B, JK, MC FR & TR RECON W. SIDE OF MINE FIELD B : T.B. UNABLE to comment ROTASONIC Rig to drill in AREA UNLESS ACCESS ROADS ARE CONSTRUCTED.
CHECK IN WITH OFFICE - MC. will coordinate Road construction w/ T. BRENT & NSWC CONS FORESTER

1100 Hrs - T.C. & F.R checking w/ Public Works to SEE IF other AREAS CAN be CLEARED besides W. Side of MINE FILL B - Public Works still having problems to complete SWMU 16 by 10/25/03 & REMAINDER of MINE FILL B by 10/27/03
DONNA Zollman told T.R. that WELLS & Borings inside MINE FILL B WERE not located - T.C. & F.R. will locate & get back to Public Works which job is ACCOMPLISHED.

1200 Hrs - LUNCH

1230 Hrs - RETURN to BLDG #3245

- M.C. & F.R. TRENCH (2) SEEPS & (1) SW location, w/ backhoe & dig ONE SW location w/ SHOVEL
- RECON & OK Road CONSTRUCTION FOR ACCESS to drilling locations W/ of MINE FILL B w/ ROTASONIC T. BRENT & FORESTER CONFIRM - BE CAREFUL & AVOID ALL SHAGBACK hickory TREES (COUNT & SAP ring)

Work continued to Page

SIGNATURE [signature] DATE 10/21/03

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Brent Thomas J CNIN
From: Johnson, Douglas G (PKI) [DOUG.JOHNSON1@US.ARMY.MIL]
Sent: Tuesday, October 07, 2003 3:56 PM
To: Clinton, Leah K (PKI); Voorhies, John D (PKI); Roach, Michael D (PKI)
Cc: Brent Thomas J CNIN
Subject: FW: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

Partial list of TetraTech employees that will be conducting fieldwork @ MFB and 146. Will provide the names of the drilling crew as soon as Tom forwards.

-----Original Message-----

From: **Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]**
Sent: Tuesday, October 07, 2003 2:27 PM
To: Johnson, Douglas G (PKI)
Subject: FW: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

Doug,

Here's the partial particulars. Current plan is to begin work at B146 on Friday, October 24, 2003. I'll pass along the names of the drillers once I get them. Note that SWMUs 1, 13, & 16 are Mustard Gas Burial Grounds, Mine Fill B, and B146, respectively.

Thanks,
Tom

-----Original Message-----

From: **Basinski, Ralph [mailto:BasinskiR@ttnus.com]**
Sent: Tuesday, October 07, 2003 2:13 PM
To: Brent Thomas J CNIN
Cc: 'Bill Gates'; Rojahn, Terry; Cochran, Matthew; Johnston, Tom; Goldman, Mary Lou
Subject: TtNUS Participants in Fieldwork at SWMUs 1, 13 & 16

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16.

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec
All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers will be made shortly. Once the award is made the driller will be requested to provide a list of staff and their office locations.

The fieldwork is scheduled to start on Monday, October 20, 2003.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

Brent Thomas J CNIN

From: Brent Thomas J CNIN
Sent: Thursday, October 16, 2003 1:41 PM
To: Johnson Douglas G CNIN
Subject: FW: Bowser Morner personnel Participating in Fieldwork Starting O ctober 20, 2003 at NSWC Crane

Doug,

As promised, here is the list of drillers who will be working with the Tetra Tech folks on the upcoming fieldwork at B146 and MFB. Please distribute to CAAA Security. As a reminder, they will begin mobilizing here on Monday, October 20, 2003. The 1st shift will end on Wednesday, October 29, 2003. Please let me know if you have any questions.

Thanks,
Tom

-----Original Message-----
From: Rojahn, Terry [mailto:RojahnT@ttnus.com]
Sent: Wednesday, October 15, 2003 3:07 PM
To: Brent Thomas J CNIN
Cc: Basinski, Ralph
Subject: RE: Bowser Morner personnel Participating in Fieldwork Starting O ctober 20, 2003 at NSWC Crane

Tom, the following personnel from Bowser Morner need clearance, however not all of them will be starting work on October 20, 2003:

	Tim Boehmer (TM)	Dayton, OH
	Ken Boehmer	Dayton, OH
	John Davis	Dayton, OH
	Jon Keifer (JK)	Dayton, OH
*	Maynard Lahti (ML)	Dayton, OH
	Dennis Sinic (DS)	Dayton, OH
	Robert Trader	Dayton, OH
	Todd Wollenhaupt (TW)	Dayton, OH
	Nick Post (NP)	Dayton, OH
	Tony Mayrer	Dayton, OH
*	Joshua Dean JD	Toledo, OH
*	James Walsh JW	Toledo, OH

All the above are US citizens.

Just a heads up...you should be receiving a lot of coolers and equipment over the next few days.

-----Original Message-----
From: Basinski, Ralph
Sent: Wednesday, October 15, 2003 2:34 PM
To: 'Tom Brent'
Cc: Rojahn, Terry; Cochran, Matthew; Wudkwych, Frank; Ramser, Fred; 'Bill Gates'; Goldman, Mary Lou

Subject: TtNUS Personnel Participating in Fieldwork Starting October 20, 2003 at NSWC Crane

The following Tetra Tech NUS, Inc. personnel will be participating in fieldwork at NSWC Crane SWMUs 1, 13, and 16 starting October 20, 2003

Terry Rojahn
Matt Cochran
Frank Wudkwych
Fred Ramser
Robert Balkovec

All of these staff are located at Pittsburgh, Pennsylvania office of Tetra Tech NUS.

The award for the drillers has been made to Bowser-Morner. Terry Rojahn is in contact with the driller and will send an e-mail to you with the list of drillers and their home office locations.

L. Clinton : 854-3960

Brent Thomas J CNIN

From: Johnson, Douglas G (PKI) [DOUG.JOHNSON1@US.ARMY.MIL]
Sent: Monday, October 20, 2003 9:37 AM
To: Clinton, Leah K (PKI)
Cc: Voorhies, John D (PKI); Brent Thomas J CNIN
Subject: TetraTech Fieldwork @ MFB

Leah,

Just wanted to make you aware that TetraTech personnel conducting fieldwork usually work until dark. Are there any special procedures we need to implement for after normal hours-work?

If after hours work is a problem, please let me or Tom Brent know.

Doug Johnson
Environmental Protection Specialist
SJMCN-SF
Crane Army Ammunition Activity
(812)854-1481
DSN 482-1481

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

10/21/03 Cont'd

Work continued from Page

- T.K. & F.R. - problems accessing MINE FIELD B; security @ North Gate needed E-Mail to confirm our access - T. Brent got access E-Mail to Gate via D. Johnson & L. Clinton see Pages 106 + 108
- TK & F.R. → Accessed MINE FIELD B @ 1500 Hrs & Talked w/ Mr. Kluesner; Talk Mr. Kluesner about drilling & sampling activities in area - Mr Kluesner said extraction may be completed in ~ 1 week & Bldg #165 Buffer Zone will not be needed
- TK & F.R. - Lay out 5 well & 10 Boring locations within MINE FIELD B
- TK & F.R. - Return to Public Works to let Donna know that above was accomplished

1640 Hrs - Return to BLDG #3245

- Paperwork
- Check on sediment & soil containers w/ Anna Ho - should arrive tomorrow
- Check in @ Pit Office - T. Johnston - report progress w/ accessing MINE FIELD B; decission to build Roads W. of MINE FIELD B; & Progress w/ seep search & trenching

1730 Hrs - Left Site for Lowes (F.R. & TK) & Sams (F.R. & MC, to Purchase supplies.

1840 Hrs - Return to Hotel.

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE			DATE
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T+NUS - Crew same as 10/21/03 P. 105

MB - " " " " P. 105

10/22/03 Summary

Drilling:

- Bull Dozer Arrived this date
- Installed 13MW740
- Start Installation of 13MW740
- Site Access Completed on W. Side of Mine Fill B to Access Locks on Sewer Utility Corridor
- See Note Book 2555 for Details

Sampling Completed:

Seeps	Surface Water	Sediment
135P0101	13SW1601	13SD29000Q (13FD10220302)
135P0201	13SW1401 (13FD10220301)	13SD31000Q
135P0301	13SW3101	13SD30000Q
135P0401	13SW2201	13SD28000Q
	13SW1302 (13FD10220305)	
	13SW1202	
	13SW3001	

CoCs = 4801, 4802 & 4803; Shipped this date on AB # 8412249110571 to Locks

Surface Water Locations that were Dry:

13SW29, 13SW15 & 13SW28

Dry Seep: Seep Location 4 down grade of 13SW15.

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED 10/22/03

Work continued from Page

WEATHER - Mostly Sunny TEMP 60°; mild

0650Hrs - ARRIVE @ BLDG #3245
- CHECK IN W/ R. BASINSKI
- " YSI & LaMotte
- INVENTORY BOTTLE SHIPMENT
- PREP. to SAMPLE SW/SD

0820Hrs - CHECKED ACCESS AREAS W.OF MINE FIELD FOR CLEARING FOR ROTASONIC RIG - MARKED TREES NOT TO BE REMOVED (trees 20" DBH); NO SWAG BASIC HACKLES WERE REMOVED

0930Hrs - START SAMPLING SURFACE WATER & SEDIMENT @ SWMU 13; FRANK, MATT & TERRY

1130Hrs - LUNCH

1200Hrs - REFRIGERATE SAMPLES @ BLDG #3245 TAKEN THUS FAR - SECURED IN REFRIGERATOR

1230Hrs - RETURN to SWMU 13 CONT SAMPLING SW, SD & SEEPS

1630Hrs - RETURN to BLDG #3245
PREP. SAMPLES COLLECTED THIS DATE FOR SHIPMENT ON COCs 4801, 4802 & 4803 to LAUCKS ON AB# 8412 2491 1051

1800Hrs - LEFT BASE FOR FED. EX

1835Hrs - DROP OFF SAMPLES @ FED. EX

1900Hrs - RETURN to MOTEL

END

Work continued to Page

SIGNATURE Ted Rogut DATE 10/22/03

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T4N45 / BM - CREWS SAME AS 10/21/03 P. 105

10/23/03 SUMMARY

SAMPLING: SURFACE WATER (SW) & SEDIMENT (SD)

SW:

13SW08, 10, 18, 19, 20 & 27

SD:

13SD24, 25, 26, 27

SAMPLES SHIPPED VIA FED. EX AB# 8412 2491 0813
ON COCS 4804 & 4805

DRILLING SUMMARY

INSTALLED 13MWT40

INSTALLED UPPER CASING @ 13MWT41

SEE NB# 2555 POC DETAILS

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

THUR. 10/23/03

Work continued from Page

WEATHER - Mostly Sunny TEMP 60's

0700 Hrs - ARRIVE @ BLDG #3245
- Prep. to sample SW/SD @ SWMU 13
- Check YSI cali.
- Calibrate LaMotte
- FAX CoCs FROM 10/22/03 to Quicks Lab & OFFICE (E.S.)

0830 Hrs - Check in @ N. GUARD Gate @ SWMU 13 (out @ 0900

0850 Hrs - Begin sampling SW/SD @ SWMU 13

1100 Hrs - LUNCH

1150 Hrs - ARRIVE @ BLDG #3245
SECURE MORNING SAMPLES in Frdg.

1215 Hrs - RETURN to SWMU 13 cont sampling SW/SD

1450 HRS - RETURN to BLDG #3245
- PACKAGING + PAPERWORK OF SAMPLES ON CoCs 4804 & 4805
- Contact Donna (Public Works) SWMU 16 will NOT be CLEARED FOR this weekends work (drilling only)
- Dig PERMIT FOR SWMU 13 inside bldg FENCED

Dig Permits

- TALK w/ R. BASINSKI - Progress Report
- CLEAN / ORGANIZE FIELD OFFICE

1745 Hrs - F.W. & M.C. LEFT SITE to DELIVER SHIPMENT to FED. EX (SAMPLES ON CoCs 4804 & 4805)
T.R. REMAINED ON SITE - PAPERWORK, ETC. to WAIT ON drilling CREW & F.R.

1845 Hrs - LEFT BLDG 3245 FOR MOTEL

END

SIGNATURE [signature] DATE 10/23/03

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B 100 P ©

THULS - SAME CREW
BM - JK, DS, TW & NEW ARRIVAL Nick Post

10/24/03 SUMMARY

SAMPLING & Collected

SW	SD
13SW3201	13SD32 & 16SD19, 17, 16, 18
16SW1701	15, 14, 21 & 22
16SW1801	
16SW1401	
16SW2101	

SAMPLES SHIPPED VIA FED. EX AB # 8412 2491 0824
ON COC's 4806 & 4807.
* Conducted SEEP SEARCH, NONE FOUND THIS DATE. @ SWMU 16

Drilling:

- Nick Post on site this Date - FE gave him the 5
- Installed 13MW-37
- Drilled to 40' BGS @ 13MW-38, Cored 25-40' BGS
- See Notebook # 2555 for Additional Detail

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

FRI 10/24

Work continued from Page

WEATHER Mostly sunny, Temp 60°s

0655 Hrs - ARRIVE @ BLDG # 3245
- FAX COCs to OFFICE & LAB (LAUCKS)
- GIVE T. Brent personnel NAMES FOR WEEK END WORK
- CALL IN TIME FOR MC, FW, FR & TR
- PREP FOR SW/SD SAMPLING
- CALL Sandy checked on Nitrite Standard - SHOULD HAVE MORE
- FW & MC. will grab SAMPLES @ 13 SW/SD 32

1000 Hrs - LEFT FOR SW/SD SAMPLING @ SWMU 16 (TR)

Sampled 16 SD 19 & SW/SD 17 - CONDUCTED SEEP SEARCH

1200 Hrs - LUNCH

1230 Hrs - ARRIVE BLDG #3245 - DROP OFF & REFRIGERATE SAMPLES
- Called TRAVEL - MAKE ARRANGMENTS FOR NOV 3 - 12TH
- Called LAUCKS - Check on THURS. DELIVERY ... MISSING
- Called Public Works - CHECKED ON Dig Permits
  - CANNOT get into SWMU 16 - Flags up
  - MAY FINISH SWMU 13 by Monday

1315 Hrs - ARRIVE @ SWMU 16 - Cont SAMPLING SW/SD

1630 Hrs - RETURN to BLDG #3245

PREP. SAMPLES FOR SHIPMENT

ON COCs 4806 & 4807

1750 Hrs - LEFT BASE FOR FED. EX.

1830 Hrs - DROP OF Samples FOR SAT DELIVERY @ FED EX UNDER AB # 8412 2491 0824

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
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THIS - SAME

BM - DS, TW & NP

10/25/03 SUMMARY

SAMPLING:

MC & FW - Collect SW1503
16SW1501, 16SW1501201, 16SW1501301 &
16SW2001.

MC, TC & FW - Collected GW
16GW0202 & 16GW0502

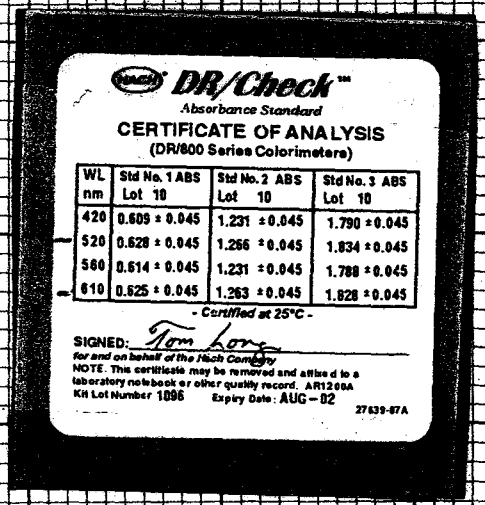
1 OF 3 COOLERS SHIPPED 10/23/03 WAS LOST BY FEDEX
LAB STILL CHECKING ON IT @ SEATAC.
2 OF 3 FOUND THIS DATE

DRILLING:

INSTALLED ISOLATION CASING @ 13.7 MW-38

AFTERNOON RAIN DELAY.

SEE NB 2555 FOR ADDITIONAL DETAIL



SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

SAT 10/25/03

Work continued from Page

Overcast w/ Periods of Rain

0650 Hrs - Arrive @ BLDG #3245

- PREP to Finish SW/SD sampling @ SWMU 16
- PREP to Collect GW samples @ SWMU 16

Cali. Additional YSI & LaMotte Meter

Cali. PID

Determine order of well sampling w/ relationship to hits & MNA

CHECK OUT NA METER DR/890 Colorimeter

1) Absorbance Solution For Inst. Performance Verification

Program #	nm	Standard 1	Standard 2	Standard 3
42	420	0.629	1.216	1.850
52	520	0.612	1.267	1.832
56	560	0.586	1.204	1.760
61	610	0.581	1.243	1.839

2) Accuracy Check for Nitrite using NO_2^-N Standard = 5mg/L

- 5.00ml/2.50mg/L NO_2^-N Standard dilute IN 250mL Vol flask
- Above took 10ml of dilute (500mg/L) & diluted in 500mL " "
  to make 0.100mg/L NO_2-N
- Ran test using Above Dilute - Results 0.091
  Should read between 0.090 & 0.110

1200Hrs - LUNCH

1245Hrs - Prep for GW Sampling @ SWMU 16 @ 1400 Hrs

FW on 16GW0202

MC & TR on 16GW0502 - ~~Collected~~ NA Parameters

1800Hrs - Arrive @ BLDG #3245

Clean up; bring in meters; decon b/bailer pump etc.

1900Hrs - Left NSWC Crane for Motel

End

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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T+ HUS - SAME CREW
BM - JK, DS, TW & NP

DRILLING:

Grouting top off casings & holes
Installed 1 PAD @ 13MT37

SAMPLING:

GW @ SWMU-13

WES-M-04-83
WES-14-01-83
16MWT82

Laid out soil boring @ SWMU 16

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Work continued from Page

WEATHER - OVERCAST AM SUNNY AFTERNOON & COLD

0650 Hrs - Arrive @ BLDG #3245
Prep to smoke GW @ SWMU 16
Cal. Instruments, etc.

0830 Hrs - Arrive @ SWMU 16
Assist MC with set up @ 16GW01
F.W. to smoke @ 16GW04

1015 Hrs - Set up @ 16GW02 - to run NA w/ ER.

1131 Hrs - Finish Running NA @ 16GW02
Lay out all 9 soil Borings @ SWMU w/ ER

1330 Hrs - Lunch

1404 Hrs - PR to check on drillers
TR PAPERWORK, ORGANIZE OFFICE & FIELD Doc.

1750 Hrs - LEFT NSWC CRANE FOR MOTEL

END

Work continued to Page

SIGNATURE			DATE
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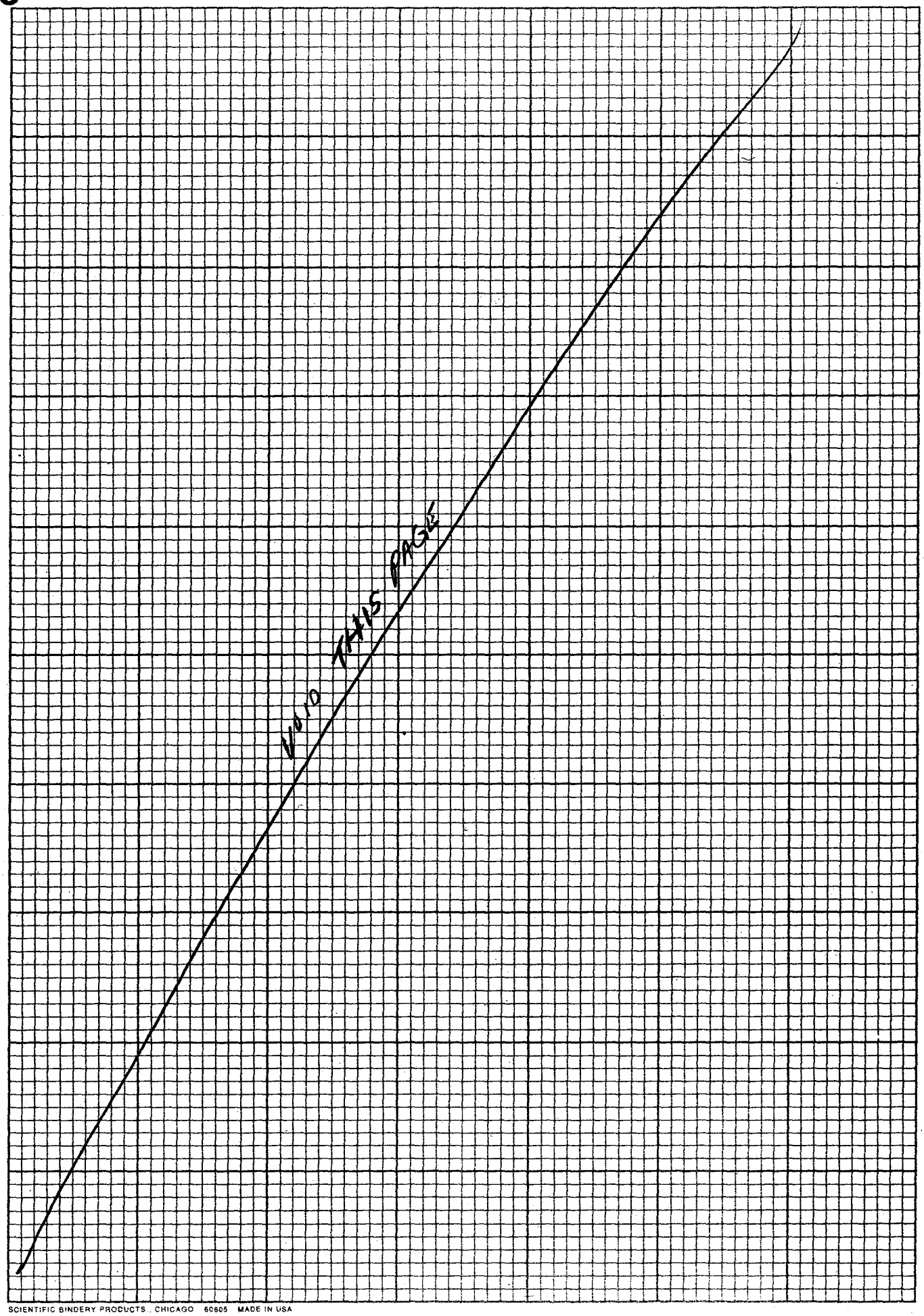

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

Mon. 10/27/03

Work continued from Page Weather AM Cold PM Sunny

0700 Hrs - Arrive @ BLDG #3245
- Cal. Instruments
- Check on Dig Permit
- Problems Associated w/ Dig Permits Talk to T. Brent
  SWMU 13 - Production
  SWMU 16 - Security
- Start Prep for Well Dev. - check pumps

0915 Hrs - Talked to T. BRENT - Public work must think to existing wells need cleared - will go check if proposed are cleared

0918 Hrs - Leave for SWMU 13

0923 Hrs - Check in @ N. Gate SWMU 13 Guard
Check for clearance Utility Pass inside SWMU 13

0956 Hrs - Check out @ N. Gate w/ Guard

1020 Hrs - Talk w/ Tom Brent - No water/sewer located on West side/~~NS~~ IOE FENCE @ SWMU 13
- Tom called PW - checked to w/ Compressed Air & Sewer & personnel Water, Also if they need any access help we would be available

1100 Hrs - T. Brent & T.R - met with Max @ N. Gate
Assisted with locating utilities

1215 Hrs - LEFT Mine Fill B - Max to sign work permit

1220 Hrs - Arrive @ P. Works - All signed but Compressed Air

1230 Hrs - Talked to T. Brent - Tom said that Compressed Air personnel would be showing after lunch

1300 Hrs - Picked up ~~Check~~ DIG Permit - Drilling CREW OFF Stand By ~1310 (Returned to BLDG #3245)
- Check in w/ OFFICERS.
- CHECKED IN W/ LAUCKS - Coolers arrived in Temp.
- More Coolers & UNPRESERVED HDPE on the way
- Check in w/ MicroSeeps - sending additional bottle sets & Coolers
- Called U.S. ENVIRONMENTAL FOR Working Groupons
- FAX Cards to LAUCKS & OFFICES

Work continued to Page 122

SIGNATURE Ted Yost DATE 10/27/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CREWS SAME AS on 1/4

SAMPLING:

1BSW15 01, 28, 09, 25, 07, 24 & 26 Samples this Date

LAUCKS samples SHIPPED on COEC's #4804, 4811, 4813 & 4814 via FED EX AIR# 8412 2491 1020

MICROSEEPS samples SHIPPED on COEC #4812 via FED EX AIR# 8412 2491 0846

DRILLING:

Stand By All Morning

39' of Isolation Casing Installed @ 13 mud lbs

10/27/03 Cont

Work continued from Page

- PACKAGING & SHIPPING
  1) LAUCKS (10 Coolers) AB# 8412 2491 1040
     COPC's # 4808, 4811, 4813, & 4814
  2) MICROSEEPS (1 Cooler) AB# 8412 2491 0846
     COPC # 4812
  3) US ENVIRONMENTAL AB# 8412 2491 0835
     GEOPUMP

1715 Hrs - LEFT NSWC CRANE FOR FED EX

1800 Hrs - DROP OFF SAMPLES @ FED. EX

1820 Hrs - PURCHASE PAPER TOWELS, Zip Lock Bags & drinking WATER @ SAMS

END

Work continued to Page

SIGNATURE Terry Agt

DATE 10/27/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREWS SAME AS ON P.114

SAMPLING

13GWT 24, 23 & 19 SAMPLED THIS DATE
ALONG WITH 2 SOURCE BLANKS
LABELS SAMPLES SHIPPED ON C-of-C # 4815
VIA FED EX AB# 8812 2491 1030

DRILLING

SET two Isolation Casings @ 13MWT 45 & 35 and
Drilled shallow WELL 13MWT 32 to TD.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TUES 10/28/03

Work continued from Page

0700 Hrs - Arrive @ BLDG. #3245
Call Metcs (YSI, Turb. & PID)
Refax CoCs to Lauches
Prep. to sample GW @ SWMU 13 & Run MNA
0810 Hrs - Arrive @ Mine Fill B AFTER checking in w/Guard
Set up @ 13MWT23 & 24
Run NA on both wells
1050 - 1151 Hrs - Run NA @ 13MWT24
1200 Hrs - Lunch
1230 Hrs - Return to BLDG #3245
Refrigerate Samples from 13MWT24 & Pick up supplies
1355 Hrs - 1438 Hrs Run NA @ 13MWT23
1450 Hrs - Finish Cleanup inside Mine Fill B ~~Ph~~ TK
1500 Hrs - Check in w/ N. Gate Guard ... Report Everyone out of Mine Fill B including Drilling Crew
1515 Hrs - Arrive @ BLDG #3245
- Unload Rental Car
- TK Collect Trip Blank TB102803 01
- FW & TK collect Source Blanks
1) SB102803 01 - Drilling Water
2) SB102803 02 - DI Water Reagent Grad Water
NEEL Lot# 0807253
EXP 08-2004
- Check in w/ R. Basinski - Reviewing Work Proce
- Packaging & Shipping
1755 Hrs - Left NSWC Crane for FED. EX.
1832 Hrs - Drop of Samples on AB# 8912 2491 1030

END

Work continued to Page

SIGNATURE [signature] DATE 10/28/03

READ AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW : T+NGS > FRASER & T. KOJACH
BM = JK, DS, TW & NP

Drilling : Complete installation of 13 mm @ 32

Sampling : None this date - Travel Day

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED. 10/29/03

Work continued from Page

0655 Hrs - Arrive @ Bldg #3245

- Fax Copy 4815 to Lauck's & Office from Yesterday's Sampling Effort
- Submit Personnel Names to T. Brent for next Shifts Passes.
- Organize Office
- Sweep & Mop Office Area, Lab & Bathroom & path to Bathroom.

0930 Hrs - Left NSWC Crane for Airport

Remainder of Day's Travel

END

Work continued to Page

SIGNATURE			DATE 10/29/03
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DR/Check™
Absorbance Standard

CERTIFICATE OF ANALYSIS

WL nm	Std No. 1 ABS Lot 43	Std No. 2 ABS Lot 43	Std No. 3 ABS Lot 43
420	0.610 ± 0.050	1.199 ± 0.050	1.770 ± 0.050
520	0.617 ± 0.050	1.220 ± 0.050	1.804 ± 0.050
560	0.593 ± 0.050	1.212 ± 0.050	1.756 ± 0.050
610	0.621 ± 0.050	1.227 ± 0.050	1.786 ± 0.050

- Certified at 25°C -

SIGNED: Patrick J. Heckman

for and on behalf of the Hach Company
NOTE: This certificate may be removed and affixed to a laboratory notebook or other quality record. AR603A

Kit Lot Number 3281 Expiry Date: Feb 2005 27639-87A

DR 890

DR/Check™
Absorbance Standard

INSTRUMENT READING

WL nm	Std No 1 ABS Lot 43	Std No 2 ABS Lot 43	Std No 3 ABS Lot 43
420	0.622	1.223	1.804
520	0.618	1.240	1.797
560	0.596	1.187	1.734
610	0.594	1.213	1.792

RECORD INITIAL VALUES IN ABOVE TABLE

NOTE: This certificate may be removed and affixed to a laboratory notebook or other quality record. AR603A

Kit Lot Number 3281 Expiry Date: Feb 2005 27639-87B

DR 850

52	0646	1.234	1.815
61	0.627	1.238	1.809

MC's Crew - Set up on 13MW-T29 (ATV Crew)
See NB# for Details

FR's Crew - Set up & start drilling @ 13MW-T22
See NB# 2333 for Details
(Rotasonic Crew)

MON 11/03/03

Work continued from Page

1425 Hrs - ARRIVE @ BLDG 3245
- CAL: YSIs ; Problem w/ pH SENSOR on 98FT#7848

1500 - 1545 Hrs - HES FOR J. WALSH & J. DEAN
M. LAHTI WAS A NO SHOW - to ARRIVE tomorrow

1600 Hrs - PREP. FOR WELL REC. OF 11/04
PREP. to CALIBRATE PUMPS
CHECK DO CALIBRATIONS w/ ABSORBANCE STANDARDS
CHECK IN w/ K. BASINSKI

1820 Hrs - LEFT SITE (BLDG #3245) FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 11/3/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

CREWS:

TH NOS - F, W, R, K, M.C. & TK

BM - ML, JK, D.S., TW, NP, JW & JD

SUMMARY 10/4/05

SAMPLING:

DEVELOPE WELLS

13MW T 42, 40, 37 & 32

DRILLING:

INSTALLED 13 MW T 29

13 MW T 28 ~~C.S.O. only~~ (TK) Isolation Casing

13 MW T 39

13 MW T 38 Isolation Casing

SEE NOTE books #2565 (ML) & 2553 (ER) For Details

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TUES 11-04-03

Work continued from Page

WEATHER Mostly Sunny Temp High 70's Low 80's

0650 Hrs - Arrive @ BLDG #3245
Prep to HES Train M. LANTI
0700 - 0800 Hrs - Training (HES) M. LANTI
0830 Hrs - Receive M.L's HES Paperwork
Prep. to Develope Wells
0845 Hrs - Show M.L. SWMU 13
0930 Hrs - Arrive @ 13MWT42
Develope Well Start = 0939
Stop = 1021 Volume Purged (3L) dry out 3 times
1035 Hrs - Arrive @ 13MWT40
Start = 1053
END = 1145 Volume Purged (11.5gal) dry out 3 times
1200 Hrs - Lunch
1230 Hrs - Arrive @ BLDG #3245
Decon Pumps & Call Office
1315 Hrs - Return to SWMU 13 WELL 13MWT37
Start = 1329
END = 1417 Volume Purged (10gal) dry out 3 times
1426 Hrs - Arrive @ 13MWT32
Start = 1435
END = 1522 Vol. Purged (8gal) dry out 3 times
1540 Hrs - Return to Bldg #3245

- Run Nitride Standard on DR 850 (Hach Colorimeter)
  Read = 0.093
- Repair - pH probe on 98FO478AB sonde
- Decon - Whale pumps
- Start Prep. for GW Sampling

1750 Hrs - Left BLDG #3245 for Motel
END

Work continued to Page

SIGNATURE [signature] DATE 11/4/03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

CORES : SAME AS ON P. 130

SAMPLING : SEE Table on P. 133

DRILLING :

Drilled & Installed the Following :

13MWT3C } MC NB#2526
13MWT3I }

13MWT3B } FC NB#2555
13MWT2J }

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

WED 11-5-03

Work continued from Page

WEATHER Mostly Cloudy Temp 40's

0655 Hrs - ARRIVE @ BLDG #3245
PREP to SAMPLE GW

0810 HRS - ARRIVE @ SWMU 13

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS *(SAMPLER)
13GWT2502	0830	0925	15.2 L	DRY	*(TR)
13GWT2102	0825	0950	2.2 gal	0950	*(FW) MS/MSD (TR NA)
13GWT1702	0945	1045	6 L	1047	*(TR) NA 13FD110503-01
13GWT4002	1455	1630	2.2 gal	1630	*(FW)
13GWT4201	1535	1614	3 L	DRY	*(TR)

NOTES:

- CHECK IN W/ BLDG 165 VIA PHONE - to mob Retsonic through buffer zone to 13MWT43 & 44 (OK)
- CHECK IN W/ LAB
- CHECK IN W/ R. BASINSKI

1730 Hrs - RETURN to BLDG. #3245
DROP OFF EQ
PAPERWORK
WAIT FOR FW

1800 Hrs - LEFT NSWC CRANE

END

Work continued to Page

SIGNATURE Ty Rogers DATE 11/5/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11-6-03

CREWS - SAME AS ON P. 130 ~~EXCEPT JK IS OFF SITE~~ (TC)

Drilling

SEE NB 2565 MC
SEE NB 2565 FE

Sampling

SEE tables on P. 135

SCIENTIFIC BINDERY PRODUCTS.. CHICAGO 60605 MADE IN USA

THURS 11-6-03

Work continued from Page

WEATHER - OVERCAST & TEMP LOW 40's

0655 Hrs - ARRIVE @ BLDG # 3245
PREP to SAMPLE G.W

0815 Hrs - CHECKED IN W/ N. GATE GUARD & MICHELLE B

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GMT2502	11-5-03		15.2 L	0845	(TR) PURGED (11-5) START SAMPLING ON 11-6 (EXPLOSIVES ONLY)
13GWT0502	0920	1320	21.7 L	1320	(TR) NA RUN
13GWT4201	11-5-03		3 L	1500	(TR) PURGED (11/5) START SAMPLING ON 11-6 (ALL but metals)
13GWT3701	1400	1550	2.3 gal	1550	(FW)

WELL DEVELOPMENT:

SAMPLE ID	START DEV	END DEV.	VOL. PURGED	COMMENTS
13MWT29	0827	1000	22 gal	—
13MWT39	1043	1140	6.5 gal	—
13MWT38	1300	1650	3 gal	WILL CONT DEVELOPING ON 11/7

1600 Hrs - PICKED up DIG PERMIT FOR SWMU 16 @ PUBLIC WORKS
1615 Hrs - RETURN to BLDG # 3245

- PAPERWORK & PREP. SAMPLES FOR SHIPMENT ON COC # 4816 VIA FED EX AB# 8412 2491 0625
- CHECK IN W/ Ralph BASINSKI
- CHECK IN W/ LAB talked to H. PRENTICE. ALSO CONFIRMED SAT. DELIVERY

1845 Hrs - DROP OFF SAMPLES @ FED EX.
1915 Hrs - FAX COCs to OFFICE & LAB FROM HOTEL

END

Work continued to Page

SIGNATURE		DATE
Tony Nagel		11-06-03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

Summary 11-7-03

CREWS - SAME AS ON PAGE 130, EXCEPT JK IS OFF SITE TODAY

Drilling:

SEE NB 2565 MC

SEE NB 2555 FR

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

FRI 11-07-03

Work continued from Page Weather - Partly cloudy Temp High 30's

0650 Hrs - Arrive @ BLDG #3245

- Cal: YSI ; Meet to sample GW @ SWMU 13
- Give MC EER priority work to install first @ SWMU 16
- Check Lock out Tag @ SWMU 16 for 16 MW-13 (EIS). Not sure so T. Brent will make calls to confirm that the lines (ele.) were turned off
- Call in Hrs to Pittsburgh

0845 Hrs - Check on FW; gave him charge # for GW sampling & Rev.

0910 Hrs - Arrive @ 13 MW-29

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	TIME SAMPLED	COMMENTS
13GWT2901	0935	1205	15 L	1205 (TR)	NA RUN
13GWT3301	0913	1400	5.1941	1400 (FW)	
13GWT4201	———	———	———	(FW)	Completed sampling Collected Tot. & Dis Meta
13GWT2502	———	———	———	(TR)	Collected Partical Misc. Ex

1400 Hrs - Set up @ 13GWT2502 collected partical MISC. Explosive. Very slow Recharge well.

1435 Hrs - Check on drilling progress @ SWMU 16

1455 Hrs - Arrive @ BLDG #3245

- Check in w/ OFFICE - R. Basnak (Progress Report) & T. Johnston (Status of Mustard Gas Startup)
- Made Travel Arrangements for Return Next Shift (Nov. 17-26) - Also talked to Scott Gee About Travel Arrangements for Next shift
- Call Laucks (Mike Baxter) - gave MB tracking No. for Sat Shipment
- Paperwork @ Packing for samples on COC 481

1835 Hrs - Drop off Samples @ FED EX (AB# 8412 2491 0618)

1852 Hrs - FAX Copy of COC to M. Baxter @ Laucks Lab From Hotel.

Work continued to Page

SIGNATURE			DATE
	Tony Nash		11-7-03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Summary 11-8-03

CREW SAME AS ON P. 130

Drilling: SEE NB 2565 NAC
SEE NB 2555 FR

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

SAT 11-08-03

Work continued from Page

Weather = mostly Sunny Temp High 30's

0655 Hrs - Arrive @ BLDG # 3245 ; Collect Trip Blank TB1108030 1 @ 0700

Prep for GW sampling @ SWMU 16

0810 Hrs - Left FW inside SWMU 16

0900 Hrs - Arrive @ 13GWT25 - Finish Collecting Misc. Explosives

Let Mlakar in to secure protective casing @ 13MWT27

0930 Hrs - Exist Minefield B (SWMU 13)

0945 Hrs - Arrive @ SWMU 16 to setup on WES-14-03-83

SAMPLE ID	Start Purge	END Purge	VOL Purged	SAMPLE Time	Comments
16GW0302	1015	1215	12.1L	1215	(TK) RAN NA
16GWT0602	0908	1308	5.1gal	1308	(FW) Will Run NA 11/9
16GWT0402	1430	1640	14.8L	1640	(TK) RAN NA
16GWT0102	1455	1800	4.2gal	NA	(FW) will sample 11/9

Note - Attempt to develope 16MWT14 today - Well Dry

1805 Hrs - Left SWMU 16 for BLDG # 3245

1807 Hrs - Arrive @ BLDG # 3245

- Secure Samples in Frig.
- Unload Meters, Etc.

1820 Hrs - Left BLDG # 3245 for Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 11/8/03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SUMMARY 11-09-03

CREW SAME AS ON P. 130

SAMPLING: SEE P. 141

DRILLING:

MC's CREW (NB#2565)
INSTALL 16MWT10 & 16 (2nd shallow well 1st WELL T14 WAS DRY)

FR's CREW (NB#2555)
INSTALL - 16MWT08 & 15

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

SAN 11-09-03

Work continued from Page

Weather - Mostly Sunny Low 40's

0655 Hrs - Arrive @ BLDG #3245
- Prep. for GW sampling & NA @ SWMU 13 (TR)
- (FW) Prep to Purge 13GWT38
- FAX R. Basinski - Status for GW Sampling & Well Installation thus far.

0840 Hrs - Arrive @ SWMU 16
Set up @ 16MWT06 to Run NA

0910 Hrs - 1000 Hrs - Run NA @ 16MWT06

1035 Hrs - Sample VOCs @ 16MWT01 Sample ID 16GWT0102
* Well was purged on 11-08-03 by FW

1100 Hrs - Arrive @ BLDG #3245
Paperwork & Lunch
Prep. to Dev. Wells @ SWMU 16

SAMPLE ID	Start Purge	End Purge	Vol Purged	SAMPLE Time		Comments
16MWT0102	←	11/8/03	→	1035	(TR)	Purged 11/8; Sampled 11/9 VOCs only
16GWT0302	1425	1635	2.1 gal	1635	(FW)	
13GWT3801				NA	(FW)	Purged only with sample 11/10

Wells Developed

Sample Loc	Start Dev	End Dev	Vol. Purged	
16MWT12	1355	1500	35.7 L	(TR)
16MWT9	1540	1648	17 gal	(TR)

1700 Hrs - TR check on FW @ 16MWT03 work out Return time to open Gate

1715 Hrs - TR Arrive @ BLDG #3245
- Clean & Mop Floors
- Paperwork
- MC to get FW out of SWMU 16 Fence

1820 Hrs - Left NSWC Came Fox Route 1

END

SIGNATURE

DATE 11-9-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary of 11/10/03

Sam Crew #5 on P 130
AK to leave today

Sampling see P. 143

Drilling:

MC: Crew (#NB 2565): Installed 13 MWT 44

FR's Crew (#NB 2335): Installed 13 MWT 45 & 41

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

MON. 11/10/03

Work continued from Page

WEATHER - Partly Sunny Temp MID AM 40°s ; MID PM 60°s

0655 Hrs - ARRIVE @ BLDG # 3245

- Prep. to SAMPLE GW
- CHECK IN W/ OFFICE Ralph Rosinski
- FAX CoC # 4817 to ED Sedlmyer
- Call Instruments
- ASK CHRIS FREEMAN to ASK Public Works to hold off on RECONNECTING STREET LIGHT @ SWMU 16 AROUND 16 MWT 13 & 15 WELL INSTALLATION LOCATION

0930 Hrs - STOP @ Public Works to discuss moving location of 13MWT47.

0945 Hrs - ARRIVE @ 13MWT03

SAMPLE ID	Start Purge	End Purge	Vol. Purged	Sample Time	Comments
13GWT3801	(← 11-09-03 →)			0915	(FW)
13GWT0302	1005	1209	10.9L	NA	(TK) will sample 11/11
13GWT0702	1120	1330	2.2gal	1330	(FW)

1225 Hrs - FINISH CLEANUP @ 13MWT03 AFTER COMPLETION OF PURGE WILL SAMPLE TOMORROW

1230 Hrs - CHECK ON FW

1245 Hrs - ARRIVE @ BLDG #3245

- CHECK IN W/ ED SEDLMYER ON QT SAMPLES
- GIVE LIST OF TANUS PERSONNEL to STAFF NEXT SHIFT FOR GATE PASSES
- PREP FOR WELL DEVELOPMENT

1340 Hrs - ARRIVE @ 13MWT36

START PURGE 1400 Hrs, END PURGE 1502 Hrs, VOL PURGED 29.4L

1515 Hrs - CHECK ON FW ; FR is working nearby will let FW out Gate

1530 Hrs - ARRIVE @ 13MWT25 - Collect additional sample volume for Total Metals & Hg

1600 Hrs - RETURN to BLDG #3245, Empty SUV to carry coolers to FED-EX PAPERWORK & Packaging CoC # 4818 (Knucks) & CoC 4819 (Microseeps) KNUCKS ON AB # 8412 2491 0375 & Microseeps on AB # 8412 2491 0386

1840 Hrs - Drop off SAMPLES @ FED-EX

Work continued to Page

SIGNATURE Tony Nagle DATE 11-10-03

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Summary of 11/11/03

CREW1 - SAME AS ON P. 130 EXCEPT FOR ML left 11/10,

DRILLING:

MC's CREW = Installed 13MWT 34, 16MWT 07 & 17

FR's CREW1 = Installed 16MWT 11

SAMPLING: See P. 145

SCIENTIFIC BINDERY PRODUCTS . CHICAGO . 6565 . MADE IN U.S.A.

TUES 11/11/03

Work continued from Page

WEATHER: Lt Showers & Temp 60's

0653 Hrs - ARRIVE @ BLDG #3245
- REP to RUN NA & Sample
- PREP FOR WELL DEV.

0805 Hrs - ARRIVE @ 13MWT38 to RUN NA (0824 - 0908 Hrs.)

0925 Hrs - (TK) Filled Total Metals From 13MWT25 - Started Filling on 11/9
(FW) SET UP @ 13MWT03 to Sample

0940 Hrs - TK ARRIVED @ 13MWT03 to Assist FW w/ Sampling AND RUNNING NA

1130 Hrs - LEAVE FOR LUNCH / FINISH @ 13MWT03

1215 Hrs - REFRIGERATE SAMPLES @ BLDG #3245

1235 Hrs - ARRIVE @ 13MWT41
- Only 1.5' of water in well will let well set until start of Next shift to develope

1315 Hrs - Return to BLDG #3245
- Check in @ OFFICE Talked to Ralph & ED
- Collect Trip Blank ~~FB~~ TB111030I @ 1315

1400 Hrs - ARRIVE @ 16 FOR Development

WELL ID	START DEV	END DEV	Vol. Purged	Comments
16MWT16	1420	1650	12+ L	(FW)
16MWT16	1435	1595	4.5 L	(TK)

1600 Hrs - ARRIVE @ BLDG #3245
- Unload CAR
- PAPERWORK & Packaging FOR SHIPPING Samples on COC #4820
- Sweep & Mop Floors (Field office Bathroom Hallway & LAB)
- FW to drop of Sample Shipment on AB #8912 2491 0397
- MG CLEANED drain & car port AREA

1830 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 11/11/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

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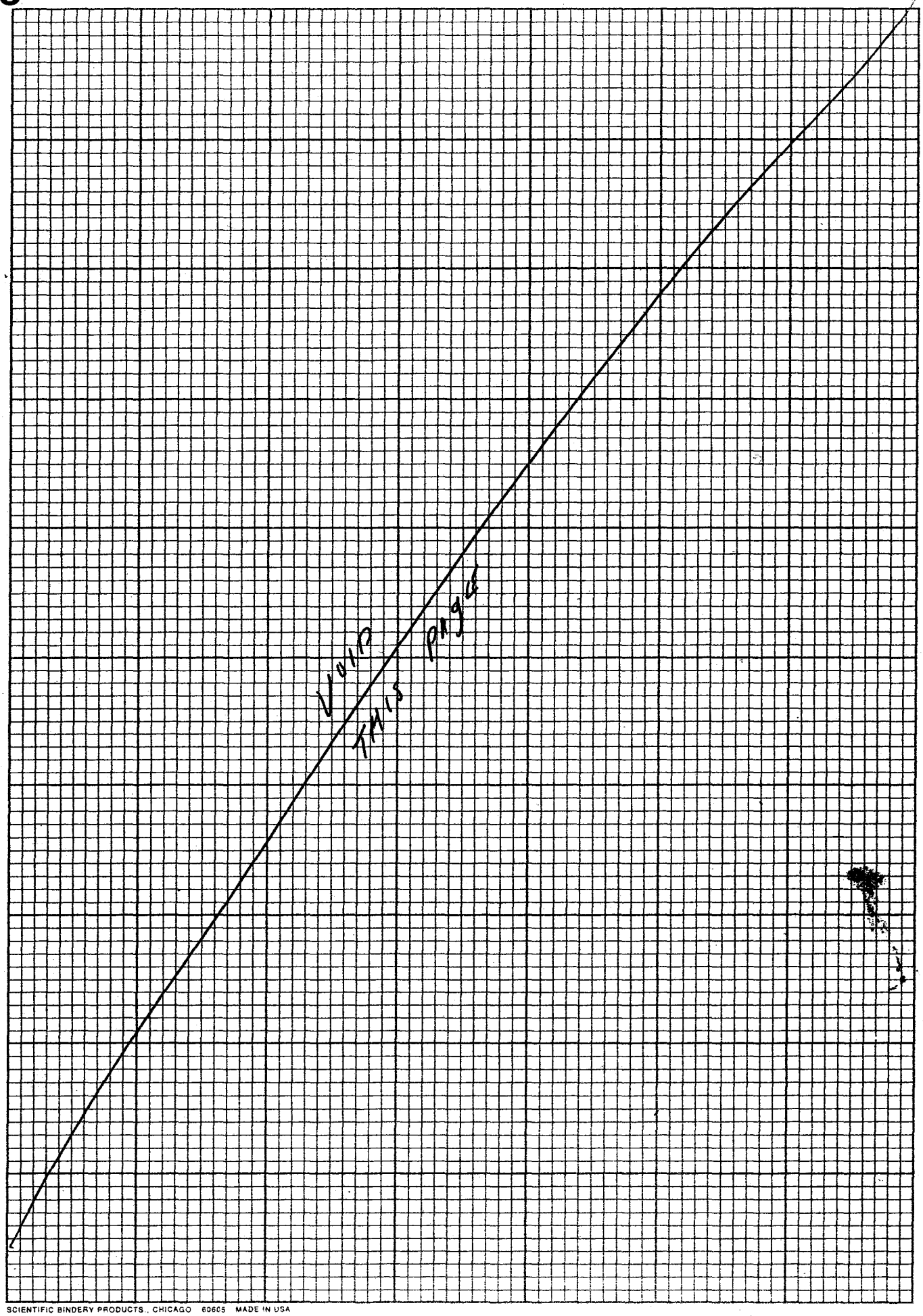


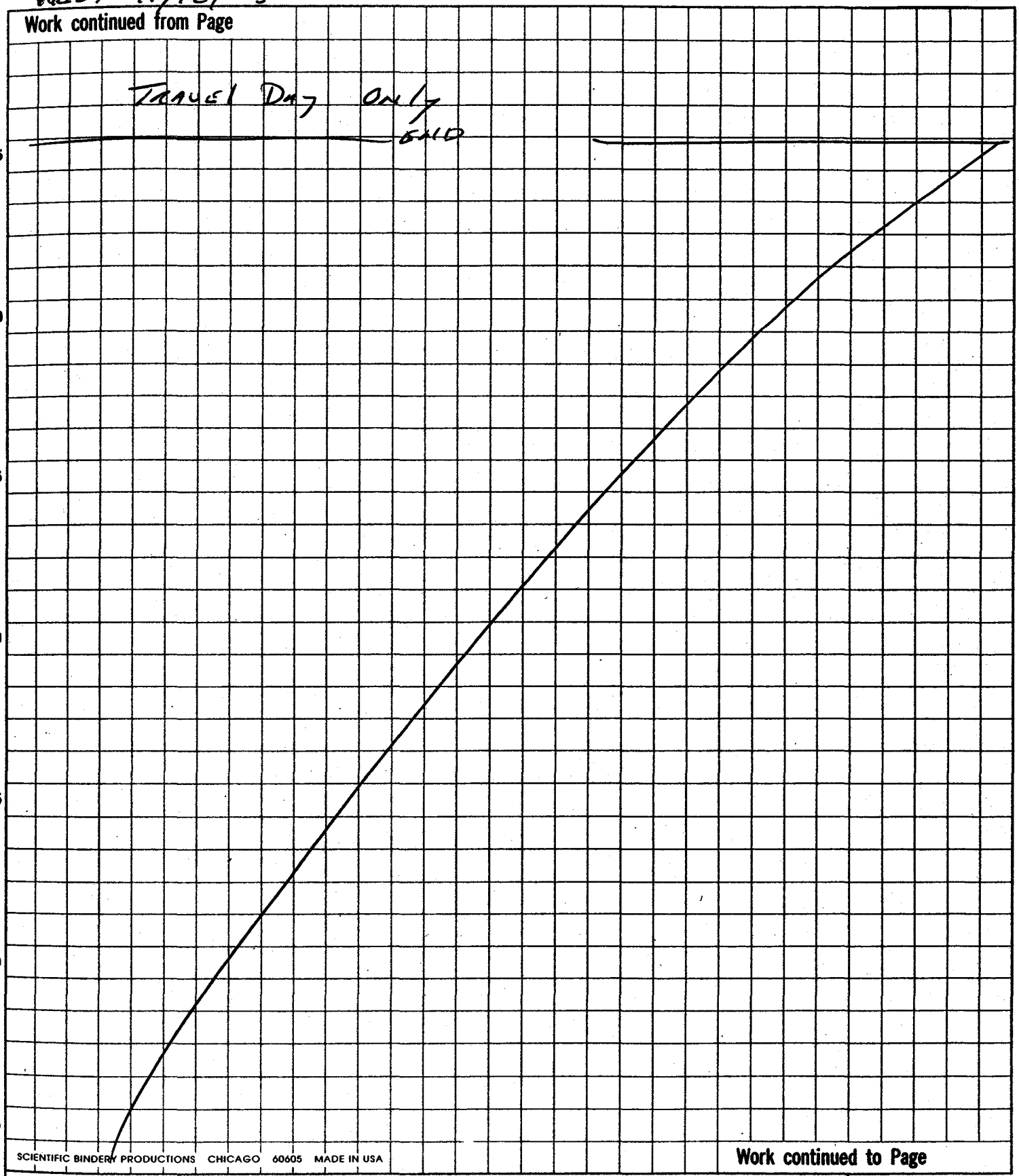
SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED. 11/12/03

Work continued from Page

TRAVEL DAY ONLY

BILLED



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 11/12/03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Summary 11/17/03

Drilling Crew: Jon Keiffer
Dennis Sivic
Todd Wallenhaupt
Nick Post
Jim Walsh
Joshua Deaki
} Rotosonic Scott's Crew
} ATV Matt's Crew

T+Nus Crew: Matt Cochran
Jim Goeckel
Scott Greer
T. Rutann

Matt's Crew - Set up on 13 MW T35
Scott's Crew - " " " 13 MW T28

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Mon 11-17-03

Work continued from Page

1405 Hrs - Arrive @ BLDG #3245
- Hold H&S Specific Training For Scott Green & Jim Gosnat

1500 Hrs - Arrive @ Public Works
- Check on Monitoring Well location 13MW147 Moved to END OF TREE LINE OK w/ Public Works - Donna Z. checked on

1525 Hrs - Arrive @ SWMU 13 - Show J. G. Around SWMU - ATTEMPT to dev. 13MW141 - Access Wet - NEED to let Utility Rest dry out VERY slippery.

1655 Hrs - Return to BLDG #3245
Cali YSIs
Prep sample sets
Paperwork

1800 Hrs - Left Crane for Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature]
DATE 11/17/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11/18/03

No Drilling Performed this date to the Road

Sampling see p. 151 - Repurge 13 Multi 25 (S.G.) @ 1345 Hrs

Crews see p. 148

SCIENTIFIC BINDERY PRODUCTS CHICAGO

TUES 11-18-03

Work continued from Page

WEATHER : MID 50'S & RAIN

0702 Hrs - Arrive @ BLDG #3245
- Rdy. to sample Groundwater & Develope Wells
- Talk w/ Tom Johnston

0930 Hrs - Arrive @ SWMU 13 & set up @ 13 MWT12 JG & TR
Start Purge = 1002
End Purge = 1402 Vol. Purged = 21.84
Sample Time = 1408 RAN & NA

1400 Hrs - M.C. Sampled 13SW11102

MONITORING WELL DEVELOPMENT

WELL ID	START PURGE	END PURGE	VOL. PURGED	COMMENTS
13MWT27	1230	1403	33.64	(TR) DRY OUT 3 times
13MWT41	1500	1505	4 L	(MC) DRY OUT WELL
13 MWT 34	1500	1658	52.84	(SG & TR) DRY OUT WELL & REMOVE 5 CASING VOLUMES

1600 Hrs - Assist S.G. with development @ 13 MWT 34

1720 Hrs - Check out of SWMU 13 @ North Gate

1730 Hrs - JG, SG & T.R. meet M.C. @ BLDG #3245
Secure all samples in Frig.
Drop of meters inside BLDG
Check in w/ K. Basinski.

1800 Hrs - Leave BLDG 3245 for Hotel

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE		DATE
		11-18-03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Summary 11-19-63

Crews same as on P. 148

Sampling see P. 153

Drilling:

Mann's Creek = Complete 13 MW + 35 ± Staff 47

Scott's Creek = Complete 13 MW + 28

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED. 11/19/03

Work continued from Page

WEATHER = Mostly Sunny AM 40's PM 50's

0650 Hrs - Arrive @ BLDG #3245
- PREP. to SAMPLE groundwater

0908 Hrs - Arrive @ SWMU 13

0815 Hrs - Start Sampling Dis. Metals @ 13MWT25 - Purged DAY 11/18

WELL ID	START PURGE	END PURGE	Vol. PURGED	TIME SAMPLED	COMMENTS
13GWT2602	0855	1135	13.2L	1140	(TC) RAN NA
13GWT2003	0828	1228	24.6L	1235	(JG) " "
13GWT3201	1409	1539	8.25L	1543	(JG)

1315 - 1429 Hrs - RAN NA @ 13MWT20

1440 Hrs - Return to BLDG #3245
- Drop off samples in Frig.
- PREP SUV FOR DEVELOPMENT

1525 Hrs - Arrive @ 13MWT33
- START DEV = 1542 Hrs
- END DEV = 1633 Hrs
- Vol. Purged = 12.8L

1650 Hrs - Return to BLDG #3245
- PREP. PAPERWORK (COC #4821) & SAMPLES FOR SHIPMENT ON FED. EX. AB# 8412 2491 0401

1745 Hrs - LEFT CRANE FOR FED EX.

1820 Hrs - Drop off SAMPLES @ FED. EX.

END

SIGNATURE		DATE
Tony Lopez		11/19/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

Summary 11/20/03

Crews: Same as OW P. 148; Except T. Bachmeier returned

Drilling: Completed 13 MWT 47; and worked on well pads.

Sampling: See P 155

SCIENTIFIC SUNDRY PRODUCTS CHICAGO 60605 MADE IN USA

THURS 11-20-03

Work continued from Page

WEATHER - Mostly SUNNY TEMP 40° / 60° AM PM

0655 Hrs - ARRIVE @ BLDG #3245
- PREP FOR GW SAMPLING
- Assist S.G. W/ WELL DEV. PREP.
- Select WELLS to SAMPLE FOR JG & TR
- T. JOHNSTON Called - discussed drilling & sampling status
- FAX CofC # 4821 to LAB & OFFICE (A. HO & E. Sedlmyer)

0910 Hrs - ARRIVE @ N. GATE CHECK IN W/ GUARD

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT1102	0930	1050	7.65 L	1055	(TR) RAN NA
13GWT1003	0917	1317	18.6 L	1322	(JG Purge) TR RAN NA & Sampled until 1558 Hrs
13GWT1602	1404	1534	8.2 L	1537	(JG)
13GWT2502	←	11/18/03	→	1610	(TR) Finish Collecting Dis. Metals & Nitrate, Nitrite & Ammonia

WELLS DEV BY SG

WELL ID	START DEV	END DEV	VOL DEV
13MWT45	1020	1205	7.25 gal
13MWT31	1330	1455	11 gal
13MWT30	1550	1650	7.5 gal

1700 Hrs - Returned to BLDG # 3245
- Checked in w/ T. Johnston talked for ~ 35 min
- Unloaded EQ & Samples
- Labeled bottles From 13MWT25

1815 Hrs - LEFT CRANE FOR HOTEL

END

SIGNATURE

DATE 11-20-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Summary 11-21-03

Crews: SAME AS ON P. 148

Drilling: Install Isolation Casing @ 13MW-46
SEE NB 2555 (S.G.)
Work on Well Pads Cont'
ABANDON 16MW-14 SEE NB #2565

Sampling: SEE P. 157

MC: Slug Testing (NB 2565)

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

FRI 11-21-03

Work continued from Page WEATHER - Mostly Sunny & 50's

ARRIVE BLDG 3245 @ 0655 Hrs

- PREP. FOR WELL DEV & WELL SAMPLING
- PREP. WEEK END PERSONNEL LIST FOR T. BECRAFT

0820 Hrs - ARRIVE @ SWMU 16

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	Comments
TB1121030I	—	—	—	0700	TRIP BLANK (TR)
16GWT1001	0842	0957	7.5L	1003	JG WELL SAMPLER, TR RAN
16GWT1201	1148	1313	9.5L	1316	
16FD1121030I	"	"	"	0000	DUP FROM 16GWT12

WELL ID	START DEV	END DEV	VOL PURGED	COMMENTS
16MWT11	0845	0947	28L	(TR) SLOW RECHARGE (DRY OU
16MWT07	—	—	—	DRY WELL
16MWT08	1316	1338	15gal	(Day out) TR & MC
16MWT13	1520	1700	41L	MC & SG
16MWT15	1610	1720	8gal	MC & SG

1620 Hrs - TR ARRIVE @ BLDG #3245 W/ J.G.

- PREP SAMPLES FOR SHIPMENT ON COC # 4822 ON FED EX AB # 8412 2491 0607
- CALL LAUCKS LAB - TALK TO H. PLEATICE - REPORT SAT. SHIPMENT
- ATTEMPT TO CALL - T. JOHNSTON & R. BASINSKI

1790 Hrs - LEAVE CRANE FOR FED EX

1815 Hrs - DROP OFF SAMPLES @ FED EX ON ABOVE AB #. FAX COC # 4822 FROM HOTEL @ 2200 Hrs TO LAUCKS

END

SIGNATURE Terry Rock DATE 11-21-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Casing same as on P 198

Drilling : Complete Installation of 13 MWT 4C
See WB 2555 for Details
Remainder of day Well Pad Construction

M.C (WB 2565) - Slug Testing

Sampling See P. 159

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Work continued from Page

WEATHER - Partly Sunny & warm 60's

0703 Hrs - Arrive @ BLDG # 3245

- Prep to sample GW w/ Bladder Pump
- Coordinate w/ M.C. (Slug Testing) RE to which wells to sample so that samplers don't interfere w/ slug tests
- Calibration & Decon of Bladder Pump

0910 Hrs - Arrive @ SWMU 16

(TR) Purge well # 16MWT16 ; (JG) to setup on 16MWT13

0940 Hrs - Return to BLDG # 3245

- to pick up Dev. Eq. to Dev. 16MWT17
- Waited for MC. so that he could access SWMU 16

1020 Hrs - Arrive @ SWMU 16 w/ MG - get M.G Dev. Sheets on 16MWT11 & 10 to assist slug test

1040 Hrs - Arrive @ 16MWT17 to Dev

Start Dev = 1100 Hrs

End Dev = 1230 Hrs

Volume Dev = 54 L

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Comments
16GWT1301	0927	1157	17.65 L	1206	(JG) TR Ran NA
16GWT0901	1422	1612	10.6 L	1614	(JG)
16GWT0502	1446	1615	10.0 L	1617	(TR)
16GWT1601	0926	0926	1.0 L	1745	(TR/JG) Min. Vol. very slow recharge PURGED DRY @ 0925; ALLOWED TO RECHARGE & SAMPLED @ 1745 Hrs w/ JG.

Well ID	Dev. Start	Dev. End	Vol Purged	Responsible Person
13MWT28	1020	1110	3.25g	(S.G.)
16MWT17	1100	1230	54 L	(TR)

1810 Hrs - Arrive @ BLDG # 3245

- Secure all samples in Lab Refg.
- Unload EQ

1830 Hrs - Left Crane

END

SIGNATURE

DATE 11-22-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREWS: SAME AS ON P. 148

Drilling: Complete well pad @ 13MW T&E & DEMOB

MC - Slug Testing

Sampling - See P. 160

SCIENTIFIC BINDERY PRODUCTS

SUN 11-23-03

Work continued from Page

WEATHER: Mostly Cloudy 60's

0700 Hrs - Arrive @ BLDG #3245
- Prep. to sample Groundwater / Develope & Run NA

0915 Hrs - Collect Addition Sample Parameters From 16MWT16 (Explosives) - This is a very slow recharge well Purged 11/22/03

SAMPLE ID	START Purge	END Purge	Vol. Purged	Time Sampled	Comments
16GWT1601	←	11-22-03	→	0915	(TR) Collected Additional Parmaet Explosives & Dis metals
13GWT4101	1025	1030	1.5 L	1530	(TR) VERY Slow Yielding WELL sampled - Expl. & Miss. Explo
13GWT0402	0942	1042	5.9 L	1044	(JG)
13GWT0102	1215	1315	6.7 L	1320	(JG) MS/MSD
13GWT0802	1330	1505	5.0 L	1515	(SG) TR RAN NA
13FD1123030	0000	"	"	-	(SG) DUP of 13GWT0802

WELL ID	START DEV	END DEV	VOL. PURGED	COMMENTS
~~13MWT44~~ (TR)				
13MWT44	1100	1153	10gal	TR & SG
13MWT43	1230	1347	21.6 L	TR

1530 Hrs - Sample @ 13MWT41

1600 Hrs - Run NA @ 13MWT08

1705 Hrs - Complete NA @ 13MWT08

1730 Hrs - Collect more AQ SAMPLE @ 16MWT16 w/ JG

1800 Hrs - Return to BLDG #3245
- SECURE SAMPLES in Frig.
- CLEAN & MOP Bathroom, Hallway, LAB & Field OFFICE

1908 HRS - LEFT BLDG #3245 for motel.

END

SIGNATURE

DATE 11-23-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P©

CROW: T+NUS ONLY
M. Cochran
J. Goerdt
S. Grier
T. Kojan

NAC - SLUG TESTING SEE NUS-2565

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

Mon 11-24-03

Work continued from Page

Weather - Cold 30's; Overcast w/ Flurries

0655 Hrs - Arrive @ Site
- Check in w/ R. Basinski
- Rec to Dev Monitoring well
- Fax Office (E.S.) CoC # 4822
- Paperwork / Assign Invoice #s to JG & SG

0945 Hrs - Check in w/ N. Gate Guard

1000 Hrs to 1200 Hrs - Sample (Complete) 13GWT4101 (went under fence Road to west)

1210 Hrs - Check out w/ N. Gate Guard

SAMPLE ID	Start Purge	END Purge	Vol Purged	SAMPLE Time	Comments
13GWT4101	←	11-23-03	→	1000	(JG) Completed sampling event 11/23/03
13GWT1402	0935	1105	2 gal	1115	(SG)
13GWT3101	0903	1143	12.7 L	1118	(JG)
13GWT3001	1415	1605	2GAL	1615	(SG)
13GWT3301	1330	1730	21.7 L	1732	(JG) Sampled Explosives only well day will complete 11/25

1225 Hrs - Lunch

1300 Hrs - Arrive @ 13MWT47 to Dev
- Start Dev. = 1335 Hrs
- End Dev. = 1445 Hrs
- Vol. Dev. = 48L

1515 Hrs - Return to Bldg #3245
- Package & Ship Samples on CoC's & Chuck's = 4824 & 4825 (Fed Ex AB# 8412 2491 0558.
- Microscops = 4826 (Fed Ex AB# 8412 2491 0592)

1800 Hrs - Left Crane for Fed Ex

1835 Hrs - Drop of Samples @ Fed Ex (MC & TC)

END

SIGNATURE

DATE 11/24/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

CREW - Same as on P. 162

M.C. - Slug Testing See NB# 2565

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TUES 11-25-03

Work continued from Page

WEATHER: Partly Cloudy & Cold (Temp 30's)

0655 Hrs - Arrive @ Bldg #3245
- Prep to sample Groundwater
- Fax offices & Lab. COCs
- Check in w/ R. Basinski

0920 Hrs - Check in w/ Guard @ N. Gate

Sample ID	Start Purge	End Purge	Vol. Purged	Sample Time	Comments
13GWT3301	←	11/24	→	0845	(JG) Completed this date
13GWT1302	1016	1146	10.9 L	1150	(JG) TK RAN NA W/SG
13GWT1502	0945	1345	18L	1347	(TR) TOC MS/MSD & DUP RAN NA
13GWT2701	1005	1415	35gal	1425	(SG)
13GWT FD 112503 01	—	—	—	0000	(TR) TOC DUP OF T13

1600 Hrs - Return to BLDG #3245 - Start Prep to ship Samples on CofC #4827 (AB# 8412 2491 0570)

1640 Hrs - Arrive @ 13MWT13 RAN NA w/ SG.

1725 Hrs - Finish Running NA @ BMWT13

1740 Hrs - Return to BLDG #3245
- Prep. some Eq. to return to US Environmental on FED. EX AB# 8412 2491 0412
- Clean Office, Bathroom, hallway, Lab, Etc. & Mop
- Work on Paperwork
- JG took Samples to FED EX & Misc. EQ Also
- Shipped mini trolls to Pittsburgh Office on FED EX AB# 8412 2491 0423
- M.C. & SG - Clean Vehicals & back of BLDG #3245 & Dr
- Organize Office
- Inventory Sample containers

2030 Hrs - Left Crane

END

Work continued to Page

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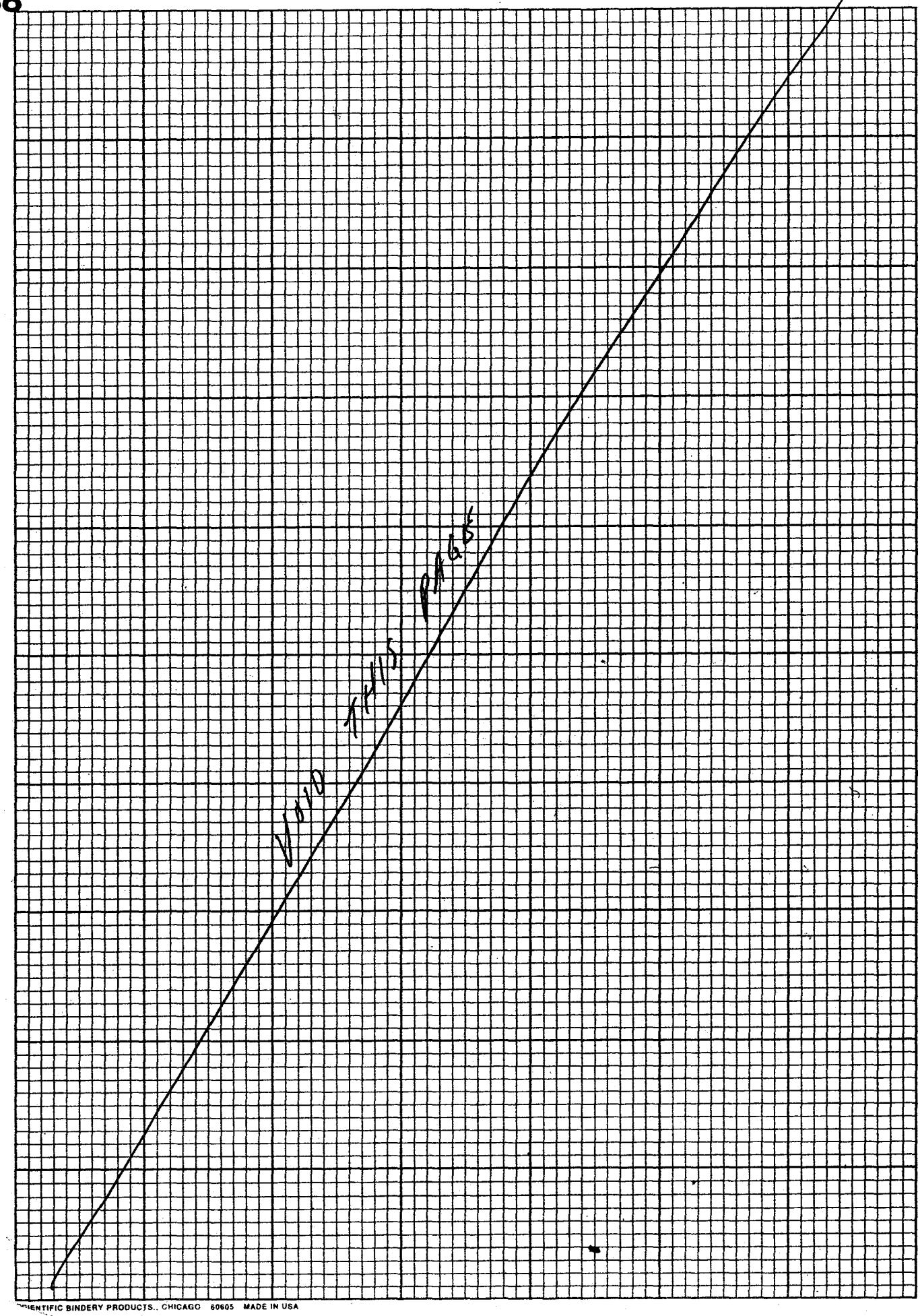


SCIENTIFIC BINDERY PRODUCTS.. CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 9060

BOOK NO. 1363

WED 11-26-03

Work continued from Page

0715 Hrs - Fax Copy # 4827 to Lancers Lab & Pittsburgh Office

0800 Hrs - Travel to INDIANAPOLIS Airport

Remainder on day = Travel

END

5

10

15

20

25

30

35

Work continued to Page

SIGNATURE T Ryan

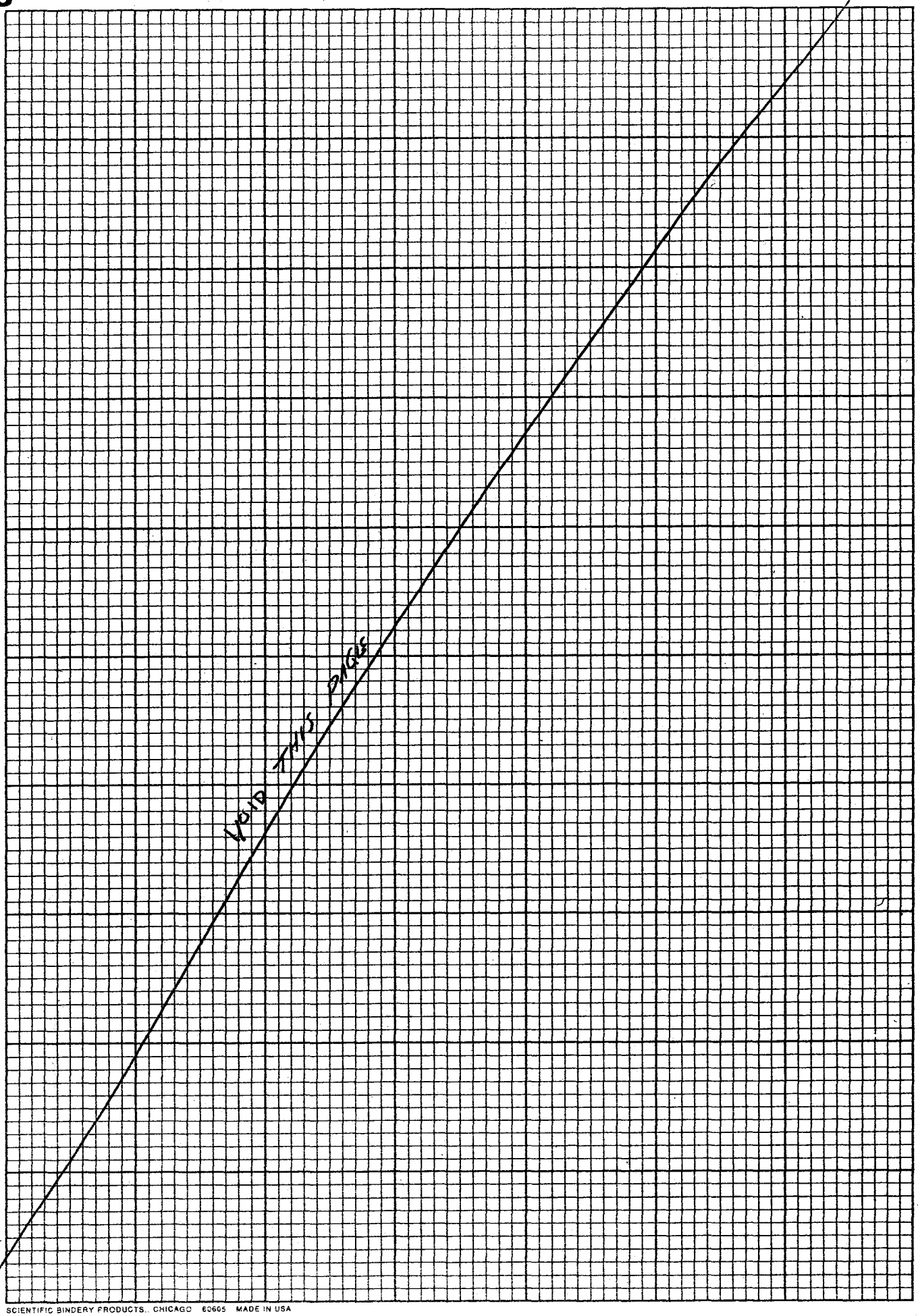
DATE 11-26-03

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE



SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

WED 12-03-03

Work continued from Page

CREW: J. GOERDT, S. GWIEK & T. RAJAHN

1400Hrs - ARRIVE @ NSWC CRANE
- CALI. YSIs
- PREP. to Collect RINSATE BLANKS

SAMPLE ID	TIME	SAMPLER	COMMENTS
TB1203030I	1500	TR	TRIP BLANK
16RB1203030I	1520	JG	BLADDER PUMP
13RB1203030I	1535	SG	PERISTALTIC TUBING (PE
13RB1203030I-F	1535	SG	" " ("
16RB1203030302	1600	SG	PERISTALTIC TUBING (TEF

REAGENT Grad Water - NERL Lot # 0807253 EXP. DAT - 8/04

1700Hrs - TRAIN JG to RUN NA

1806Hrs - LEFT CRANE FOR HOTEL

END

SIGNATURE

DATE 12-3-03

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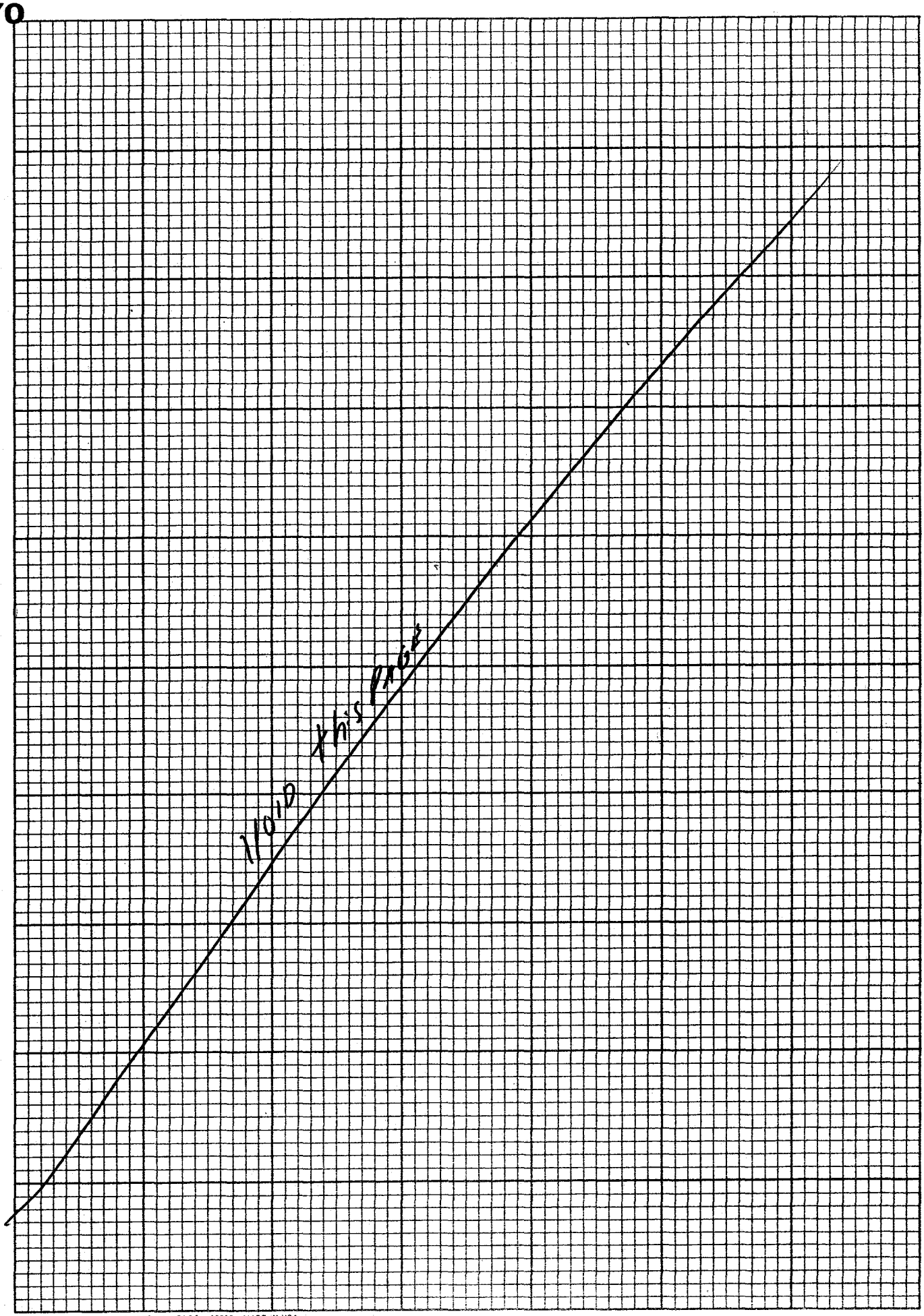


SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

THURS. 12-04-03

Work continued from Page Weather: Overcast, Periods of Lt Rain & High 30's

0635 Hrs - Arrive @ BLDG #3245
Prep. to Sample Groundwater

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT0902	0835	1015	9.0L	1018	(JG) NA RAN
13FD12040301	"	"	"	0000	(JG)
13GWT4301	0900	1040	3 gal	1050	(SG)
13GWT3401	0955	1145	10.5L	1150	(TC) NA RAN
13GWT2202	1340	1455	7.5L	1510	(JG) NA RAN DC
13GWT4401	1430	1650	4.0 gal	1700	(SG)

1330 Hrs - Return to BLDG #3245 - Check in @ Office & Secure Sam
- Prep. to Develope Monitoring Wells
- Assist S.G. w/ Bladder Pump @ 13MWT44
SG having trouble getting it going

1520 Hrs - Arrive @ 13MWT46 to Dev.
Start Dev. = 1533 Hrs
End Dev. = 1707 Hrs
Vol. Purged. = 84L

1720 Hrs - Assist S.G. w/ Clean up @ 13MWT22 then check on SG @ 13MWT44

1805 Hrs - Return to Bldg #3245
- Check in w/ K. Basinski - left message
- Unload NA Eq & Inst. secure inside Bldg #3245
- Receive Paperwork From SG & JG

1830 Hrs - Left NSWC Clang

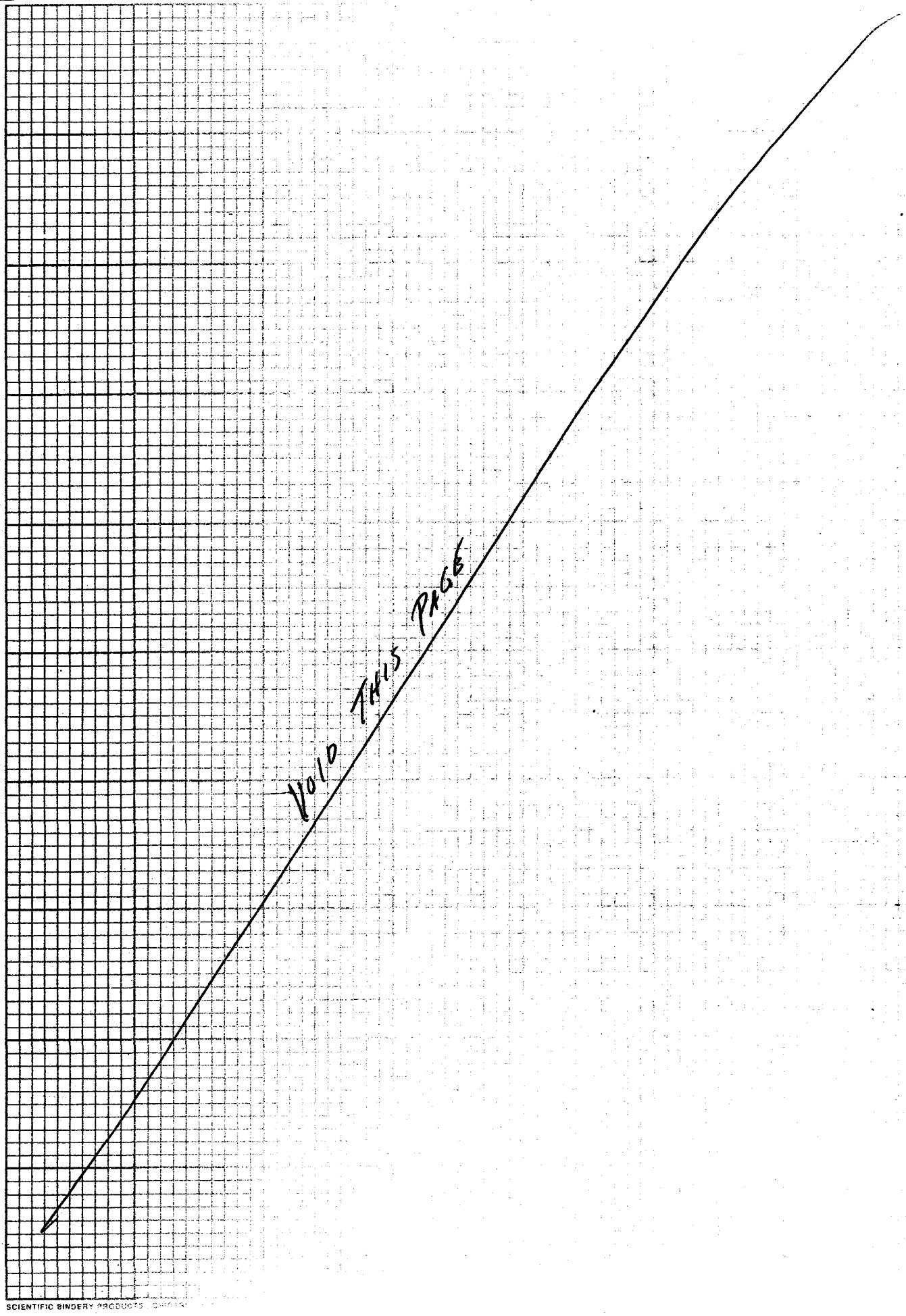
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 12-4-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS

Work continued from Page

Weather - Overcast Periods of Rain & High 30's

0655 Hrs - Arrive @ BLDG # 3245
- Prep to sample soils

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
16RB12050301	—	—	—	0800	Rinsate on Bucket Bi
16GWT0701	0900	1025	7.65 L	1027	(JG) Ran NA
16RB12050302	—	—	—	1130	Rinsate on Bucket Bi

PURGED this Date 2 WELLS (16MWT08 (JG) & 16MWT11 (SG)) BUT not sampled (WEAT Dry)

0900 Hrs - Arrive @ SWMU 16 - start clearing gravel Excav
Sampling Bore Hole #7 → 50.
- TR & SG sample soil borings 16SB42 → 50
SEE CoPC # 4829

1300 Hrs - Finish soil sampling

1315 Hrs - Check on JG @ 16MWT08 - ~6' of standing water in well
WELL IS also a SLOW RECHARGE WELL - Decided to Bail dry

1400 Hrs - Returned to BLDG #3245
- Prep. samples for SHIPMENT ON AB # 8412491043 4
CoPCs include # 4828 & 4829

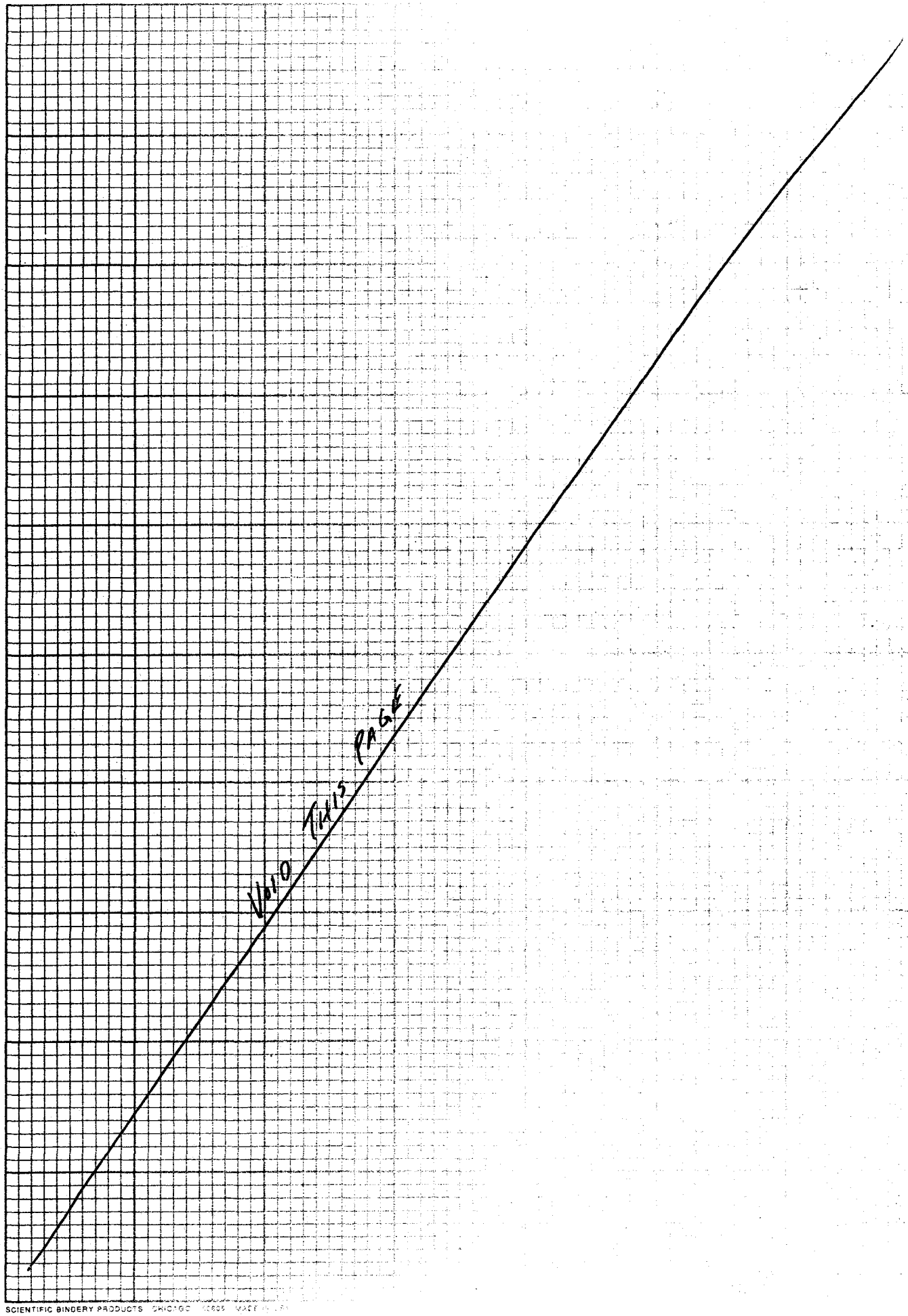
1730 Hrs - Left BLDG # 3245 for FEDERAL EXPRESS W/ JG

1800 Hrs - Drop of samples @ FED. EX. 1854 Hrs Fax Labels Copies

END

Work continued to Page

SIGNATURE			DATE
			12/5/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO

SAT. 12-06-08

Work continued from Page

Weather - Sunny Mostly & 30's

0655 Hrs - Arrive @ BLDG #3245
- Prep. to sample sumps & GW @ SWMU 16

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
TBR060301	NA	NA	NA	0700	TRIP BLANK
16SW0102	NA	NA	NA	0905	TR/SG N. Sump
16SW0202	NA	NA	NA	0935	TR/SG E Sump
16FD120603O1	NA	NA	NA	0000	FROM 16SW0202
16SW0702	NA	NA	NA	1008	TR/SG W. Sump
16GWT1501	0950	1350	21.6 L	1352	JG Ran NA DUP
13GWT0202	1210	1345	5 gal	DRY (SG)	Will collect 12/7
13GWT0602	1510	1628	2 gal	DRY	(SG) Start Collecting 12/7
16GWT0801	1320 (12/5)	1330 (12/5)	9L	1030 (12/6) (SG)	Sampled VOCs; Explosives IL; Start Total Metals & Hg
16GWT1101	1515 (12/5)	1600 (12/5)	1.25 g	1330 (12/6) (JG)	Sampled VOCs; Explosives IL; & Metals & Hg (Total)

1030 Hrs - Start Sampling @ 16MWT08
Collected VOCs, 1L of Explosives & started Total Metals & Hg

1145 Hrs - Stop collecting sample @ 16MWT08 - DRY WELL will continue on 12/07

1200 Hrs - Return to BLDG #3245 - CHECKED IN W/ R. Basinski; Checked on Shipment from 12/5 - made it to FED EX. Station in Seattle

1330 Hrs - Started Sampling @ 16MWT11
Milked well until 1500 Hrs - Collected VOCs, 1L of Explosives & Total Metals & Hg - well dry

1515 Hrs - Rechecked 16MWT08 well still dry

1530 Hrs - Check on J.G. @ 16MWT1501 - Almost done sampling & running MNA

1600 Hrs - Return to BLDG #3245
- Paper work & unload rental.

1730 Hrs - Left BLDG #3245 for Hotel

Work continued to Page

SIGNATURE		DATE
		12/6/08
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

SAMPLE Summary 12-7-03

SAMPLE ID	Start Purge	End Purge	Vol Purged	Start Sampling	Comments
16GWT1101	← Purged 12-05 →			1000	(TK) Collected M.Exp. & ~~Attached~~ metals SA
13GWT0202	← Purged on 12-06 →			0850	(JG) Full sample, none
13GWT0602	← Purged on 12-06 →			1300	(TK) Collected 500ml of Exp. sample.
13GWT2801	0930	1400	3.5gal	1410	(SG) Start sampling well dry. After Exp. collected Well continue to recharge started running none
13GWT1802	1155	1535	16.45L	1538	(JG) Rec none
13GWT4501	1515	1755	4gal	N/A	(SG) Will start sampling 12/8/03

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

SUN 12-07-03

Work continued from Page WEATHER - Mostly sunny High 40's

0655 Hrs - Arrive @ Bldg # 3245
- PREP to sample GW @ SWMU 16
- Assign work to SG & JG

0845 Hrs - Arrive @ SWMU 16
- Tighten down well lugs

0910 Hrs - Attempt to sample 16GWT08 - Collect some sample on 12/6 SEE Page 175 - well still dry this date

1000 Hrs - Collected additional sample from 16GWT11 - Misc. Explosives & Filtered Metals - Well dry

1130 Hrs - Lunch

1200 Hrs - Check on JG @ SWMU 13

1215 Hrs - Put Lock on 13 MWT 44

1230 Hrs - Check on SG. - will be ready to sample @ 1400 Hrs - will return to RUN MNA @ 13MWT28

1300 Hrs - Collect 0.5 L of sample @ 13MW06 until well dried up.

1330 Hrs - Return to well 13MWT28 @ 1400 Hrs start to RUN MNA

1420 Hrs - Well 13MWT29 - Water level @ Pump intake - SG will move to 13MWT45 & Finish sampling 13MWT28 tomorrow

1510 Hrs - Assist SG with setup @ 13MWT45

1535 Hrs - Start Dev. @ 13MWT35
- Start Purge = 1535 Monitored Recovery until = 1625
- End Purge = 1555
- Vol. Purged = 14.5L

1635 Hrs - Finished Cleanup @ 13MWT35

1640 Hrs - Check on JG & Assist w/ 13MWT19

1720 Hrs - Check on SG & Assist w/ 13MWT45

1800 Hrs - Left SWMU 13 for Bldg # 3245
- Unload Vehicle
- Clean office space, bathroom, hallway Etc. etc.

1830 Hrs - Left Office for Hotel

SIGNATURE [signature] DATE 12/7/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 12-8-03

Soil : Collected PCBs @ Soil Borings 16 - 25
SEE CoCCs 4831 & 4832

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13RB120803O1	NA	NA	NA	0740	BUCKET BIT
13RB120803O2	NA	NA	NA	0937	BUCKET BIT
13RB120803O3	NA	NA	NA	1500	BLADDEK PUMP
13GWT3601	0840	1040	13L	1050	JG MS/MSD RAN MNA
13FD120803O3	"	"	"	0000	DUP OF 13GWT3601

Continued to collect Additional Sample @ :
13MWT28 = Complete Sample Collection this date
13MWT45 = Collected 1.5L of Explosives & Misc. Expl.
13MWT06 = Collected ~500ml completed the collection of Explosive sample

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN U.S.A.

MON 12-08-03

Work continued from Page

Weather - Partly Cloudy & High 30's

0658 Hrs - Arrived @ BLDG #3245

- Prep to sample soils @ SWMU 13
- Collected 13RB120803 01 @ 0746 Hrs

NERL Reagent Grade H2O Lot # 0807253 Exp. 8/04

0848 Hrs (GR) Start Collecting Soil Samples @ SWMU 13

1115 Hrs - END " " " @ SWMU 13

1130 Hrs - LUNCH

1200 Hrs - Arrive @ BLDG #3245

- PAPER WORK & SHIPPING OF SAMPLES ON COCs:

#4831 → 4834 to LAUCKS TESTING LAB

#4835 to MICROSEEPS INC.

- LABEL Soils Samples

1730 Hrs - LEFT NSWC CRANE FOR FED. EX.

1800 Hrs - DROP OFF SAMPLES @ FED. EX

LAUCKS SAMPLES ON AB # 8412 2491 0560

MICROSEEPS SAMPLES ON AB # 2412 2491 0559

END

Work continued to Page

SIGNATURE Terry Rogers DATE 12-8-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 12-09-93

SAMPLE ID	START PURGE	END PURGE	SAMPLE TIME	VOL PURGED	COMMENTS
13GWT4601	0902	1122	1124	11.2 L	(JG)
13GWT4701	0930	1100	1110	9.4 L	(SG)
13GWT3501	1443	1530	NA	12 L	(JG) DICED OUT WELL
13GWT4501	← SEE 12/7 →		1645	12/7	1 G/PK collected total metals
13GWT0602	← SEE 12/6 →		1730	12/6	→ 1 G/PK collected total metals

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TUES 12-09-03

Work continued from Page Mostly Cloudy & 50's Temp.

0700 Hrs - ARRIVED @ BLDG #3245
- ASSIGN WORK to J.G. & S.G.
- FAX COCs to OFFICE & LAUCKS LAB

0800 Hrs - PREP. to visit SITES w/ B. Gates, T. Brent & R. Basinski AND C. FREEMAN

SITES VISITED INCLUDED:
- SWMU 18: BLDGS #104, #105, #198 & #200
- OLD GUN TUB
- Roads & Grounds - SWMU 15
- POND - SWMU 8
- SMUU - 20

1300 Hrs - RETURN to BLDG #3245

Roughed out sample location maps for BLDGS 104, 105, 198, 200 & ~~SWMU~~ SWMU 20 for B. Gates, T. Brent & R. Basinski.

1600 Hrs - Joined JG and Prep. to sample 136MW45 & 06

1645 Hrs - Collect Total metals & Hg and complete misc. Explosive sample @ 13GWT45 - and well dried out

1739 Hrs - Arrive @ 13MW106 - Sample for Total Metals & Hg and well dried out.

1745 Hrs - Return to BLDG #3245
SECURE SAMPLES in Fridge ; drop off misc. EQ.

1815 Hrs - LEFT NSWC CRANE

END

SIGNATURE Terry Brent

DATE 12-09-03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 12-10-08

SAMPLE ID	SAMPLE TIME	PURGE DATE	COMMENTS
13GWT3501	1145	12/9	FULL SUITE COLLECTED (TRE, JG)
13GWT4501	1300	12/7	Nitrate + Nitrite, Ammonia & Filtered Metals by TR
TB 121003 01	1500	NA	
RB 121003 01	1510	NA	TR/JG Disposable Bailer

SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. N9060

BOOK NO. 1363

183

WED 12-10-03

Work continued from Page

Weather: Overcast Periods of Rain & 50's

0653 Hrs - Arrive @ BLDG #3245
- Paperwork CoC 4836, etc.
- Start office clean-up
- Start Pack. of EQ clean up & shipment prep.
- (JG) drilled screw holes in well tags 13MW19→26 in prep. to secure the wells tags
- Start clean up in Storage Room / Garage

1100 Hrs - Lunch

1130 Hrs - Arrive @ Mo Gate Notify Guard of our access

1145 Hrs - Start Sampling 13GWT35

1300 Hrs - " " 13GWT45 for Filtered Metals & Hg; and Nitrate Nitrite & Ammonia

1400 Hrs - Arrive @ BLDG #3245
- Talked to Ralph Basinski - ask me to set up the Revegetation / Restoration w/ Jacobi Seeding
- Talked to Jacobi (Dave Fulkerson) and set up Friday 1/9/12 for work / sites access
- Paperwork, Packaging / Shipping prep. for samples on 4836

1630 Hrs - (JG) to work on securing well tags & Sample 13GWT06

(TC) To drop off samples & Rental EQ. @ FEDEX

1720 Hrs - Drop of Samples on CoC #4836 FED EX AB# 8412 2491 0526

US Environmental EQ shipped on FED EX AB# 8412 2491 0537

END

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE		DATE
Terry Gosliner		12-10-03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

SAMPLE Summary 12-11-03

Note: TALKED to Mr SLAVEN NO production @ BLDG #165 today & tomorrow.
OK to take in Revegetation/Restoration CREW.

Collected - Nitrate + Nitrite and Ammonia sample Rkm 13GWLT0662.

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 50605 MADE IN USA

Work continued from Page

OVERCAST & COLD

0650 HRS - ARRIVE @ BLDG #3245 - ARRANGED FOR RESTORATION TO TAKE PLACE TOMORROW
- DECONS ALL WHALE PUMPS & HAND AUGER EQ.
- PREP. SOME EQ TO RETURN TO PITTSBURGH
- GENERAL OFFICE CLEANUP - JG SECURING WELL TAGS ON 13MW WELLS

0930 HRS - START TAKING PHOTOS OF CORE BOXES

1130 HRS - LUNCH

1200 HRS - RETURN TO BLDG #3245 - CONT. TAKING PHOTOS OF CORE BOXES

1330 HRS - FINISH PHOTOING CORE BOXES
T. BRENT WILL HELP DELIVER CORE BOXES TO STORAGE FACILITY - LOADED GOV. TRUCK W/ CORE BOXES (~1/3 OF TOTAL)

1600 HRS - COMPLETE DELIVERING CORE BOXES TO STORAGE (MAG. 1970)
15 CORE BOXES REMAIN FOR NEXT SHIFT ~ 65 MW60.

1615 HRS - COLLECTED NITRATE & NITRITE / AMMONIA @ 13MWT06
SAMPLE ID 13GWT0602.

1630 HRS - ARRIVE @ BLDG #3245
- PAPERWORK & PACK SAMPLES FOR SHIPMENT VIA FED EX.

1715 HRS - → AIRBILL 8412 2491 0504
DROP OFF SAMPLES ON COC # 4837 @ FED EX.
ALSO, SHIPPING PERISTALTIC PUMP TO US ENVIRONMENTAL
ON FED. EX AIRBILL 8412 2491 0490

1735 HRS - ARRIVE @ MOTEL

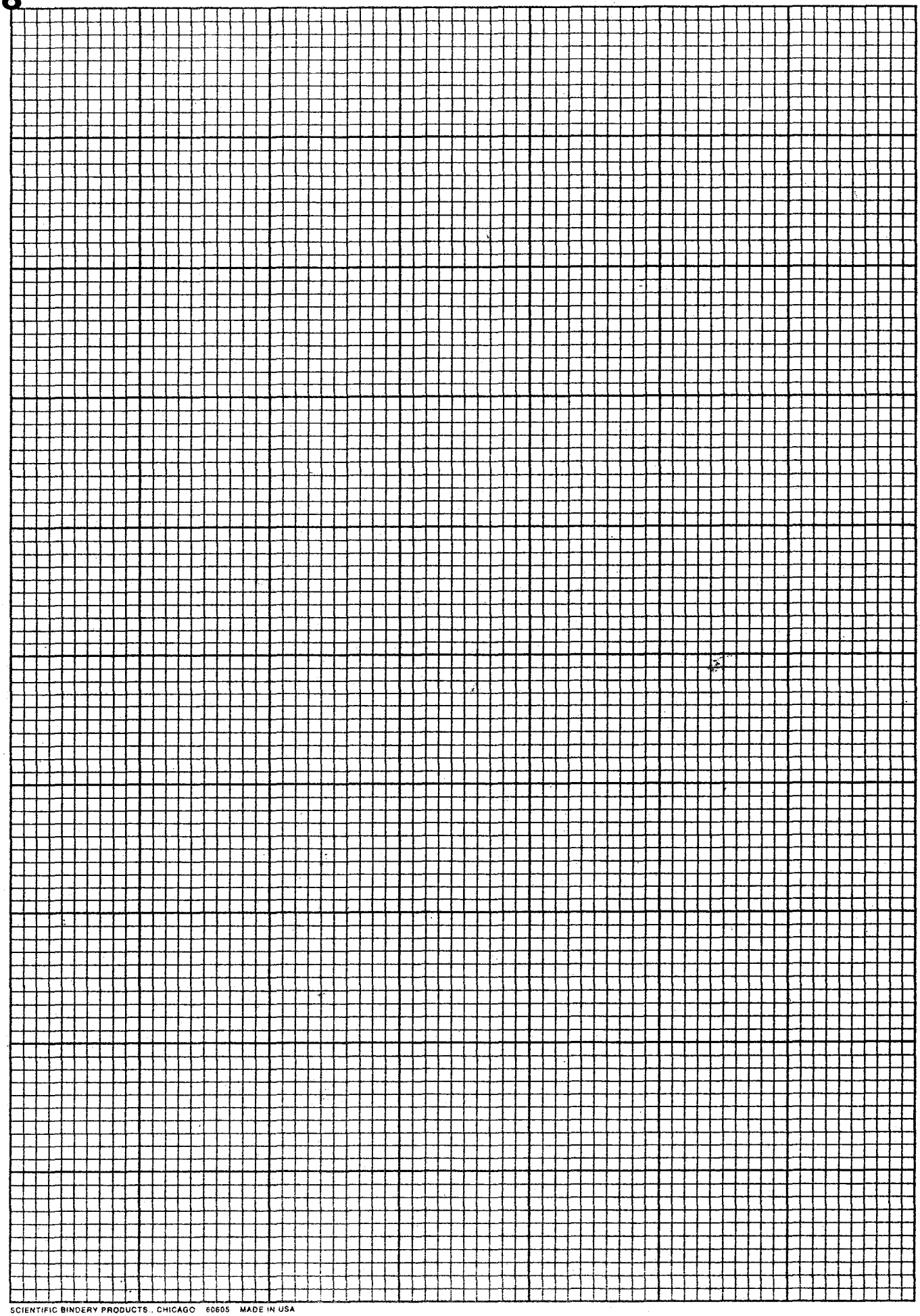
END

Work continued to Page

SIGNATURE Tony Brent

DATE 12/11/03

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS., CHICAGO 60605 MADE IN USA

FRI 12/12/03

Work continued from Page

0650 Hrs - ARRIVE @ BLDG #3245
- Start Packing EQ & PAPERWORK to Ship to Pittsburgh
- OFFICE ORGANIZE

0800 Hrs - MEET W/ Site Restoration CREW
- Ground to hard to dig will have to postpone Restoration to later date (possibly spring)

0830 Hrs - Return to BLDG #3245
- Check in W/ OFFICE talk to T. Basinski - inform him of Site Restoration delay
- CALL in time
- Clean out VEHICLE
- CLEAN OFFICE LAB Hallway Storage room & Bathroom & MOP
- CLEAN DRAIN out back
- Finish Preparation to ship EQ & PAPERWORK to Pittsburgh
  OFFICE - AB# 8412 2491 0478
  WAREHOUSE - AB# 8412 2491 0467

1130 Hrs - LEFT NSWC CRANE to check out the Hotel & FED EX Drop OFF.

END

SIGNATURE			DATE
			12/12/03
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Synoptic Potentiometric Levels @ SWMU 13 04

11/29/04

Well ID	Time	WL	Well ID	Time	WL
1	1347	7.55	35	1424	63.96
2	1357	16.24	36		
3	1344	9.98	37		
4	1408	14.09	38		
5	1404	5.78	39		
6	1342	11.91	40		
7	1417	9.21	41		
8	1412	3.88	42		
9	1337	8.77	43		
10	1421	14.96	44		
11	1427	8.76	IS 45	1505	72.75
12	1430	10.75	46		
OS 13			47		
OS 14					
15	1443	14.59			
16	1501	11.01			
17	1458	8.89			
18	1446	20.21			
OS 19					
20	1333	5.00			
21	1503	9.09			
22	1516	8.18			
23	1331	8.50			
24	1328	9.25			
25	1523	7.05			
26	1326	10.05			
27	1441	9.31			
28	1339	79.63			
29					
30					
31					
32					
33					
34	1512	5.42			

SCIENTIFIC BINDERY PRODUCTS . CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

Mon 1-19-04

PROJECT NO. ~~6004~~ (TK) X9060 **189**

BOOK NO. 1363

Work continued from Page

Morning - worked on SWMU 1

1230 Hrs - Prep to do Waterlevels @ SWMU 13

TK - all well measurements inside security fence & All staff Gauge measurement & install SG 11

ER - to do all measurements of wells outside of the security fence @ SWMU 13

1620 Hrs - Meet w/ Fred @ BLDG #3245 Fred got tied up with the drillers and couldn't do well measurement, we will complete the measurement tomorrow & within the 24 Hrs. of start time (1319 Hrs)

- Prep. to develope monitoring Well 16 MW 18

1730 Hrs - TK Assisted ER w/ well development & returned to BLDG #3245 to prep. ship of samples from SWMU 1.

SEE Notebook # 1340 (SWMU 1)

SG	Time	Wl.	Flow	
1	1401	1.77	Stagnet	0.15 x 0.85
2	1351	3.68	0.35 x 1.3	22sec/1'
3	1602	1.87	ICE Pool 1x3' → (O Flow other side of Road)	Discharge
4	15.35	2.45	0.04 x 0.35	4sec/1
5	15.39	3.90	0.01 x 0.25	35ec/1
6	1531	2.35	1'x1' Stagnet Pool	
7	13:19	1.47	Stagnet	
8	1519	5.08	0.01 x 0.3	1sec/1'
9	1452	4.15	0.06 x 0.9	2sec/1' (2 streams merg @ culvert)
10	14:33	4.82	0.05 x 1.6	3sec/1'
11	1554	2.74	0.1 x 1.2	6sec/1'

END

Work continued to Page

SIGNATURE		DATE
TK Rose		1/19/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

Synoptic Water Levels @ SWMU 13 04
1/19/04 & 1-20-04

WELL ID	TIME	WL	
1	1347	7.55	
2	1357	16.24	
3	1344	9.98	
4	1408	14.09	
5	1404	5.78	
6	1342	11.91	
7	14.17	4.21	
8	14.12	3.88	
9	13:37	8.77	
10	1421	14.96	
11	14.27	8.76	
12	14.30	10.75	
OS 13	11.28	4.93	
OS 14	11.04	14.17	
15	14.43	14.59	
16	1501	11.01	
17	1458	8.89	
18	1446	20.21	
OS 19	1058	10.96	1-20-04
20	1333	5.00	
21	1538	9.09	
22	1516	8.18	
23	1331	8.50	
24	1328	9.25	
25	1528	7.05	
26	1320	10.05	
27	1441	9.31	
	139	79.63	

WELL ID	TIME	WL	
35	1424	63.96	
36	900	19.26	1-20
37	913	14.37	1-20
38	911	61.90	1-20
* 39	920	14.25	1-20
40	941	18.55	1-20
41	940	66.58	1-20
42	949	21.14	1-20
43	1002	8.50	1-20
44	1007	64.57	1-20
SS 45	1505	72.75	
* 46	925	58.10	1-20
* 47	1115	7.32	1-20
32	1039	9.52	
31	1052	10.65	1-20
33	1048	10.63	1-20
19		10.96	

19	1058	10.96	1.20
30	1109	11.72	1-20
29	1122	5.82	

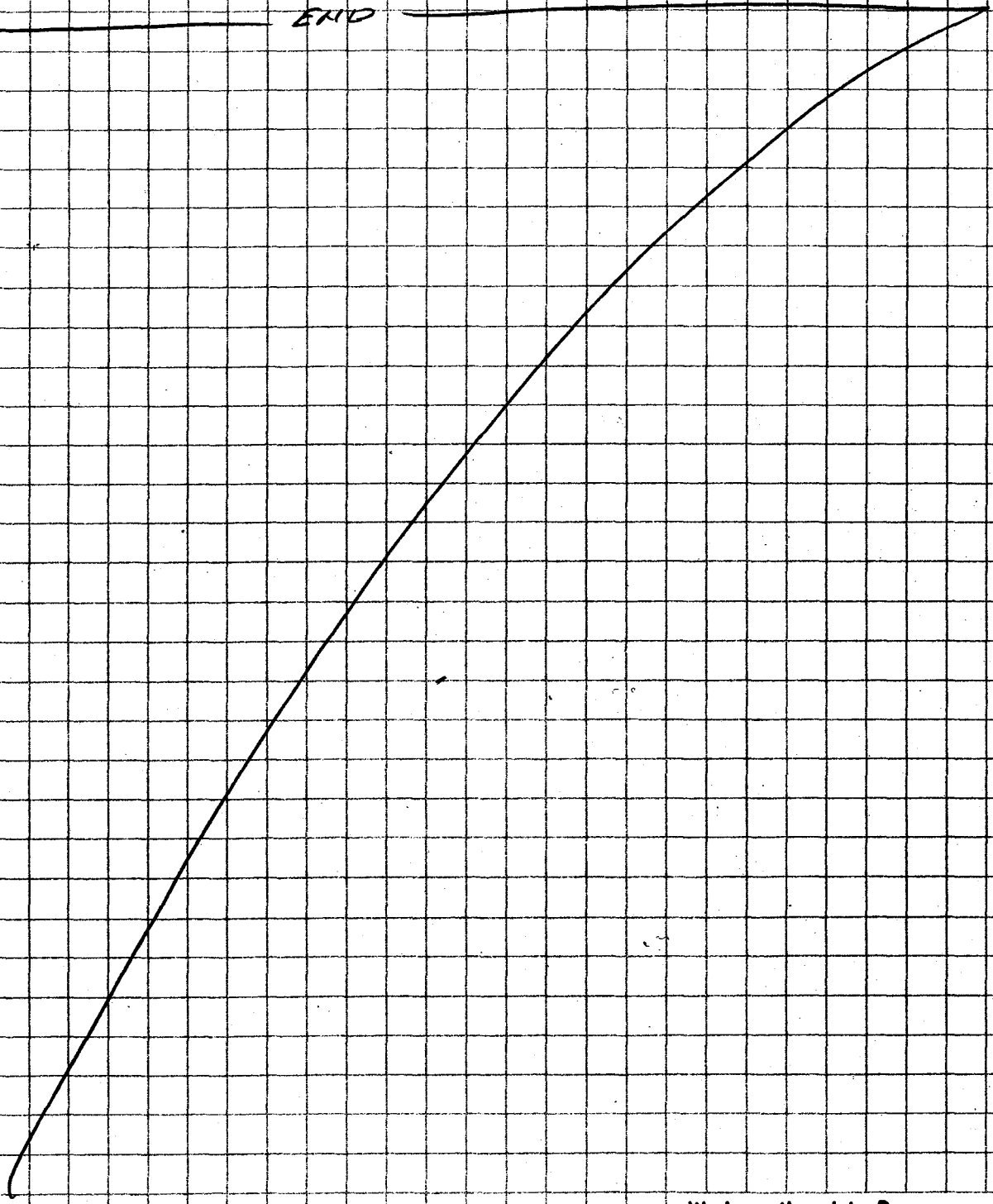
SCIENTIFIC NOTEBOOK PRODUCTS, CHICAGO 60605 MADE IN USA

TUE 1-20-04

Work continued from Page

F. Ramsek completed the synoptic water level measurements (see p. 190) @ Skimch 13.

END



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

SIMMU 16 SYNOPTIC WATER LEVELS

WELL ID	WL. ∠	TIME
WES-14-1-83	- 31.98	- 10:32
WES-14-2-83	- 15.36	- 0935
WES-14-3-83	- 20.00	- 1047
WES-14-4-83	- 28.39	- 1041
WES-14-5-83	- 34.18	- 1038
16MW1T01	- 19.12	- 0945
02	- 10.94	- 1029
03	- 28.34	- 1021
04	- 13.11	- 10:15
05	- 31.44	- 10.18
06	- 17.41	- 0947
07	- DRY	- 1003
08	- 97.03	- 1005
09	- 13.88	- 1008
10	- 22.05	- 1010
11	- 96.30	- 1012
12	- 20.13	- 1044
13	- 10.25	- 1025
14	ABANDONED	
15	- 53.23	- 1026
16	- 32.93	- 0956
17	- 15.35	- 1000
18	- 96.65	- 0951 TD 104.5

SAT. 1-24-04

Work continued from Page

0700 Hrs -
Arrive @ BLDG # 3245 - Prep. & Sample 16MW17S & take a complete round of water LEVELS @ SWMU 16.

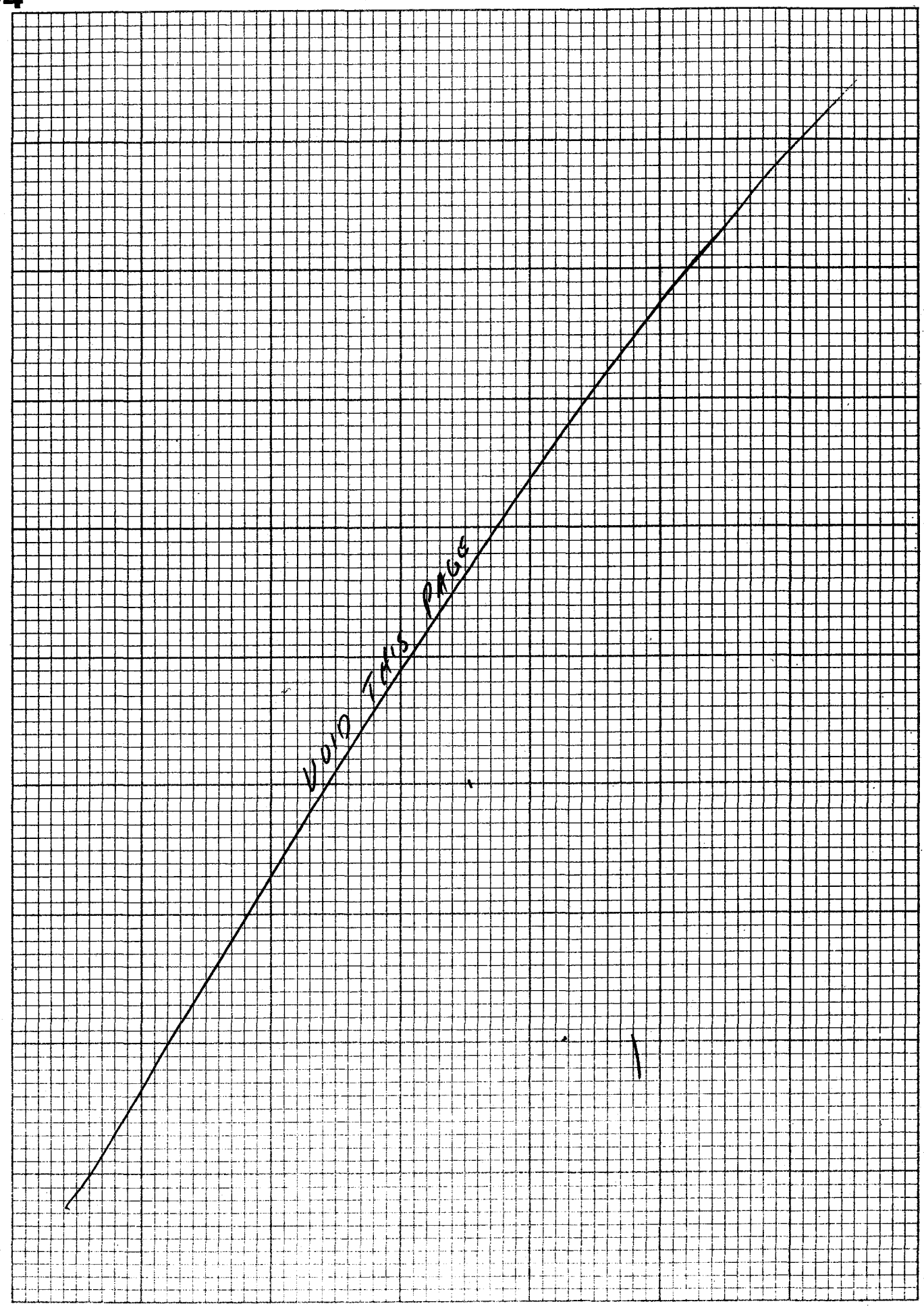
0900 Hrs - Arrive @ SWMU 16
• 0935 - 1047 Hrs - Run synoptic round of ~~SYNOPTIC~~ water levels

1100 Hrs - Start set up @ 16MW17S
Start Purge - 1115 Hrs
END Purge - 1305 Hrs (well dry)
Vol Purged - 3.6 L
Will sample well tomorrow after well RECHARGES

1320 Hrs - Arrive @ BLDG # 3245
Prep to sample wells @ SWMU 1
Remainder of day see NBK 1340 for N0845
Charge #, CTO 315

END

SIGNATURE			DATE
			1-24-04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO MADE IN U.S.A.

Work continued from Page

0700 Hrs - Arrive @ BLDG # 3245

PREP to SAMPLE 16MWT18

0853 Hrs - Begin sampling 16MWT18

1100 Hrs - Finish clean up @ SWMU 16 & Return to BLDG # 3245.

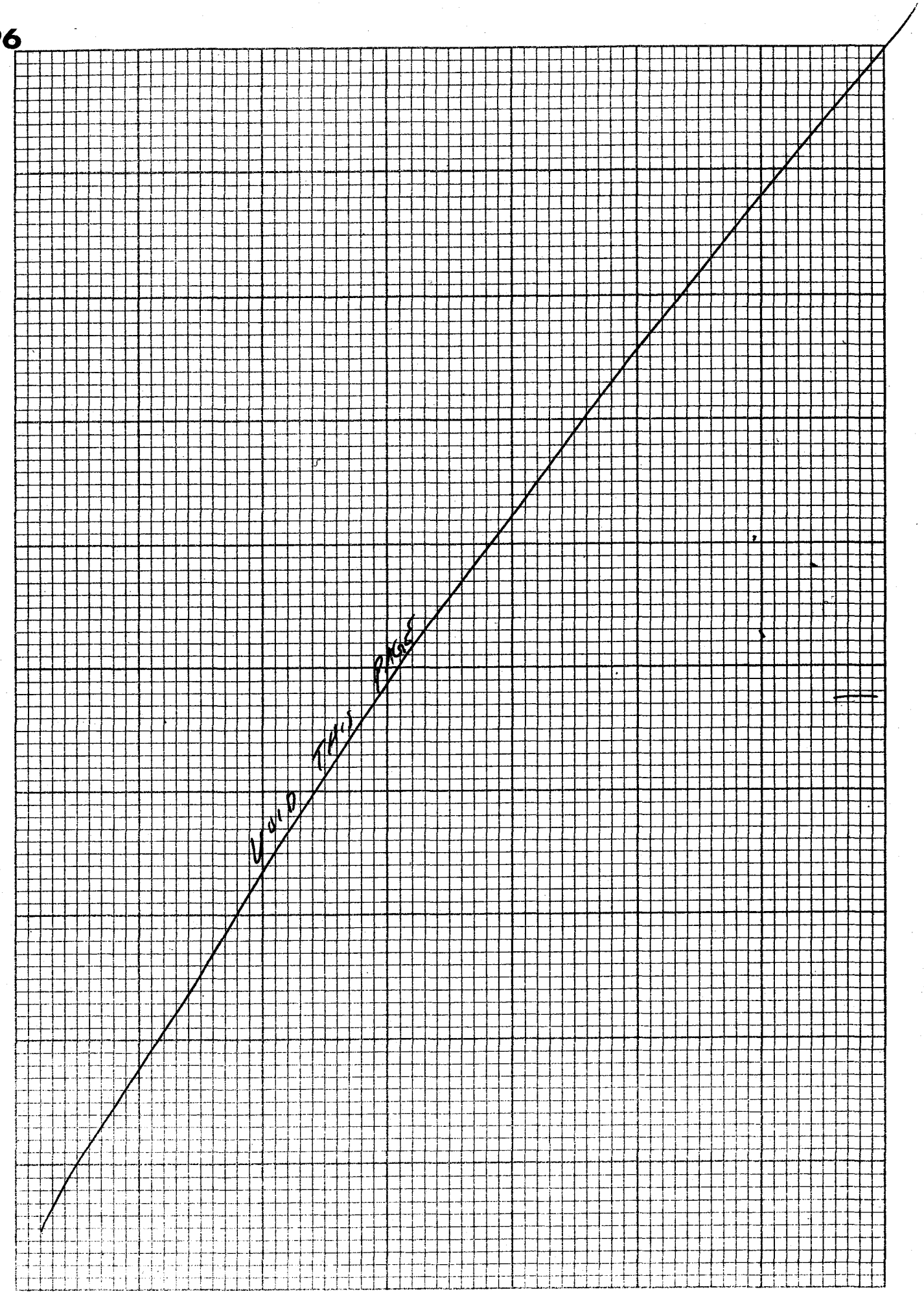
REMAINDER OF DAY SEE MGBG Note Book # 1346

END

Work continued to Page

SIGNATURE Tony Rozek **DATE** 1-25-04

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**



SCIENTIFIC SENDERY PRODUCTS CHICAGO 60632 MADE IN USA

Work continued from Page

SHIP SAMPLE 16GMT1801 this date &
LAUCKS - CofC # 4395 AB# 8412 2491 9971
MICROSEALS - CofC # 4394 AB# 8412 2491 0993
Drop off @ FED.EX. @ 1845 Hrs
END

Work continued to Page

SIGNATURE [signature]

DATE 1-26-04

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

APPENDIX D.1.3
SWMU 13
SITE LOGBOOK
ROUND 3

NSWC CRANE

N7448

SWMU 13 & 16

1376

NSWC CRANE

PROJECT # ~~6078~~ TD 7448

CTO ~~0357~~ TR 0343

PROJECT TOM & RALPH BASINSKI

FOL - TERRY ROJAHN

START WORK - 7/8/04

END WORK -

OTHER NOTE BOOKS

3577 - S. Cont:

2575 - J. Goerdt (sampling)

2565 - C. LANEY

~~2575 - J. Goerdt~~ TR

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 7-8-04

Work continued from Page

1615-Hrs Pick up Dig Permit # 4560 this date FOR WELLS ONLY @ SWMU 13 - SEE opposite Page

END

5

10

15

20

25

30

35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 7-8-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4572

REQUESTED BY	DATE
Tetra Tech NUS Inc/Ralph Basinski 412-921-8308	7/9/04
WORK REQUEST ON E/S NO.	
153704	B-1998 & B-1996 on Hwy 77
WORK WILL BE PERFORMED BY	**DATE (Start - on or about)**
Tetra Tech NUS, Inc.	

WORK DESCRIPTION

2 Soil borings & monitoring wells along Hwy 77 between Magazines 1998 & 1996. Sites are marked & drawing is attached.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed 22 7/9/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR	N/A			7/9/04 dg
HIGH VOLTAGE ELECTRICAL	N/A			7/9/04 DHW
FIRE ALARM Z2				7-14 MH
GROUNDING Z2				
NATURAL GAS	N/A			7/9/04 dg
SECURITY ALARM Z2	N/A			7-14 MH
SEWER	N/A			7/9/04 dg
STEAM	N/A			7/9/04 dg
TELEPHONE	N/A			7/9/04 DHW
WATER	N/A			7/9/04 dg
SECOND ELECTRICAL	N/A			7/9/04 DHW
GENERAL DYNAMICS/NMCI	N/A			7/9/04 dg

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Tony Kosek	7/22/04
DIGGING PERMIT APPROVED BY	**DATE**
William F. Zellman	7/22/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File
YELLOW - Surv. At work site

TITLE NSWC CRANE

S. Cont.
J. Goerdt
T. Rojahn

PROJECT NO. 7448

BOOK NO. 1376

THURS. 7-22-04

Work continued from Page

1230 Hrs - Arrive @ BLDG
- CHECK IN W/ T. Brent & C. Freeman
- OPEN EQ / METERS
- BEGIN OFFICE ORGANIZATION

1330 Hrs - Pick up Dig Permits 4562 (RENEWED FOR MFA) & 4572 SEE LEFT PAGE FOR SWMU 16 (WELLS along Hwy 77)

1350 Hrs - Recon decon (possible) locations outside MFA

1430 Hrs - CHECK prime location FOR decon site W/ T. Brent FORMER PESTICIDE MIXING bldg. - HAS WASH RACK & IND SEWER.

1500 Hrs - Return to BLDG.
Compile SHIPPING lists FOR Sams & Hardware stores

1545 Hrs - LEFT SITE to CHECK into motel & SHOP FOR SUPPLIES

1650 Hrs - PURCHASE SUPPLIES @ SAMS

1745 Hrs - RETURN to HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 7-22-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7-23-04:

WELL ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT2403	0948	1123	1.09 L	1128	JG
13GWT1103	1545	1650	5.7 L	1652	TC
13GWT2603	1448	1738	21.8 L	1745	JG.
13GWT2503	1250	1925	13.5 L	NA	PURGED DRY

Drilling Summary

- MoB Day for drilling Crew J. Walsh, J. Dean & C. Mahaffey (CM)
- S. Cont. grout C.M H&S training
- Decon pad OKed by MEA Fire Dept (got Hot Work Permit see NB # 1374 pp 8 & 9) & Army CAAA (B. Gilkis).
- Set up decon behind bldg # 3245

TITLE NSWC CRANE — T+NUS — S. Conti, J. Geordt, T. Rojahn

PROJECT NO. 7448

BOOK NO. 1376

FRI. 723-04

Work continued from Page — WEATHER - Hot & Humid Temp High 80s

0710 Hrs - Arrive @ BLDG # 3245
- Organize office material
- Select wells for JG @ SWMU 13
- Tried several time to contact supervisor @ SWMU 13 - NO ANSWER
- Contacted Fire Department - to inspect decon location @ MFA
- Contacted Bob Gillis Army Safety - he said area for decon is outside of AACs for BLDGs 160 & 155 so he would defer to the Fire Dept

0920 Hrs - S. Conti & T.R. Arrive @ proposed decon AREA for ~~BLDG #~~ MFA to meet Fire Inspector.

0935 Hrs - Meet w/ Fire Insp. - OKed area but w/l meet w/ S. Conti when drillers arrive @ BLDG # 3245 + wright Hot Work Permit

0940 Hrs - Arrive @ BLDG #3245
- FED. EX dropped off dedicated Bladder Pumps
- Prep. to install bladder Pumps @ SWMU 13

1020 Hrs - start Bladder Pump Installation w/ S. Conti Installed 13MW109, 11, 15, 17, 21, 28, 34 & 45

1215 Hrs - Stop for lunch

1250 Hrs - Return to BLDG #3245
- Talked to D. Baker MFA Super. informed him that we will be drilling in MFA over the WEEKEND.
- PREP FOR H&S (training) FOR one driller (CHAD MAHAFFEY)
- PREP. to SAMPLE GW
- Call for more Nitrogen & Check in w/ OFFICE (R. Basinski)

1545 Hrs - Start Purge @ 13MW111

1652 Hrs - Begin Sampling @ 13MW111

1735 Hrs - Finish @ 13MW111 CHECK on JG @ 13MW126

1800 Hrs - Return to BLDG #3245, PAPERWORK

1830 Hrs - SECURED samples in Frig.; JG. ARRIVED; LEFT Site for HOTEL

Work continued to Page

SIGNATURE Terry Rojahn — DATE 7-23-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7/24/04:

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT0603				NA	(JG)
13GWT0803	0923	1043	8.2 L	1045	(TR)
13GWT0403	1102	1202	6.0 L	1205	(JG)
13GWT0203	1318	1428	7.2 L	1435	(JG)
13GWT2503	—	—	—	1511	(JG) Purged 7/23/04
13GWT0503	1230	1630	16.5 L	1635	(TR)
13GWT0303	1605	1815	11.7 L	1825	(JG)

DRILLING SUMMARY:

Drilled & set 12MWT01 @ 34'

Drilled 12MWT02 to 29.5' will set well on 7/25 probably @ 28'

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60635 MADE IN USA

SAT 7/24/04

Work continued from Page

Weather AM - Mostly Cloudy Tsmi 70's, PM - Same

0705 Hrs - Arrive @ Bldg # 3245

- Prep to sample GW
- Paperwork & Pick wells for sampling this date

0900 Hrs - Arrive @ MFB

0923 Hrs - Start Purge @ 13MWT08

1115 Hrs - Finish @ 13MWT08

1130 Hrs - Lunch

1200 Hrs - Return to MFB

1230 Hrs - Start Purge @ 13MWT05

1730 Hrs - Finish @ 13MWT05

1735 Hrs - Check on J. Goerdt

1800 Hrs - Return to Bldg # 3245

- Refrigerate samples
- Drop off EQ, Dump Purge H2O
- Organize office

1830 Hrs - Left NSWC Crane for Motel

- E-mail R. Basiuski work summary for 7/23 & 24/04 from Motel

END

Work continued to Page

SIGNATURE Tony Rojalw DATE 7/24/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7-25-04 :

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	COMMENTS
13GWT0603	(SEE PAGE 6		)	1405	(JG) start sampling Exp (
13GWT0703	0920	1120	9.7L	1122	(TR) DUP 13FD072504
13GWT1203	0856	1211	17.6L	1218	(JG)
13GWT1603	1440	1540	5.4L	1547	(JG) Collected MS/MSD
13GWT2303	1420	1640	10.2L	1642	(TR)

DRILLING SUMMARY :

Set / installed 12MWT02 at 28' / drilled on 7/24)

Drilled / set / installed 12MWT08 @ 24'

Pulled out ue MCA & disconnect Rig.

SCIENTIFIC NOTEBOOK PRODUCTS CHICAGO 60603 MADE IN USA

SUN 7/25/04 Stop Raining @ 0900 Hrs

Work continued from Page WEATHER: AM - Mostly Cloudy 60's; PM - SAME W/ Rain

0700 Hrs - ARRIVED @ BLDG #3245
- PREP. to SAMPLE GW
- PAPERWORK & PICK WELLS FOR SAMPLING this DATE

0900 Hrs - ARRIVE @ MFB

0920 Hrs - BEGIN PURGE @ 13MWT07

1240 Hrs - FINISH SAMPLING @ 13MWT07 obtained 13FD0725040I

1300 Hrs - LUNCH / RAIN

1345 Hrs - RETURN to MFB SET UP CANOPY @ 13MWT23

1725 Hrs - FINISH @ 13MWT23

1740 Hrs - ARRIVE @ BLDG #3245
SECURE SAMPLES & METERS
ASSIT J.G. in labeling MS/MSD

1800 Hrs - LEFT BLDG #3245 FOR Motel
- E-MAIL FIELD WORK SUMMARY to R. BASNSK FROM motel

END

Work continued to Page

SIGNATURE Tony Ard DATE 7/25/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 7/26/04 :

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT3002	0850	1040	9.4L	1042	(TR)
13GWT3302	0858	1038	8.0L	1043	(JG)
13GWT3302	1245	1645	18.6L	1650	(JG)
13GWT0603	(PAGE 6		)	(PAGE 8)	Cont'd to sample EXPLOSIVES

DRILLING SUMMARY 7/26/04 :

RAIN DELAY ... H&S Caccese, B-MS CALLS

CROWS - ... EXCEPT CHIP LANEY ARRIVED 1245 HRS

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

11

MON 7-26-04

Work continued from Page

0705 Hrs - ARRIVED @ BLDG #3245
- PREP to SAMPLE GW
- PAPERWORK & PICK WELLS FOR SAMPLING this dark

0830 Hrs - ARRIVED @ Monitoring WELL 13MWT30

1130 Hrs - FINISH SAMPLING & CLEAN UP @ 13MWT30

1145 Hrs - LUNCH

1230 Hrs - ARRIVE @ BLDG #3245
- CHECK IN W/ R. BASINSKI
- PREP. SAMPLES FOR SHIPMENT ON COCs 0050 & 0051 & SHIP VIA FED EX AB#8447 8135 5362
- FAXED LAWCHS & OFFICE COPIES OF COCs
- CALLED Bloomington Oxygen REGARDING TUES. delivery
- DISCUSSED SCH. W/ CHIP LANEY
- S. Conti to pick up HARDWARE SUPPLIES

1930 Hrs - • PREP. to INSTALL Bladder-Pumps W/ C.L.
INSTALLED Bladder Pumps 13MWT 13, 14, 31 & 47

1545 Hrs - RETURN to BLDG #3245
LOAD SAMPLE Coolers

1555 Hrs - LEFT Bldg #3245 FOR FED. EX.

1630 Hrs - DROP OFF SAMPLES @ FED. EX. IN Bloomington

1700 Hrs - RETURN to Hotel
- E-mail FIELDWORK SUMMARY to R. BASINSKI From Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE		DATE
		7/26/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

SAMPLING SUMMARY 7/27/04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1903	0815	0950	8.3L	0954	JG
13GWT3202	0830	0950	8.0L	0954	TR MS/MSD
13GWT2902	1029	1149	10L	1152	JG
13GWT2203	1440	1550	6.2L	1554	JG
13GWT1403	1435	1625	12.5L	1628	TR
13GWTdup03	(SEE PAGE 6			(PAGE)	TR FINISH collecting 1L Amber for EX

DRILLING SUMMARY 7/27/04:

Drilled, SET & INSTALLED monitoring WELLS:

13MWT51 @ 15'
13MWT50 @ 25'
13MWT49 @ 9'

Drilled 13MWT48 to 9'

EDIX ENTERPRISE BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE — S. Conti, C. Laney, J. Goerdt, T. Kosahal; J. Walsh, J. Dean, C. Mahaffey

PROJECT NO. 7448

BOOK NO. 1376

TUES 7/27/04

Work continued from Page

WEATHER AM: Mostly Sunny 65°

0650 Hrs - ARRIVE @ BLDG # 3245
PREP FOR GW SAMPLING
PAPERWORK & PICK WELLS FOR SAMPLING THIS DATE

0815 Hrs - ARRIVE @ 13MWT32

1110 Hrs - FINISH @ 13MWT32

1130 Hrs - LUNCH

1200 Hrs - ARRIVE @ BLDG # 3245

- RR PRE-CON meeting moved to THURS 0800 Hrs WAS SCH. FOR today @ 1300 Hrs
- Check in w/ R. Basinski - Already Knew about the meeting change
- Sign RECEIPT FOR Nitrogen cylinders & SECURED in upright position along FENCE @ BLDG # 3245
- MEET w/ S. Conti discuss meeting change & C. Laney will stay w/ him the REMAINDER of the day to observe coring activities

1320 Hrs - CHECK IN ON J.G. ... dead car battery

1400 Hrs - Get CAR started AFTER purchase of cables @ on base gas station

1410 Hrs - ARRIVE @ 13MWT14

1710 Hrs - FINISH Clean up @ 13MWT14

1720 Hrs - Collect SAMPLE @ 13MWT06

1735 Hrs - ARRIVE @ BLDG # 3245

- Drop off EQ.
- SECURE SAMPLES IN Frig

1745 Hrs - LEFT BLDG # 3245 FOR Hotel

- E-mail FIELDWORK Summary to R. Basinski From Hotel
- PAPERWORK

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE		DATE
Terry Right		7/27/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

7/28 SUMMARY OF SAMPLING:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1803	0901	1231	17.8L	NA	(JG) will not purge on 7
13GWT2103	1120	1300	8.9L	1300	(CL/TK)
13GWT1003	1364	1559	9.4L	1604	(JG)
13GWT4502	1430	1730	13.5L	NA	(CL) will sample 7/29 C

7/28 SUMMARY OF Drilling:

Drilled, set & installed 16 MWT 19 & 20 @ 5-15'

Finish installation of 13 MWT 48 set @ 6-10'

WED 7/28/04

Work continued from Page Weather - Mostly Sunny 80's

0655 Hrs - Arrive @ BLDG # 3245
- Meet w/ T. Brent on Sch. - Printed out D. Johnstons
- Production sch.; Also, talked to R. Basinski regarding sch.
- Prep. for GW sampling Picked wells for JG, CL, TR

0830 Hrs - Mark Peterson Arrived @ BLDG # 3245 for Internal Audit
- Work w/ M.P. answering question and producing doc. For Audit.
- Had C.L. work w/ S.C. during questions period
- Showed M.P. decon ~~NEXT TO~~ (TC) MFA, how to access MFB (S. gate) and drop him off @ SWMU 16 where S. Conti and ~~M-B~~ (TC) B-M were drilling

1045 Hrs - Pick up C.L. @ SWMU 16

1100 Hrs - Arrive @ North Gate SWMU 13 & check into MFB w/ Guard

1120 Hrs - Start purge @ 13MW21 (TC)
- M.P. Audit sampling until completion of well sampling @ 1325 Hrs

1335 Hrs - Finish cleanup @ 13MW21

1350 Hrs - Pick up sandwich @ Subway

1410 Hrs - Return to MFB - 13MW46

1430 Hrs - Start Purge @ Well 13MW45
Assisted C.L. in set up

1500 Hrs - Returned to BLDG # 3245 - C.L. stayed @ 13MW45
- Prep samples for SHIPMENT
- M. Peterson - went over results of Audit w/ TR
- SHIPMENT ON Fed. Ex. AB # 8447 8135 5384
SAMPLES ON COC # 0052

1715 Hrs - Left BLDG for FED EX

1755 Hrs - Drop-off samples @ FED. EX.

1830 Hrs - Return to Hotel

- PAPERWORK & E-mail R. BASINSKI Fieldwork Summary

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rogal DATE 7/28/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLING SUMMARY 7/29/04 ☼

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT1803	(Purged	7/28	SeePage 14)	0850	(JG)
13GWT3902	0827	1047	12.7L	1047	(CL)
13GWT3602	0934	1044	5.6L	1048	(JG)
13GWT3902	1235	1355	8.0L	1359	(JG)
13GWT1703	1240	1510	15.0L	1510	(CL)
13GWT4502	(PURGED	7/28	SeePage 14)	1602	(CL)
13GWT1503	1340	1700	15.9L	1704	(TR)

Drilling Summary 7/29/04 ☼

Built PADS @ SWMU 16

Installed 12MWT38 (TR) (Drilled & Set)

THURS. 7/29/04

Work continued from Page

WEATHER: Partly Sunny 80's

0645 Hrs - ARRIVE @ BLDG #3245
- FAX COPC # 0052 TO OFFICE & LAB
- Prep JG & CL FOR Sampling - select WELLS

0800 Hrs - Pre Con MEETING FOR 600 Hill GL tracks @ BLDG #2

1010 Hrs - RETURN to BLDG #3245
- T. Brent to set up meeting w/ Doug Johnson @ BLDG #~~3245~~ TA 146 to mark Boring locations INSIDE THE BLDG.
- Prep FOR Locating Borings @ BLDG #~~3~~46
- TALK to R. BASINSKI

1100 Hrs - ARRIVE @ SWMU 16
ID Borings 90-97 & Dis. SAMPLES 79 & 80

1140 Hrs - RETURN to BLDG #3245
- PAPER WORK
- REPORT to R.B. about MEETING W/ TOM & Doug @ BLDG 146
- Prep to Sample GW @ MFB

1215 Hrs - LEFT Bldg #3245

1225 Hrs - LUNCH

1305 Hrs - STOP @ PUBLIC WORKS Donna not in

1320 Hrs - ARRIVE @ 13MW15

1740 Hrs - FINISH @ 13MW15

1800 Hrs - ARRIVE @ BLDG #3245
SECURE SAMPLES IN Frig.
PAPERWORK

1830 Hrs - LEFT BLDG #3245 FOR Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ty Brent DATE 7/29/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©

Sampling Summary 7/30/04:

Sample ID	Start Purge	End Purge	Vol. Purged	Sample Time	Comments
13GWT4202	0904	1016	4.9 L	NA	(JG) Dry well
13GWT3702	0853	1102	9.4 L	1102	(CL) Dup 13FD070304
13GWT4002	0940	1120	8.8 L	1124	(TR)
13GWT4602	1210	1330	7.6 L	1333	(TC)
13GWT2702	1314	1604	8.6 L	1608	(JG)
13GWT2004	1546	1746	12.0 L	1749	(JG)
13GWT3802	1538	1713	7.6 L	NA	(CL) Dry will sample 7/31/04

Drilling Summary 7/30/04:

Drilled set & installed 12MWT39' @ 34'

FRI 7/30/04

Work continued from Page

WEATHER Mostly Cloudy High 70's

0705 Hrs - ARRIVE @ BLDG #3245
- PREP FOR GW SAMPLING
- PICK WELLS FOR SAMPLING
- CALL R. BASINSKI leave message on 7/29/04 FIELDWORK SUMMARY

0845Hrs - Arrive @ MFB
INSTALL Bladder Pumps (Dedicated) @ 13MWT40 & 46
C.L. INSTALLED 13MWT37

0920Hrs - SETUP @ 13MWT40 AFTER WELLS BLADDER PUMP INST

0940Hrs - START PURGE @ 13MWT40

1145 Hrs - FINISH SAMPLING & CLEANUP @ 13MWT40

1210 Hrs - Start PURGE @ 13MWT46

1400 Hrs - FINISH CLEANUP @ 13MWT46

1410 Hrs - CHECK W/ C.L. Problem starting Purging With REUSEABLE 1 3/4" Bladder Pump
Determined that the o-ring FOR the Top Spool WAS missing

1430 Hrs - TR - WENT to the OFFICE to get O-ring

1505 Hrs - Drop OFF o-ring AND Prep Pump FOR sampling FOR CHIP.

1530 Hrs - RETURN to BLDG #3245
PREP SAMPLES FOR SHIPMENT TO LAUCKS ON COC 0053 VIA FED. EX. AB# 8447 8135 5.

1730 Hrs - LEAVE BLDG #3245 FOR FED. EX

1815 Hrs - Drop OFF SAMPLES @ FED. EX.

1855 Hrs - RETURN to HOTEL

END

SIGNATURE			DATE
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE
			7/30/04

SAMPLING Summary 7/31/04

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	Comments
13GWT4202	(SEE	PAGE	18)	0822	(JG)
13GWT4102	0820	0825	1.5L	NA	(TR) DRIED OUT
13GWT2802	0834	1234	11.3L	1234	(CL)
13GWT3802	(SEE	PAGE	18)	1442	(CL)
13GWT3502	1455	1519	13.0L	NA	(TR) DRIED OUT
13GWT4302				NA	(JG) DRIED OUT
13GWT0904	1540	1710	7.9L	1710	(CL)

DEV. Summary 7/31/04

WELL ID	START DEV	END DEV	VOL PURGED	Comments
13MWT51	0850	0936	7gal	Dried out 3 times
13MWT50	0955	1047	5.5gal	Dried out 3 times
13MWT49	1307	1354	18.0gal	Dried out 3 times
13MWT48	1401	1415	26gal	Recharge kept up with Whaler Pump

Drilling Summary 7/31/04

Drilled, set & installed 12MWT13 @ 20'

Bearings went bad on swivel... Rig down

for Remainder of the week end.

SAT 7/31/04

Work continued from Page

Mostly Cloudy high 70°s Low 80°s

0650 Hrs - ARRIVE @ BLDG #3245
- PREP FOR GW SAMPLING & WELL DEVELOPMENT
- Select WELLS to be SAMPLED FOR JG, CL & TK

0800 Hrs - Arrive @ 13MWT41
0835 Hrs - FINISH @ 13MWT41
0840 Hrs - MEET W/ JG AND PROCEED to 13MWT51
0850 Hrs - START PURGING / DEV. 13MWT51
0936 Hrs - END DEV @ 13MWT51
0955 Hrs - START PURGING / DEV. @ 13MWT50
1047 Hrs - END DEV @ 13MWT50
1105 Hrs - DUMP DEV H2O IN IND. SEWER
1120 Hrs - LUNCH
1150 Hrs - DECON WHALER PUMP & FOOT CHECK VALVE
1307 Hrs - START DEV. @ 13MWT49
1334 Hrs - END DEV. @ 13MWT49
1401 Hrs - START DEV. @ 13MWT48
1415 Hrs - END DEV @ 13MWT48
1430 Hrs - DUMP DEVELOPMENT H2O @ IND. SEWER MANHOLE
1455 Hrs - START PURGING @ 13MWT35
1519 Hrs - FINISH PURGING @ 13MWT35
1540 Hrs - CHECK ON CL @ 13MWT28
1600 Hrs - RETURN to BLDG #3245
- CLEAN OUT VEHICLE
- DECON WHALER PUMP & FOOT CHECK VALVE
- RESTOCK CONTAINERS IN OFFICE
- PAPERWORK
- CL. LEFT SIDE ~ 1800 hrs

1820 Hrs - LEFT SITE (BLDG #3245) W/ JG.
E-MAIL FIELDWORK SUMMARY TO K. BASINSKI FROM HOTEL
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 7/31/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLING SUMMARY 8/4/04:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	COMMENTS
13GWT4102	(SEE PAGE 20		)	0816	(TR/SC)
13GWT3502	(SEE PAGE 20		)	0825	(JG)
13GWT4302	(SEE PAGE 20		)	0850	(JG)
13GWT4402	0913	1143	7.6 L	1143	(CL)
13GWT5101	1016	1416	29.3 L	1420	(JG)
13GWT1303	1407	1547	11.5 L	1547	(CL)
13GWT4702	1641	1811	7.8 L	1811	(CL)
13GWT0103	1618	1818	13.0 L	1821	(JG)

DEVELOPMENT SUMMARY 8/4/04

DEVELOPED: 12MWT01, 02, 08, 13, 37 & 39

T+NUS CREW SAME AS ON PAGE 13

TITLE NSWC CRANE B-M-CREWS GW&E

PROJECT NO. 7448

BOOK NO. 1376

SUN 8/1/04

Work continued from Page Weather - Mostly sunny High 80°s

0705 Hrs - ARRIVE @ BLDG #3245
- Asign wells to sample For CL,NG & TR
- Prep to sample GW & DEV WELLS @ SWMU 12

0805 Hrs - Arrive @ 13MWT41 W/ S.C.

0816 Hrs - SAMPLE 13MWT41 BEGAN

0930 Hrs - FINISH @ 13MWT41 - INSIT RECHARGE VERY SLOWLY

1011 Hrs - Start Development @ 12MWT01

1026 Hrs - Finish DEV @ 12MWT01, Purged 28 gal, H2O CLEAR

1100 Hrs - Start DEV. @ 12MWT03

Dry out 3 times, H2O Brownish

1151 Hrs - Dry out 3rd time; Purge 16.75 gal

1205 Hrs - Lunch, CHECKED IN W/ R. BASINSKI

1230 Hrs - DECON WHALE PUMPS & PICK UP ADDitional

Supplies @ BLDG # 3245 Dis Bailer, Rope, ETC.; DUM. DEV.

1353 Hrs - Return to SWMU 12 to Purge the Remaining 4 WELLS

WELL ~~SAMPLED~~ ID	START DEV.	END DEV	VOL DEV	COMMENTS
12MWT37	1353	1448	3 gal	Dry out 3x; color-BRN
12MWT39	1505	1605	8.5L	Dry out 3x; color-BRN
12MWT08	1620	1713	10.5 gal	Dry out 3x; color-Cloud
12MWT02	1725	1750	30 gal	RAPID RECHARGE; color-cls

1810 Hrs - Return to BLDG #3245

Unload RENTAL SUV - CLEAN INSTRUMENTS

~1900 Hrs - VG & C.L. Return to BLDG #3245-

ASSIST in UNLOADING & CLEANING VEHICALS & EQ.

ORGANIZE OFFICE

1940 Hrs - LEAVE BLDG #3245 FOR MOTEL

E-MAIL R. BASINSKI FIELDWORK SUMMARY From MOTEL.

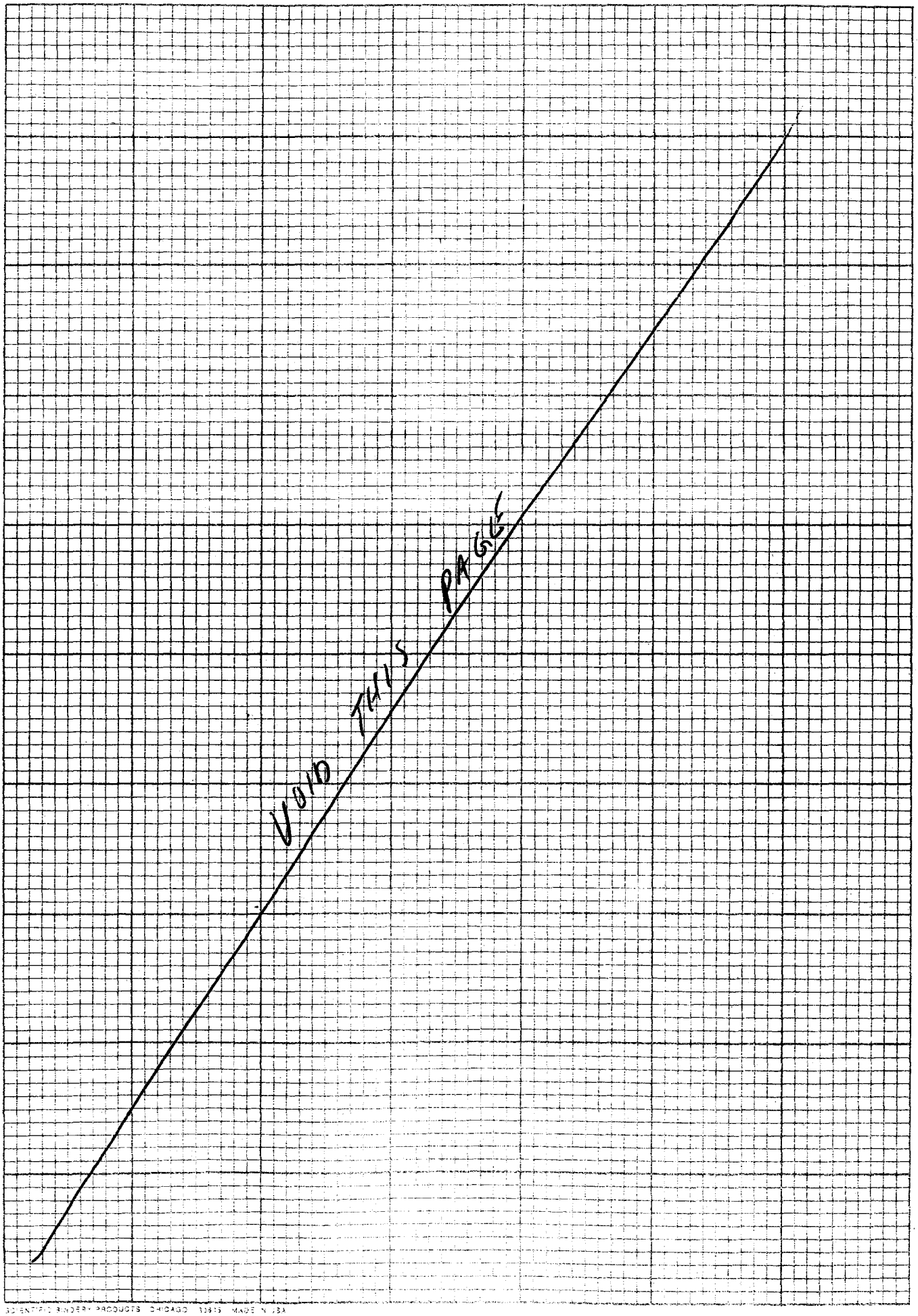
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tim Rosati DATE 8/1/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC RINDERY PRODUCTS CHICAGO 10915 MADE IN USA

TITLE NSWC CRANE

CREW
J. GOGERDT
C. LANEY
T. ROJAHN

PROJECT NO. 7448
BOOK NO. 1376

MON 8/2/04

Work continued from Page

0715 Hrs - ARRIVE @ BLDG #3245

- PREP SAMPLES FOR SHIPMENT ON COC 0054 & 0055 VIA FED EX AB# 8447 8135 5400
- FAX CoCs 0054 & 0055 - OFFICE ED S. @0836; ALSO CALLED OFFICE CHECK IN W/ R.B. LAUCKS HUGH P. @0835

0930 Hrs - KICK OFF Dig Permits FOR BLDG #146 (SWMU 16), DPT WORK @ SWMU 13 done; PERMIT FOR SWMU 12 to up date 16 MWT 21 missing on DONNA'S MAP - WENT back to BLDG #3245 AND PICKED up MAP WITH WELL shown AND delivered it to Donna Z. @ 1020 Hrs

C. LANEY & J. GOGERDT -
- DECON Whaler Pumps & REUSEABLE 1 3/4" Bladder Pump
- PACKAGED SAMPLES FOR SHIPMENT ON AB# 8447 8135 5400
- CLEANED OFFICE, LAB, hallways & REST ROOM FLOORS.
- J.G. DROPPED OFF SAMPLES @ FED. EX.
- INVENTORIED SAMPLE containers

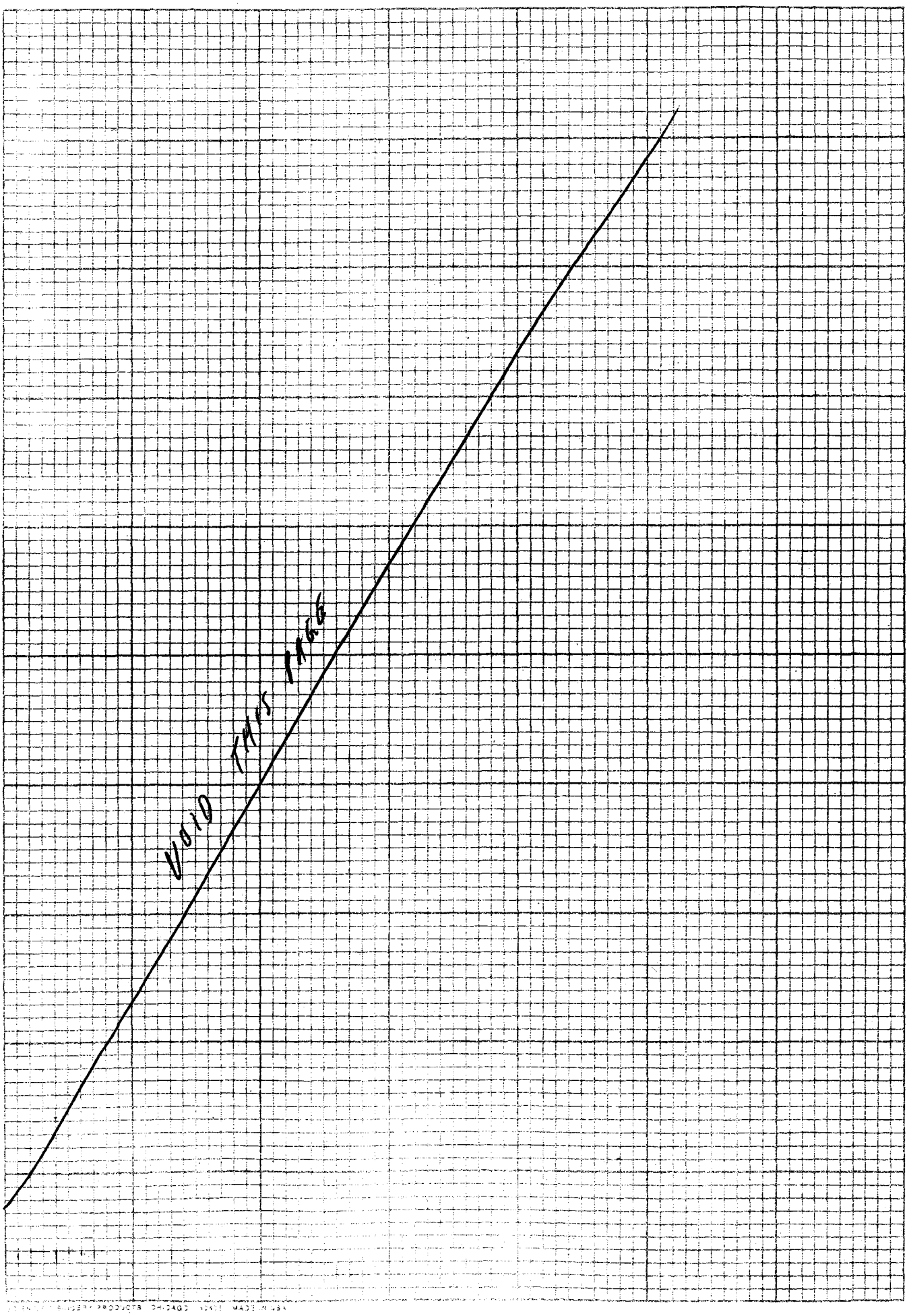
1100 HRS - LEFT BLDG #3245 FOR AIRPORT (INDY)

REMAINDER OFF DAY TRAVEL

END

Work continued to Page

SIGNATURE			DATE
Tony Rojahn			8/2/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE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TITLE NSWC CRANE

UXO: C. Laney, J. Goerdt, J. Dutton

Drilling: S. Conti, J. Walsh, J. Dean, C. MAHAFFEY

PROJECT NO. 7448

BOOK NO. 1376

27

MON 8/9/04

Work continued from Page

~~0645~~ 1305 Hrs - ARRIVE @ BLDG # 3245 - TRAVEL DAY

- CHECK IN W/ R. BASINSKI
- CHECK ON DIG PERMITS @ PUBLIC WORKS
  - MFA & B ALMOST READY - CHECK BACK TOMORROW MORNING
  - BLDG #146 SWMU 16 - NEED ANOTHER DAY
- CHECK ON CERT. CLEAN CERTIFICATES ON SWMU 16 PUMPS.
- GAUG JOSH DUTTON - SITE SPECIFIC HES TRAINING LEFT SITE ~ 1530 HRS
- C. LANEY & J. GOERDT PREP FOR DPT WORK

1600 Hrs - CHECK SWMU 16 BORING LOCATION W/ SEWER MARKINGS FROM PUBLIC WORKS

1700 Hrs - CHECK BORING LOCATIONS @ SWMU 13 - MOWERS DISTURBED UTILITY MARKERS - WILL NEED TO GET SEWER & WATER REMARKED.

1750 Hrs - RETURN TO FIELD OFFICE BLDG # 3245

1800 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tim Rodak

DATE 8/9/04

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

SAMPLING SUMMARY 8/10/04:

Collected soil samples @ 13 5B 26, 28, 29, 31-44 & 46
Also, Collected 2 Source Water & 2 Rinsate Blanks

DRILLING Summary 8/10/04:

Drilled, set & installed Monitoring Wells
12 MW 23 & 24, Both @ 30'

TUES 8/10/04

Work continued from Page

WEATHER - Mostly Sunny 80's

0645 Hrs - ARRIVE @ BLDG #3245
PREP. to meet w/ PUBLIC WORKS & PAPERWORK & DAT EQ INSPECTION.

0715 Hrs - ARRIVE @ PUBLIC WORKS
- MFB Dig Permit done #4558 SEE PAGE 30, however... told Donna MOWERS disturbed pin flags @ MFB - ARRANGED to MEET MACS (SEWER & WATER location) @ 0815-0830 Hrs @ N. GATE
- MFA - Dig Permit almost ready - SECONDARY ELEC. only utility to check... will take ~ ½ hr
- Told DONNA ABOUT small section of SEWER NEEDS Marked @ SWMU 16 North of BLDG #146
- ASKED ABOUT Battery Site - only WATER out there will check w/ MACS on it AS WELL.

0750 Hrs - RETURN to BLDG #3245, BRIEF tailgate meeting
- ASK STAN to go to public works and WAIT FOR MFA dig permit should be ready by 0815
- CL & JG ARE READY to go to MFB

0810 Hrs - CL, JG, TK & J. DUTTON (DPT operator) ARRIVE @ North Gate OF MFB to check in with Guard - had ACCESS problems will work out later w/ T. Brent

0830 Hrs - Cable locators (MACS) ARRIVED @ North Gate - they WENT inside MFB - TETRA TECH got in ~0840 Hrs

0840 Hrs - MEET Cable locators inside MFB - REMARKED All boring locations

0955 Hrs - FINISHED locating SEWER & WATER @ MFB will meet MACS tomorrow @ 0830 Hrs / BLDG 146

1005 Hrs - CHECK IN W/ DPT CREW - OK

1025 Hrs - Stop @ Public Works - Donna will call MACS boss FOR MEETING @ BLDG #146 tomorrow

1040 Hrs - RETURN to BLDG #3245
- T. Brent NEEDS VEHICAL INFO. FOR VEHICAL PASSES
- Get driller VEHICAL INFO @ MFA
- " DPT " " @ MFB

1200 Hrs - RETURN to BLDG #3245 drop off VEHICAL INFO. FOR T. BRENT

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
			8/10/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

30

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02) 4558

REQUESTED BY	DATE
TETRA TECH NUS INC./RALPH BASINSKI 412-921-8303	6/24/04
WORK REQUEST OR E/S NO.	
150740	MINE FILL "B"
WORK WILL BE PERFORMED BY	**DATE (Start - on or about)**
TETRA TECH NUS, INC.	7/7/04

WORK DESCRIPTION
22 Soil samples at various site in Mine Fill "B". Locations are marked with wooden stakes & orange flags & the number on the attached drawing. SWMU-13

EQUIPMENT TYPE
☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed Z2 6/24/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR Z2	N/A			per phone J. Beasley 8/10/04
HIGH VOLTAGE ELECTRICAL	NA			S.P 7-6-04
FIRE ALARM Z2	NA			7-14-04 MA
GROUNDING Z2	N/A			6-29/04 BA
NATURAL GAS	N/A			6/24/04 dg
SECURITY ALARM Z2	NA			7/2/04 MA
SEWER	Yes	Yes		7-7-04 MG
STEAM	N/A			6-28-04 RT
TELEPHONE Faxed 6/24/03	N/A			7-5-04 RP
WATER	Yes	Yes		7-8-04 RW
SECOND ELECTRICAL Z2	N/A			6-29/04 BA
Faxed 6/24/03 GENERAL DYNAMICS/NMCI	N/A	N/A		6-30-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Ted Faul	8/10/04
DIGGING PERMIT APPROVED BY	**DATE**
Donna L. Tollman	8/10/04

DISTRIBUTION:
ORIGINAL - Code 09Z5 File

TUES 8/10/04 Cont'

Work continued from Page

1220 Hrs - LUNCH

1255 Hrs - RETURN to BLDG # 3245

- PAPERWORK
- Check in w/ OFFICE T. JOHNSTON
- Order PID REPLACEMENT From US Environment
- Unload Casing For deep wells - Global Drilling Supplies drop off For Bowser Morner
- Touch Base w/ Stan Lyn of EMI about SWMUs
- Touch Base w/ Tom Dickson - Travel Plans For 8/15
- Receive Samples From C.L & J.G
- Talked to T. Patton - Regarding malfunctioning PID & THURSDAY'S EQ. SHIPMENT
- Received E-mail For Inside Bldg 146 use as Dig Perm See Pages 32 & 33.
- Call From RALPH BASINSKI
  - Discuss EMI work & BLDG # 146 work
  - T. Dickson Travel
  - H&S Plan For BLDG 146 & EMI work should have by THURSDAY
  - D. Westenhoff working on EQ list For inside BLDG # 146

1630 Hrs - Collect Trip Blank TB08100401

1645 Hrs - Collect Source Blank (DI) SB08100401 (NERL Lot #

1700 HRS - Collect " " TAP H_2O SB08100401

1730 Hrs - Collect Rinsate " Core Liner

1745 Hrs - Collect Rinsate " Disposable Trowel

Paperwork until JG & CL Arrive Prep. to Leave

1830 Hrs - Left BLDG # 3245 For Hotel

END

SIGNATURE Tony Boyd DATE 8/10/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

32

E MAIL to USE AS DIG PERMIT FOR B-146 FLOOR.

Sent: Thursday, August 05, 2004 1:28 PM
To: Brent Thomas J CNIN
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Tom, to our knowledge, there are no utilities under the floor at B-146.

-----Original Message-----

From: Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]
Sent: Thursday, August 05, 2004 9:08
To: Thompson, Susan CIV NAVFAC MW Crane Det CROP2
Cc: Gates, William H CIV EFDSOUTH; Ralph Basinski (E-mail)
Subject: FW: Emailing: B146 Interior DPT Locations Field Markup.pdf
Importance: High

Susan,

Per my v-mail yesterday, I need some guidance on who clears utilities inside CAAA buildings. I understand that Zone 2 (or the PW Detachment formerly known as Zone 2) is responsible for this. We are needing to core through the floor inside B-146 to collect soils samples under the floor of the building. As such, we need to make sure that we're not going to hit any buried utilities under the building. Please get back with me as soon as possible.

Thanks,
Thomas J. Brent
Corrective Action Program Manager
Crane Division, Naval Surface Warfare Center (NSWC Crane)
Harnessing the Power of Technology for the Warfighter

-----Original Message-----

From: Basinski, Ralph [mailto:BasinskiR@ttnus.com]
Sent: Thursday, August 05, 2004 8:34 AM
To: Brent Thomas J CNIN
Cc: Bill Gates; Johnston, Tom; Rojahn, Terry
Subject: Emailing: B146 Interior DPT Locations Field Markup.pdf

<<B146 Interior DPT Locations Field Markup.pdf.pdf>> Tom:

Per our discussion, the mark-up figure showing the B146 interior DPT locations is attached to this e-mail. Terry Rojahn provided this mark-up based on the site visit made by you, Terry, and Doug Johnson. Please let me know if you need anything else for utility clearance by Zone II.

Ralph

<<B146 Interior DPT Locations Field Markup.pdf.pdf>>

Work conti

Brent Thomas J CNIN
From: Basinski, Ralph [BasinskiR@ttnus.com]
Sent: Thursday, August 05, 2004 3:45 PM
To: Brent Thomas J CNIN; Bill Gates
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Tom

OK. We will keep a copy of the e-mail.

Ralph

-----Original Message-----

From: **Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]**
Sent: Thursday, August 05, 2004 4:35 PM
To: Bill Gates (E-mail); Basinski, Ralph
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Bill/Ralph,

Other than what we have I don't know how to get a "dig permit." Perhaps we can check with Donna next week and see if she would cut us some sort of official dig permit. However, I think we're covered with this email.

Thanks,
Tom

-----Original Message-----

From: **Basinski, Ralph [mailto:BasinskiR@ttnus.com]**
Sent: Thursday, August 05, 2004 2:57 PM
To: Brent Thomas J CNIN
Cc: Bill Gates (E-mail); Johnston, Tom; Rojahn, Terry; Conti, Stanley
Subject: RE: Emailing: B146 Interior DPT Locations Field Markup.pdf

Bill and Tom,

I interpret that to mean "Drill at will".

Do Navy procedures call for issuing the equivalent of a "Digging Permit" in this case? Or are we to consider this the "Digging Permit?

Ralph

-----Original Message-----

From: **Brent Thomas J CNIN [mailto:brent_t@crane.navy.mil]**
Sent: Thursday, August 05, 2004 3:04 PM
To: Bill Gates (E-mail); Basinski, Ralph
Subject: FW: Emailing: B146 Interior DPT Locations Field Markup.pdf

Here is the official reply from "Zone 2."

-Tom

-----Original Message-----

From: **Thompson Susan L CNIN (NMCI)**

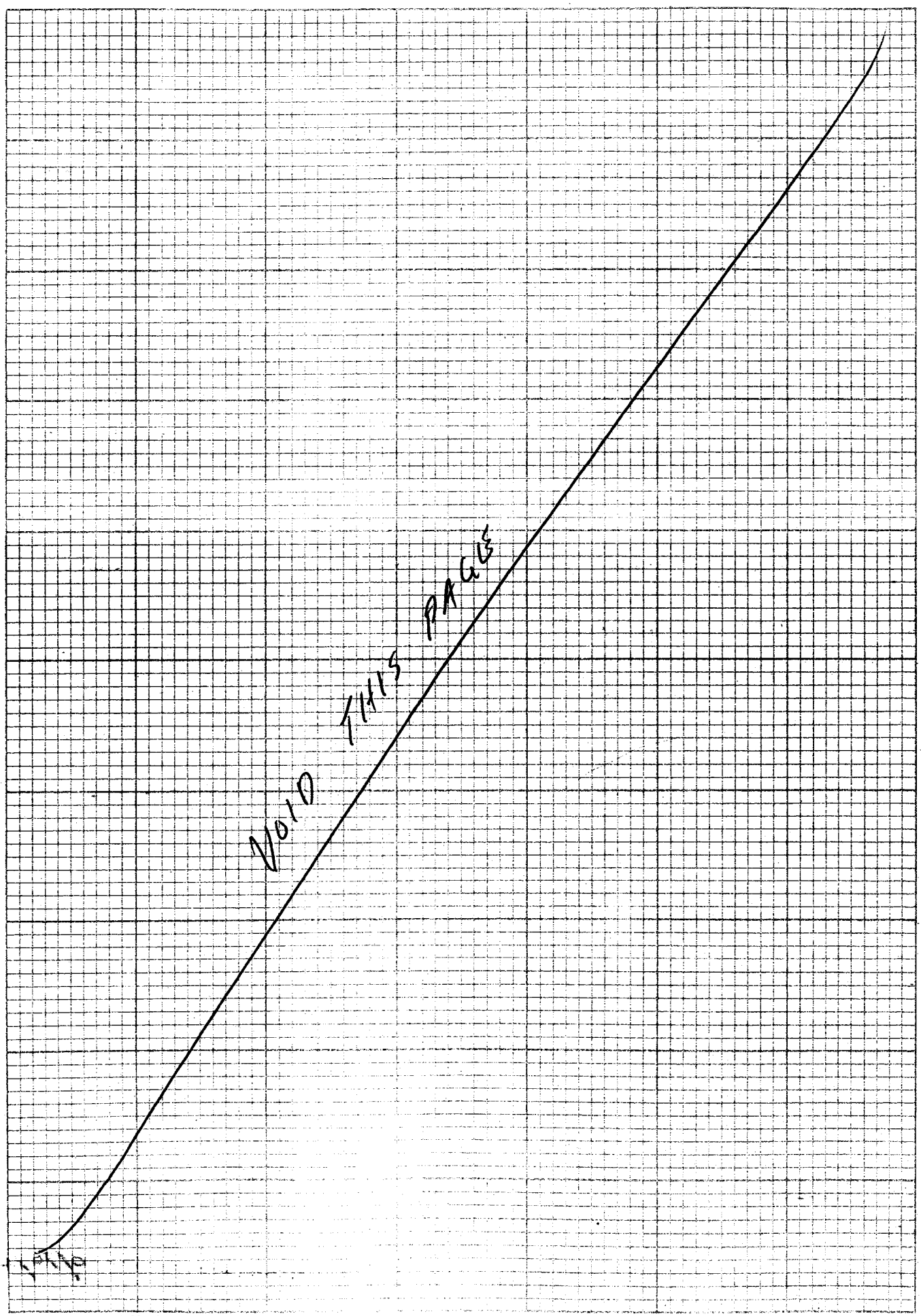
Work continued to Page

SCIENTIFIC BINDER PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Tom Rojahn DATE 8/10/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

B 100 P ©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PAGE

DIGGING PERMIT
NSWC CRANE 11000/3 (REV. 8/02)

4594

REQUESTED BY	DATE
Tetra Tech NUS, Inc. / Ralph Krasinski 412-921-8305	8/2/04
WORK REQUEST ON E/S NO. 158106	Bldg 146 Area
WORK WILL BE PERFORMED BY Tetra Tech NUS, Inc	DATE (Start - on or about) 9/9/04

WORK DESCRIPTION

Soil borings to obtain surface & subsurface samples. Locations are marked with wooden stakes with pink/orange flagging & the corresponding number on the attached drawings (solid circles). All are inside fence except 1 at the south end of area near the treeline.

EQUIPMENT TYPE

☐ HAND TOOLS ☐ CORE DRILL ☐ TRENCHER ☐ BACKHOE ☐ HEAVY EQUIPMENT

Faxed Z2 8/2/04

UNDERGROUND UTILITIES LOCATED IN WORK SITE

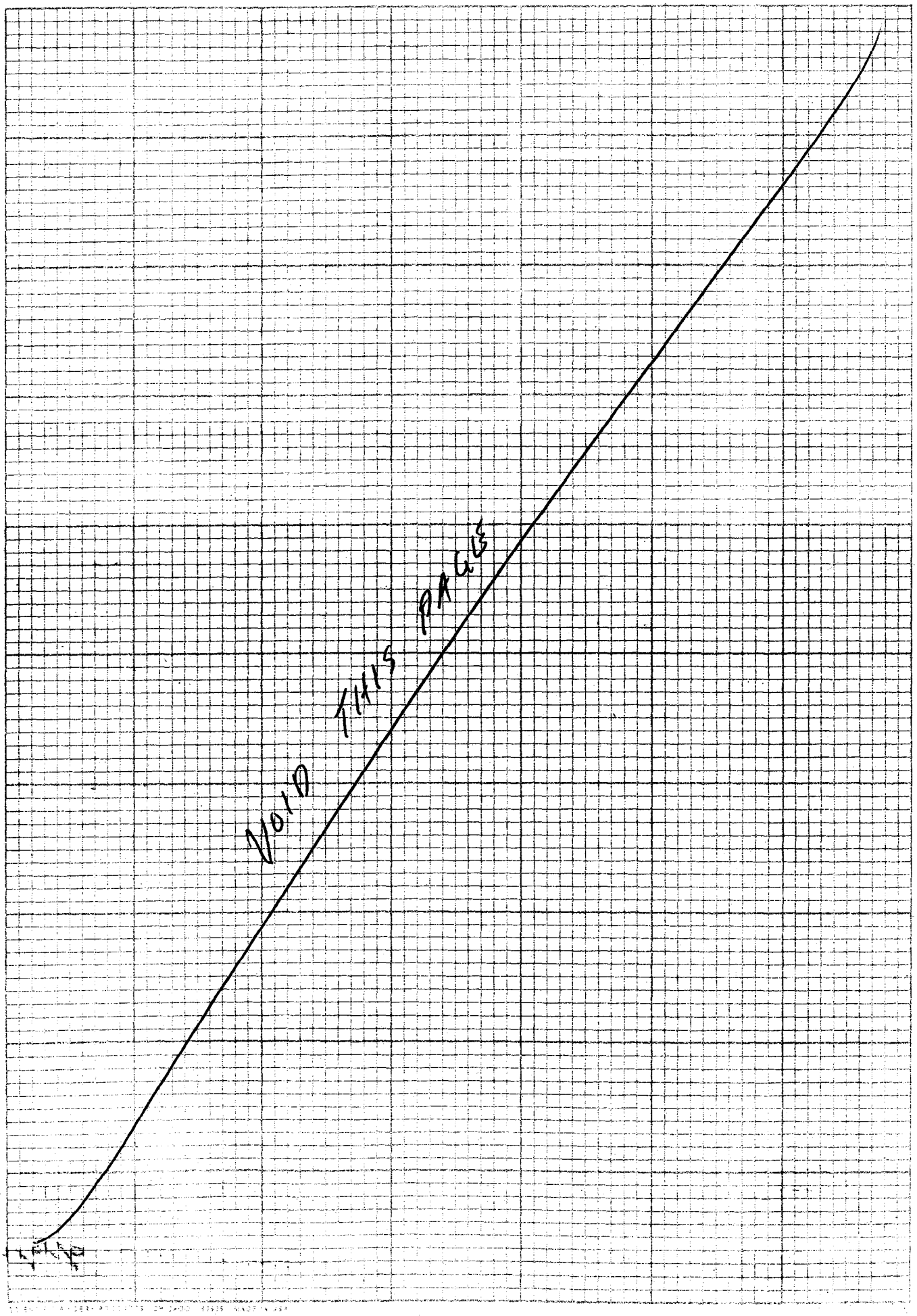
UTILITY	PRESENT	MARKED	NOT LOCATED	REMARKS
COMPRESSED AIR Z2	N/A			J. Bentley 8/10/04
HIGH VOLTAGE ELECTRICAL	Yes			S.T. 8-10-04
FIRE ALARM Z2	Yes	Yes		8-9-04 MH
GROUNDING Z2	N/A			8-6-04 BZ
NATURAL GAS EXP 8/23 OH08033044	YES	YES		8-5-04 RKH
SECURITY ALARM Z2	NA			8-9-04 MH
SEWER MW 8/11/04	Yes	Yes		8-4-03 - MJ
STEAM Z5	N/A			8-3-04
TELEPHONE Faxed 8/2/04	Yes	Yes		8-3-04
WATER MW 8/11/04	Yes	Yes		8-4-03 - MJ
SECOND ELECTRICAL Z2	N/A			8-6-04 BZ
Faxed 8/2/04 GENERAL DYNAMICS/NMCI	N/A	N/A		8-11-04

In addition to the general precautions for excavating where underground utilites are present, comply with the following:

PERMIT HOLDER SIGNATURE	DATE
Terry Lopez	8/11/04
DIGGING PERMIT APPROVED BY Thomas L. Goldman	DATE 8/11/04

DISTRIBUTION:

ORIGINAL - Code 09Z5 File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NOW

TR Summary 8/11/04:

Morning clearing locations w/ cable locators & Bird Dogging dig permit for SWMU 16.
- Section of sewer line missed North of BLDG 141
- Isolated Fire Alarm - NO APEMENT line only one old pin flag.

SHIPPED SAMPLES ON COCs - 0056 - 0060 & 0062 VIA FED. EX. AB# 844781355410

SAMPLING SUMMARY 8/10/04:

Soil Borings Completed - 13SB30, 45 & 47; 16SB60, 61, 63, 64 & 65.

Drilling Summary 8/11/04:

Set permanent casing @ 12MW134 @ 39.5' and drilled, set & installed monitoring well 12MW10 @ 20'

CREWS - SAME AS Page 27

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED 8/11/04

Work continued from Page

WEATHER: Mostly Sunny 70's

0645 Hrs - ARRIVE @ BLDG #3245
- PHONE IN WORK SUMMARY FROM 8/10/04 to R. BASINSKI
- CHECK W/ T. Brent to Pick up VEHICLE PASSES

0715 Hrs - Pick up Contractor VEHICLE PASSES FOR TTHUS, EFS & B-M VEHICLES W/ T. BRENT

0740 Hrs - CHECK on Dig Permit FOR SWMU-16, NEEDS ONE signature for MCI - but All markings ARE complete CAN PICK UP AROUND 0930 Hrs

0800 Hrs - BRIEF H&S Tailgate W/ DIT CREW @ BLDG #3245

0815 Hrs - ARRIVE @ Gate to SWMU 16 to wait FOR Public Works Cable locator (Macs)

0835 Hrs - MEET Macs & CHECK IN W/ DAN @ Break BLDG

0840 Hrs - ARRIVE BLDG 146

0900 Hrs - LEAVE SWMU 16

0915 Hrs - CHECK in @ Public Works (Fire Alarm)
NEED MCI signatures & CHECK isolated ORANGE pin
FLAG - that TTHUS pointed out

1030 Hrs - RETURN to Bldg #3245 - DAT CREW is FINISHED @ MFB

1100 Hrs - RETURN to Public Works
MCI still no signature on Dig Permit
& Fire Alarm Not check yet

1130 Hrs - LUNCH

1205 Hrs - CHECK back w/ Public Works
Fire Alarm locator called in will meet him @ BLDG 146 - still waiting FOR MCI

1230 Hrs - MEET W/ Mike (Alarm locate) @ BLDG #146

1240 Hrs - MIKE marked out Fire Alarm cable

1250 Hrs - RETURN to Public Works

1300 Hrs - MCI SIGNED dig Permit #4594 SEE PAGE 35

1330 Hrs - Got DIT Crew inside SWMU 16 to start work

1345 Hrs - Check on drilling crew - drop off PID

1400 Hrs - RETURN to BLDG #3245

PAPERWORK

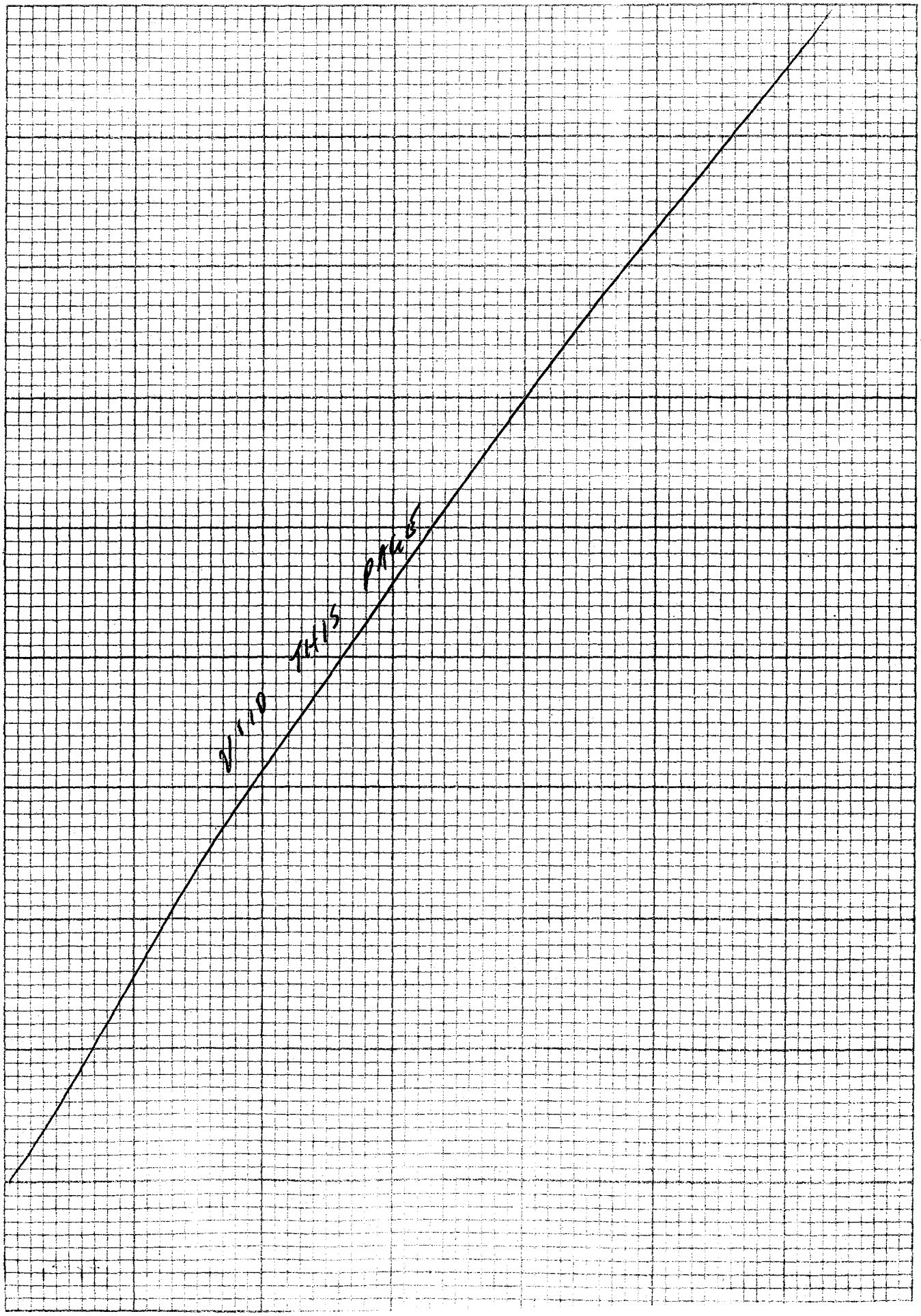
SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tom Brent

DATE 8/11/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE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WED 8/11/04 Con't

Work continued from Page

1605 Hrs - Arrive @ BLDG #146
Start COC for SWMU 16 samples

1700 Hrs - Return to BLDG #3245
Paperwork & Packaging samples on COCs 0056-0062 for shipment on FED EX AB# 8447 8135 5410.

1730 Hrs - Left BLDG #3245 for FED EX

1805 Hrs - Drop off samples @ FED. EX. and B10 PID returned to U.S. ENV. on AB# 8447 8135 5421

1830 Hrs - Purchased supplies @ MENARDS

END

SIGNATURE [signature]

DATE 8/11/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS

DRILLING SUMMARY 8/12/04:

Drilled, set & installed 12MWT40 @ 28'
Cont. Coring at deep well 12MWT34 From 48-58'

SAMPLING SUMMARY 8/12/04:

SAMPLED the following soil borings: 165852, 53, 55, 56
66-69, 71-73, & 75-78.

SHIPPED SAMPLES ON COCS 0063-0066 VIA FED EX
AB # 8447 8135 5432

SCIENTIFIC BINDERY PRODUCTS CHICAGO 90605 MADE IN USA

CLOWS SAME AS Page 27

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

THURS 8/12/04

Work continued from Page

WEATHER: Mostly Sunny Temp in 70's

0650 Hrs - Arrive @ BLDG # 3245

- FAX COCs to LAB & OFFICE (0056-0060 & 0062)
- Talk w/ R. Basinski - sch. for Drilling & Sampling NEXT SHIFT; Access for sampling & drilling @ SWMU 12
- H. Prentice called regarding the Amount of VOA samples to be collected this SHIFT - may be A PROBLEM - he will look into it w/ his staff and CALL Ralph if there is a problem
- Called Ralph - heads up ON Conversation w/ Prentice
- PAPERWORK; Talk to T. Dickson (Sch.) & T. Patton (EQ.)
- H & S Tailgate - drilling w/ Utility pin flags & markings IN MIND.
- Receive FED. EX. equipment delivery

0930 Hrs - Check in w/ DPT Crew

1010 Hrs - Return to BLDG # 3245

PAPERWORK

TRIED to REACH MR BAKER @ MFA

1053 Hrs - Talked to Mr. Baker OK to check stakes & Public Work Pin Flags For drilling.

1100 Hrs - LEFT BLDG # 3245 FOR MFA

- Work ON updating MFA digging permit - LB # 1374

1430 Hrs - Return to BLDG # 3245

START PAPERWORK FOR DPT SAMPLING

1600 Hrs - Arrive @ BLDG # 146

- Assist DPT Crew in Clean up

1635 Hrs - Return to BLDG # 3245

PAPERWORK & PACKAGE SAMPLES ON COCs 0063-0066

FOR SHIPMENT VIA FED EX AB # 8447 8135 5432

1720 Hrs - LEFT SITE FOR FED. EX.

1750 Hrs - ARRIVE @ FED. EX DROP OFF SAMPLES

1805 Hrs - ARRIVE @ SAMS CLUB - to PURCHASE SUPPLIES

1835 Hrs - FINISH @ SAMS

END /

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Troy Rook DATE 8/12/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

DRILLING SUMMARY 8/13/04:

INSTALLED 12MWT34 @ 76-86'

Start Drilling 12MWT12 to 95'

SAMPLING SUMMARY 8/13/04:

Soil Borings Completed:

SWMU 16 = 16SB51, 54, 57, 58 & 59 & 62

SWMU 12 = 12SB12-15

PHONES & RADIO CHECK ON 600 HILL this date

CREWS SAME AS PAGE 41

TITLE NSWC CRANE

FRI 8/13/04

PROJECT NO. 7448

BOOK NO. 1376

Work continued from Page

WEATHER: Mostly Sunny Low 70's High

0650 Hrs - ARRIVE @ BLDG # 3245

- UNLOAD SUPPLIES FROM SUV truck brief tailgate
- FAX COCs 0063-0066 to OFFICE & LAB
- CHECK IN W/ T. Brent - will check out Radios & Phone @ 600 Hill today - Called RR will let T. Brent Know when tracks are clear

0755 Hrs - Collect TB08130401

0800 Hrs - Collect RB08130401 Cover Sleeve

0815 Hrs - Collect RB08130402 Drilling Shoe

0830 - 1015 Hrs - Radio check and Phone check on 600 Hill For SWMU 12.

1030 Hrs - Check Eq. (RR) ~~Same~~ RECEIVED 8/12 ; Also drager tubes for Nitrogen Dioxide came today but No drager pump Tried to CALL T. Patton but Not in WAREHOUSE will try later.

1130 Hrs - Lunch

1200 Hrs - Prep DPT CREW to sample @ SWMU 12 - Go with CREW to help them get started sampling @ the BATTERY SITE - Showed C. CAMEY All Boring location INSIDE MFA FENCED AREA AS WELL

1330 Hrs - Return to BLDG #3245 - to do paperwork for SWMU 16 samples. COCs 0067 & 0068 PACK SWMU 16 samples ON FED EX AB # 8447 8135 5443.

1600 Hrs - ARRIVE @ SWMU 12 (BATTERY SITE), CHECK IN W/ DPT CREW... CREW starting to CLEAN UP

1630 Hrs - Return to BLDG # 3245

- PAPERWORK COC # 0069
- PACKAGE SAMPLES FOR SHIPMENT ON AB # 8447 8135 5443

1720 Hrs - LEAVE BLDG # 3245 FOR FED EX.

1750 Hrs - DROP OFF SAMPLES @ FED EX

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE T. Brent

DATE 8/13/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Drilling Summary 8/14/04

12MWT11, 12 & 16, SET & installed @ 14-24'
TDS 25'; and set up on T17.

SAMPLE SUMMARY 8/14/04

Soil Borings Collected - 16SB05-09
GW Samples Collected - 13MWT40, 47 & 50
All Bladder Pumps installed @ SWMU 16

CHIGGERS / TURKEY MITES:

CREWS SAME AS ON P. 27

TITLE NSWC CRANE

PROJECT NO. 7498

BOOK NO. 1376

SAT. 8/14/04

Work continued from Page

WEATHER: MOSTLY SUNNY M10 70S

0650 Hrs - ARRIVE @ BLDG #3245 CL & TR SOIL SAMPLING; JG. GW SAMP.
- PREP TO SAMPLE SOILS, DECON BUCKET AUGER BITS; HS TAILG
- COLLECT RB08140401 - 0836 HRS

0850 Hrs - ARRIVE @ SWMU 16
PREP. TO LOCATE SAMPLING LOCATIONS OUTSIDE SWMU 16 FENCE.
- LOCATE SAMPLE LOCATIONS - 16S885-89

1020 Hrs - START SAMPLING

1330 Hrs - FINISH @ SWMU 16 SOIL SAMPLING

1335 Hrs - LUNCH @ SUBWAY

1400 Hrs - RETURN TO BLDG #3245
- SECURE SOIL SAMPLES / PAPERWORK
- PREP TO INSTALL BLADDER PUMPS @ SWMU 16
- CHECK IN W/ R. BASINSKI
- REMOVE TICKS AND CLOTHING - 100S

1515 Hrs - ARRIVE @ SWMU 16 - *MITES & TICKS ON CLOTHING
- INSTALL ALL BLADDER-PUMPS SEE PP. 46-49 FOR CONSTRUCT
- CUT HUBS CLOSE TO GROUND @ BORING LOCATIONS IN GRASS & GRAVEL LOT

1730 Hrs - RETURN TO BLDG #3245
- REMOVED SHOES & SOCKS FOUND TINY MITES ON SKIN AROUND ANKLES SEE PAGE 44.
- PAPERWORK; CLEAN OUT VEHICLES
- DECON BUCKET BITS
- SEE PAGE 50 FOR BLADDER PUMP DESIGN & FILTER
- GENERAL CLEAN UP
- SEE PAGE 51 FOR WELL PIECE PROTECTION STEPS

1830 Hrs - START LEAVING SWMU 12 - GOT DRILLING SUMMARY

1850 Hrs - CHECK ON JG @ 13MW17 48
JGs SUV BROKE DOWN (STARTER PROBLEM POSSIBLY)

1930 Hrs - ARRIVE @ BLDG #3245
- SECURED SAMPLES FROM 13MW17 50, 49 & 48
- CALLED SECURITY REGARDING JGs SUV
- JG CALLING AVIS FOR REPLACEMENT.

1945 Hrs - LEAVE BLDG #3245 FOR MOTEL.

Work continued to Page

SCHEDEC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE

DATE 8/14/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SEVERN TRENT SERVICES

16MW02

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106

www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MW03

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106

www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SEVERN TRENT SERVICES

16MW04

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106

www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

SCIENTIFIC SUNDRY PRODUCTS CHICAGO 60605 MADE IN USA

Work continue

QED PUMP CERTIFICATION

16MWT04

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on QED's Pump Certification Program, please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT06

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on QED's Pump Certification Program, please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT09

Quality Certification Manager

MAR 1 2004

Date

T1250

Pump Model

020402

Batch Serial Number

If you need further information on QED's Pump Certification Program, please contact QED Environmental Systems at 1-800-624-2026

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SCIENTIFIC BINDERY PRODUC

SIGNATURE DATE

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

16MWT10

SEVERN TRENT SERVICES

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

16MWT11

SEVERN TRENT SERVICES

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

16MWT02

SEVERN TRENT SERVICES

▼QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106
www.qedenv.com

QED PUMP CERTIFICATION

The enclosed pump has been tested for the EPA priority pollutant parameters under conditions more critical than those required in current accepted ground water monitoring practices. We certify that this pump will not adversely affect the results of your ground water sample analysis.

Work continued from Page

QED PUMP CERTIFICATION

16MWT13

Quality Certification Manager

MAR 1 2004
Date

T1250
Pump Model

020402
Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT15

Quality Certification Manager

MAR 1 2004
Date

T1250
Pump Model

020402
Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

QED PUMP CERTIFICATION

16MWT17

Quality Certification Manager

MAR 1 2004
Date

T1250
Pump Model

020402
Batch Serial Number

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

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SCIENTIFIC BINDERY PROD
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DISCLOSED TO AND UN

DATE 8/14/04
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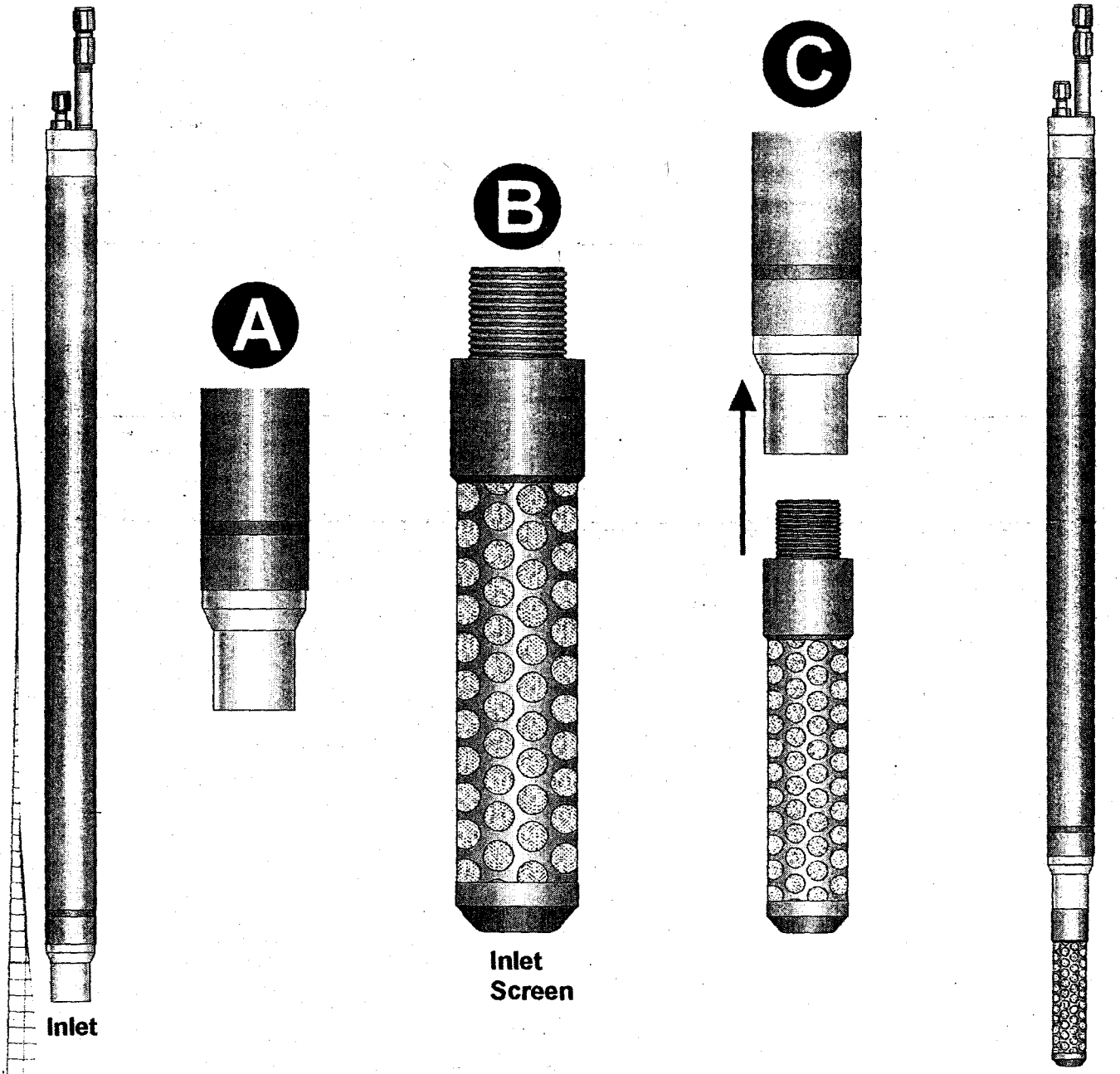
B 100 P ©

WELL WIZARD® Stainless Steel Pump Inlet Screen Attachment

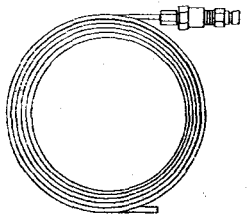
Thread screen (clockwise) into the threaded inlet of the bladder pump until snug.



WELL WIZARD® Well Cap Freeze Protection P/N 38458

Parts

Freeze Protection tube- 1/8" OD tube with brass quick-connect at one end.



Optional in-line filter for sites with serious concern with airborne contaminants.

Tubing Freeze Protection Instructions

There are two optional methods for preventing freezing blockage of the sample discharge tube above the frost line: a simple mechanical displacement method for 1/4" OD discharge tube, and a pressurized blowout method for both 1/4" and 3/8" OD discharge tubes.

Displacement Method (for 1/4" OD discharge tubing)

1. Immediately after samples have been collected, insert the small, 1/8" OD freeze protection tubing down into the sample discharge tube to a depth equal to twice the depth of the local frost line, any extra tubing may be cut off and discarded. Before inserting the 1/8" OD tube into the sample discharge tube, seal the end of the brass fitting with your thumb to prevent escape of air during insertion. The insertion action will displace the water out through the end of the discharge tube.
2. After the 1/8" tube is fully lowered and the water has been displaced, remove your thumb from the tube and pull the 1/8" OD tube up slowly until it is out of the well. Shake or blow out the tube to remove any remaining water.
3. Store the freeze protection tube by hanging it in the well. Insert the tube into the small hole in the cap until the brass fitting at its end rests on the cap **(Figure 3)**.

Blowout Method (for 1/4" and 3/8" OD tubing)

1. Immediately after samples have been collected, insert the small, 1/8" OD freeze protection tubing down into the sample discharge tube to a depth 2 feet greater than the depth of the local frost line. Any extra tubing may be cut off and discarded.
2. Turn the controller throttle fully counter-clockwise, so that very low or no pressure will be initially supplied to the 1/8" OD tube.
3. Make sure that the compressed gas source and pump controller are turned off at this time.
4. Connect the air supply hose from the pump controller to the freeze protection tube fitting **(Figure 1)**.
5. Direct the discharge tube away from all personnel and into any desired collection container **(Figure 2)**
6. Turn on the compressed gas source and enter the controller into a prolonged discharge cycle, following controller instructions specific to your model of controller.
7. Slowly turn the controller throttle clockwise until the water in the discharge tube is displaced and flows out the end of the tube. High pressure is unnecessary and may spray personnel with contaminated water. When water ceases to flow from the discharge tube, pull the 1/8" OD tube out of the discharge tube while compressed gas flow continues, then disconnect the freeze protection regulator.
8. Store the freeze protection tube by hanging it in the well. Insert the tube into the small hole in the cap until the brass fitting at its end rests on the cap.

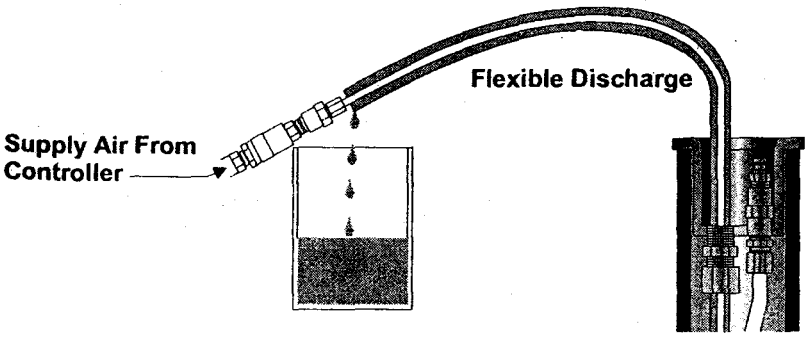


FIGURE 2

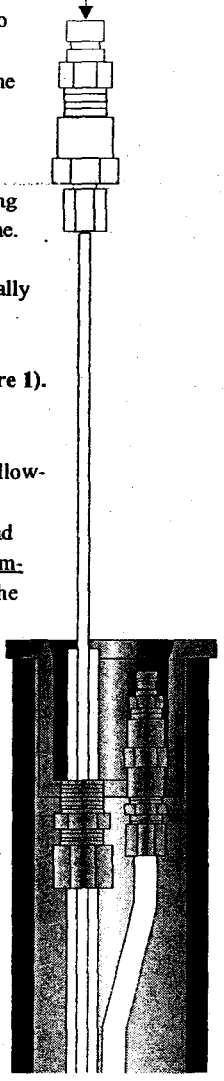


FIGURE 1

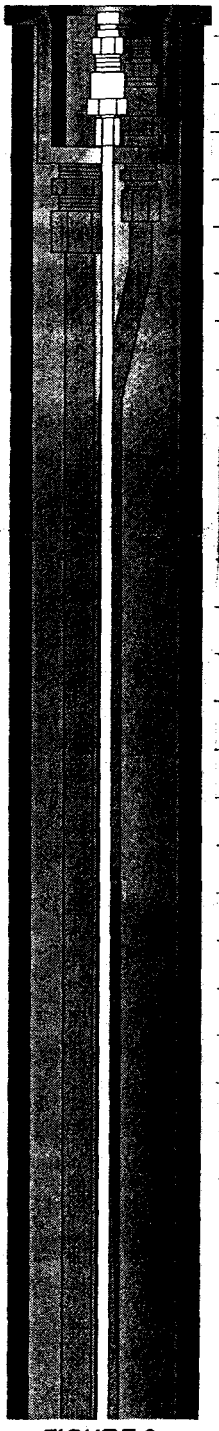


FIGURE 3

P/N 95190 REV. # 1-31-01

DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

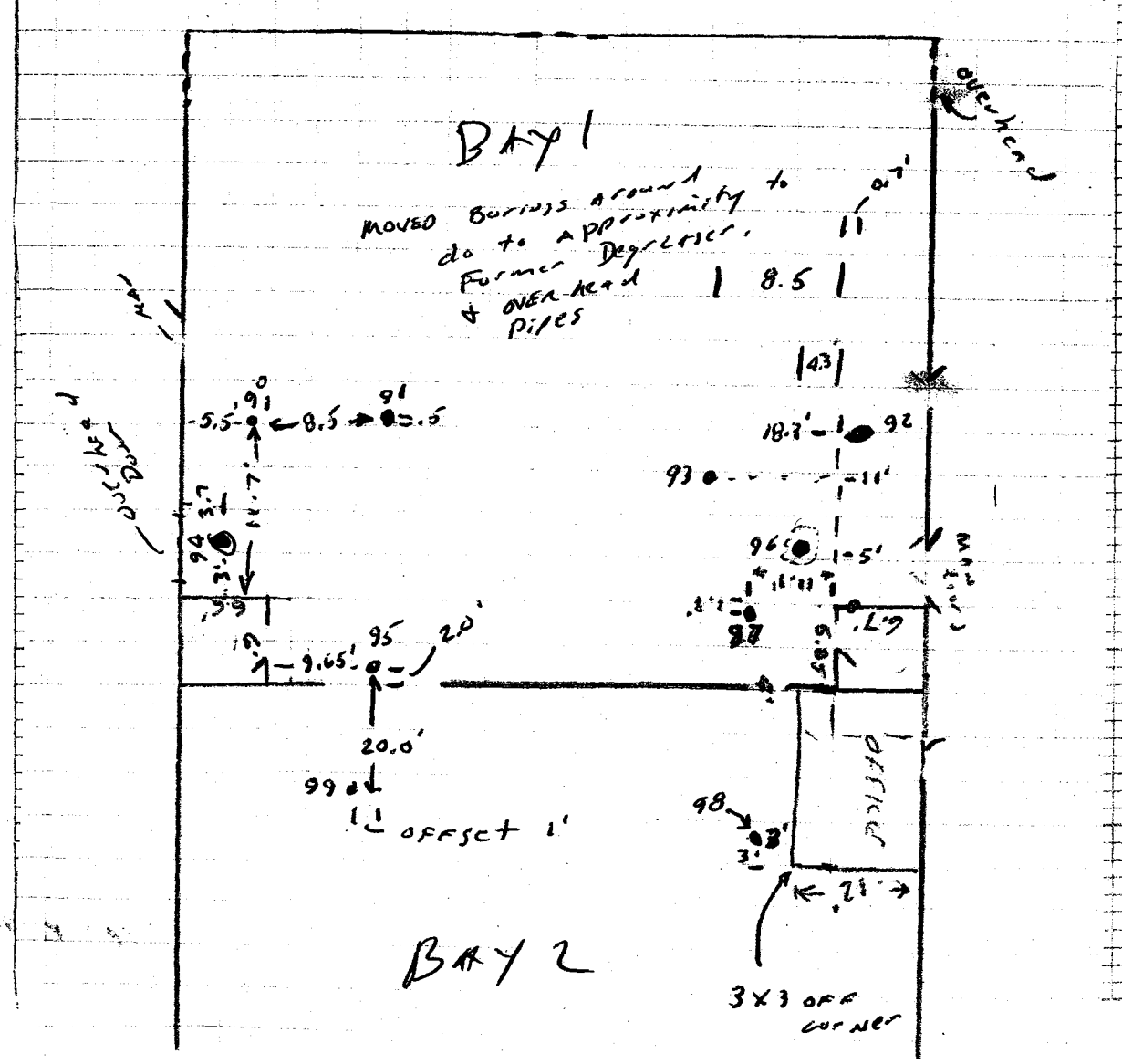
Drilling Summary 8/16/04

- Installed 2nd well @ 12MW124A First well Dry
  - ↳ set @ 54'
- Remainder of Day - Clean up and prep. to move to SWMU 16

Sampling Summary 8/16/04

Collected Soil Boring samples @ 165890-99 inside BLDG #140

Shipped samples collect 8/14-16/04 (COCs 0070, 0072 0073, 0075-0078, 0080 & 0081) via FED. EX. AB# 8447 8135 5944.



T. Dickson oversight - EMI Stanley Lynn & Robert Porges

TITLE NSWC CRANE — Corer - Eric Westley From Capital Coring — **PROJECT NO.** 7448 — **BOOK NO.** 1376 — **55**

MON 8/16/04

Work continued from Page

WEATHER - Mostly sunny w/ Temp in 70s

0655 Hrs - Arrive @ BLDG #3245
- PREP. to sample in B-146
- T. Dickson - Cali. CO meter
- PREP. to meet w T. Brent @ B-146
- MEETING @ B-146 w/
  T. Brent, T. Dickson, T. Rohaun
  Frank Mitchell - Army
  Don Mills - Fire Inspector (SEE Hot Work Permit on P
  Pam Gould - SUPERVISOR B-146
  Safety Specialist - (SEE SAFETY & Bldg Availability Perm
  Charles Wesley on P. 57
- Fill out Contractor VEHICLE PASSES - FOR T. Brent to sign (Corer Eric ~~Westerley~~ Westerley (TR), T. Dickson & J. Gooch New vehicle)

0915 Hrs - Escort (TR) ~~Drilling~~ Coring Contractor to B-146
- T. Dickson & T.R open OVER HEAD DOORS & MAN DOORS set up FANS to push & pull FUMES out of bldg
- T. Dickson prep. monitoring instruments

1030 Hrs - DPT work begins - T.D. H&S OVERSIGHT. Train C.L. w/

1045 Hrs - LEFT FOR BLDG #3245
- PAPERWORK

1200 Hrs - EMI personnel arrive Stanley Lynn & Rob Porges
- GO to B-146 and get T. Dickson - Tom will ESCORT EMI personnel while they are @ CRANE

1230 Hrs - RETURN to B-146 to OVERSIGHT BLDG ~~unit~~ AND CORER (ERIC) UNTIL DPT CREW RETURN FROM LUNCH

1315 Hrs - DPT CREW RETURN

1330 Hrs - RETURN to BLDG #3245
PAPERWORK

1600 Hrs - RETURN to B-146 - help DPT CREW CLEAN UP

1640 Hrs - RETURN to BLDG #3245
- PAPERWORK & PACKAGE SAMPLES ON COCs 0070, 0072, 0073 0075 - 0078 & 0080 & ~~0081~~ FOR SHIPMENT ON AB# 844701355

1800 Hrs - LEAVE BLDG #3245 FOR FED. EX

~~1830~~ Hrs DROP SAMPLES @ FED. EX.

Work continued to Page

SCIENTIFIC BINDERS PRODUCTIONS CHICAGO 60606 MADE IN USA

SIGNATURE		DATE
		8/16/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS / DATE

FLAME TOOL/HOT WORK PERMIT
NSWC CRANE 11320/19 (REV. 1-02)

ITEM	FROM	TO	ISSUED TO
EFFECTIVE DATES	8-16-04	8-20-04	☐ NSWC ☐ CAAA ☑ CONTRACTOR ☐ TENANT
TIME	0600	2300	NAME OF TRADE/CONTRACTOR/TENANT ACTIVITY: TESTING

TYPE OF EQUIPMENT TO BE USED *(Cutting Torch, Arc Welder, etc.)*

CORE DRILL

PURPOSE OF USE

DRILL HOLE FOR CORE SAMPLE

WHERE USED *(Building/Structure/Other location)*

BLDG 1496

☑ INSIDE
☐ OUTSIDE

INSTRUCTIONS OF THE FIRE SUPPRESSION/PREVENTION BRANCH, FIRE DEPARTMENT

☑ GENERAL FIRE PREVENTION INSTRUCTIONS ON REVERSE SIDE MUST BE COMPLIED WITH.

☑ IN addition TO THE GENERAL FIRE PREVENTION INSTRUCTIONS ON REVERSE SIDE, YOU SHALL COMPLY WITH THE FOLLOWING:

☑ REMOVE ALL COMBUSTIBLES 35 FEET, ALL FLAMMABLE LIQUIDS 50 FEET, AND ALL EXPLOSIVES (UNLESS APPROVED TO STAY BY THE SAFETY DEPARTMENT (CAAA OR NAVY ESO) AND FIRE PREVENTION) 100 FEET FROM THE HOT WORK AREA.

1) FIRE WATCH REQUIRED UNTIL JOB MONITOR AFTER WORK COMPLETE

2) KEEP CORE DRILL AREA WET / DAMP

PERSON DESIGNATED AS FIRE WATCH *(NOT SAME PERSON AS PERMIT HOLDER)*

Thomas M. Quakenbush

REQUIRED FIRE EXTINGUISHER AT WORK SITE		OTHER FIRE PROTECTION STANDBY REQUIREMENT(S)
TYPE	SIZE	
☐ WATER ☐ CO_2 ☑ DRY CHEMICAL		

I have read, understand and will comply with the above "Instructions of the Fire Suppression/Prevention Branch, Fire Department"

SIGNATURE *(Permit Holder)* — DATE: 8/16/04

HAZARDOUS AREAS ONLY

I agree that the "Instructions of the Fire Suppression/Prevention Branch, Fire Department" stated above are adequate and area is safe to work in.

SIGNATURE *(Building Supervisor/Forman/Representative)* — DATE: 8-16-04

Permission is hereby granted the Trade/Contractor/Tenant Activity named above to use specified equipment in accordance with the "Instructions of the Suppression/Prevention Branch, Fire Department as stated above.

SIGNATURE *(Fire Department/Representative)* — DATE: 8-16-04

DISTRIBUTION: Original *(Code 0631 File)*
Yellow *(Work Site)*

TITLE PROJECT NO 7

SAFETY & BUILDING AVAILABILITY PERMIT
NON-ROUTINE REPAIR OR MAINTENANCE
9ND-NWSCC 10470/1 (REV. 12-78)

FROM	TO
SAFETY SPECIALIST	TETRA TECH
ISSUED TO	**DATE**
SAMK	8/16/04

PERMIT TO PERFORM THE FOLLOWING WORK

DESCRIPTION OF WORK

CORE DRILL FLOOR IN BLDG. CORE DRILL REQ'D

LOCATION

AREA N/E (MKR) BUILDING 146

DATES

FROM 8/16/04 THROUGH 8/21/04

APPLICABLE SAFETY PRECAUTIONS

☒ General Safety Instructions on the reverse side deemed adequate.

☐ In addition to the General Safety Precautions on the reverse side, comply with the following:

WET DRILL ONLY

BUILDING AVAILABLE AND WORK APPROVED

SIGNATURE *(Supervisor)* Pam Gould

SIGNATURE *(Issuing Safety Specialist)*

Drilling summary:

Set 150# from casing for 16MWT01

Sampling summary 8/17/04

Complete Soil Boring - 165874

Purge & sample monitoring wells 16MWT09, 10 & 15

& Purge 16MWT13 (will sample 8/18/04)

Ship samples on COC 0082 via FED EX ##

8497 8135 5822

SCIENTIFIC SINDERY PRODUCTS, CHICAGO 80805 MADE IN U.S.A.

Crews same as on Page 27 except J. Dutton Demobed on the 16th

TITLE NSWC CRANE **PROJECT NO.** 7448

BOOK NO. 1376

TUES 8/17/04

Work continued from Page

WEATHER : Mostly Sunny Temp in 70's

0650 Hrs - Arrive @ BLDG #3245
- Brief tailgate
- Fax COCs to office & LAB
- Prep. for sampling GW @ 16MWT13
- Prep for T. Dickson while he helps CL. collect 6 soil samples @ 16SB74
- Paperwork / organize office / select wells for sampling

1040 Hrs - Arrive @ 16MWT13 ; T.D will sample 16MWT15 so that TR can assist.

1110 Hrs - Start Purge @ 16 MWT 13
END Purge @ 1510 Hrs

1512 Hrs - Start sampling @ 16MWT13 - No pump dry will let RECOVER and sample 8/18/04.

1530 Hrs - Finish Clean up @ 16MWT13

1535 Hrs - Check in on VG

1545 Hrs - Arrive @ BLDG #3245
- Unload SUV
- PAPERWORK & PACKAGING
- Prep Samples on COC #0092 to ship via FED EX AB# 8447 8135 5822
- Prep. U.S. ENG. EQUIPMENT FOR SHIPMENT (Compass, Auger Kits & Cable Locator) on FED EX AB# 8447 8135 5833.

1800 Hrs - LEFT BLDG #3245 FOR FED EX

1830 Hrs - Drop off Samples & EQ @ FED. EX.

END

Work continued to Page

SIGNATURE Tim Burt DATE

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE Summary 8/18/04:

Sampled 16 MW-13 (Purged on 8/17/04)

Shipped Sample on COC 0083 via FED EX
AB# 8447 8135 5811

SCIENTIFIC BINDERY PRODUCTS CHICAGO 63635 MADE IN USA

TITLE NSWC CRANE — CREW: T. DICKSON TO T. ROSAHN TR — **PROJECT NO.** 7448 — **BOOK NO.** 1376 — 61

WED. 08/18/04

Work continued from Page

0645 Hrs - Arrive @ BLDG # 3245
T.D. Prep to sample 16MW13
TR. Prep to Triangulate Soil Borings inside B-146

0700 Hrs - Arrive @ B146 / SWMU 16
Sample 16MW13 (Purged 8/17/04) & Triangulated Soil Borings @ B-146 - Checked in & out w/ Charles

0820 Hrs - Return to BLDG # 3245
- Package & Paperwork of Samples on COEC 0083 to be shipped VIA FED EX AB# 8887 8135 5811
- Check in w/ Office, S. Conti & C. Laney
- Bottle Inventory
- Check in w/ Lab - order Trip Blanks, discuss shipment on 8/17 & 18
- FAX COCs 0082 & 0083 to Office & Lab.
- Clean & Mop Floors

1030 Hrs - Left BLDG # 3245 for FED. EX
1105 Hrs - Drop off Samples on COEC #0083 at FED. EX.
1230 Hrs - Arrive @ Indy Airport - Remainder of day Travel.

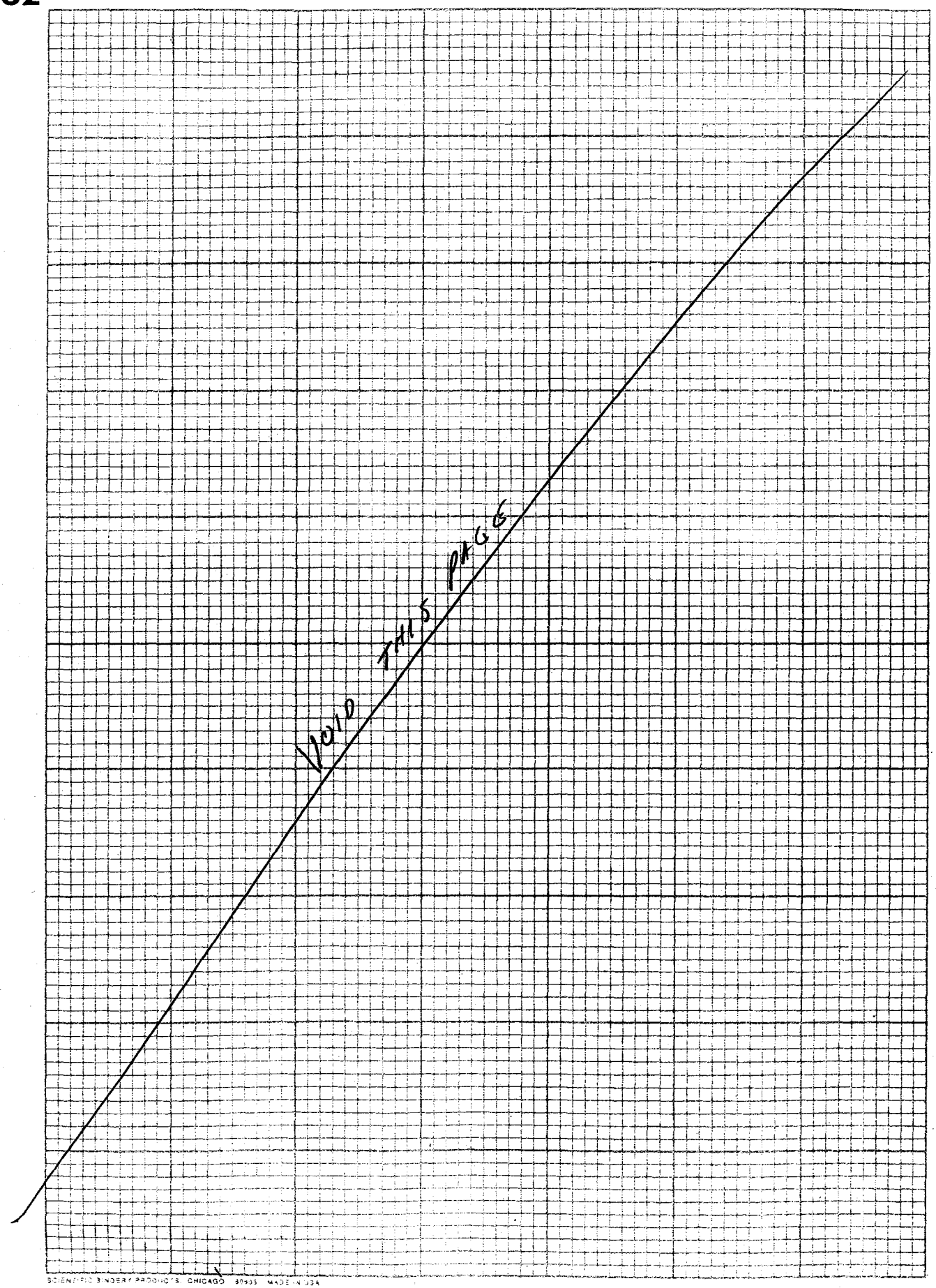
END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rosahn — DATE 8/18/04

DISCLOSED TO AND UNDERSTOOD BY — DATE — WITNESS — DATE



SCIENTIFIC SINDERY PRODUCTS CHICAGO 80535 MADE IN USA

TITLE NSWC CRANE

CREW
J. Goerdt
T. Colman

PROJECT NO. 7448

BOOK NO. 1376

MON - 8/23/04

Work continued from Page

1205 - ARRIVE @ BLDG # 3245

CHECK PSI ON ALL Nitrogen GAS Cylinders

- 2 EMPTY & 1 almost empty called IN Oxygen FOR REPLACEMENTS
- Assemble & Decon bladder pumps
- Prepare list of things to purchase
- Check in W/ OFFICE - Army may be working NEXT WEEK @ MRA / may not have drilling ACCESS the WEEK OF 8/30 AS shown on Army SCH.
- REPAIRED anchor holes @ BLDG # ~~3245~~ 146

1600 HRS - LEFT SITE / BLDG # 3245 FOR MOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 09/23/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLING SUMMARY 8/24/04:

MONITORING WELLS PURGED & SAMPLED:
16MWT06 & 12 and 16MW03

MONITORING WELLS PURGED ONLY: 16MWT11

SCIENTIFIC SUNDRY PRODUCTS CHICAGO 93805 MADE IN USA

TUES - 8/24/04

Work continued from Page

WEATHER: PARTLY SUNNY, TEMP LOW 80°s

0700 Hrs - ARRIVE @ BLDG # 3245; Collect Trip Blank TB082404-01
- TALK to T. Brent regarding 8-166 & 165 SCH.
- PREP. FOR GW SAMPLING @ SWMU 16; H&S Tailgater
- CHECK in w/ OFFICE (R. BASINSKI)
- SELECT WELLS to be sampled/purged this date
- TRANSFERRED Purge water FROM 1MW24 w/DYE FROM 8 gal containers to MANAGE456 55 gl Polys

1000 Hrs - ARRIVE @ 16MWT11
END Purge @ 1125 Hrs & CLEAN up

1150 Hrs - LUNCH

1125 Hrs - ARRIVE @ SWMU 16; 16MWT06

1335 Hrs - FINISH @ SWMU 16; 16MWT06 collected SAMPLES checked out J.G. (Will start sampling in 10 min)

1545 Hrs - ARRIVE @ BLDG # 3245
- STOCKED CONTAINERS IN OFFICE
- PAPERWORK

1845 Hrs - LEAVE BLDG # 3245 FOR MOTEL

END

Sampling Summary 8/25/14:

Collected Samples @ 16MWT11 & 17
16MW02, 04, 05

Shipped Samples on COC 0095 via FED EX AB#
8447 8135 5454

CREW
J. Gocht
T. Rujaw

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1346

WEO 8/25/04

Work continued from Page

WEATHER: Mostly Cloudy Temp 80's hot & hum.

0655 Hrs - ARRIVE @ BLDG # 3245
- Prep. to collect groundwater @ SWMU 16
- H&S Tailgate
- Check in w/ R. Basinski
- T. Brent secured a Lock out / Tag out For Fed. night @ 12 MWT09 & 30 Location - Also, has D. Johnson looking int. night work @ SWMU

0830 Hrs - ARRIVE @ SWMU 16

0855 Hrs - START SAMPLING 16MWT11 (Purged 8/24)

0953 Hrs - Filled VOAs & 1/2 L of EXPLOSIVES - DKY will return later to check recharge / continue sampling.

1013 Hrs - Start Purging To @ 16MW04

1120 Hrs - Start Sampling @ 16MW04

1150 Hrs - Finish @ 16MW04

1202 Hrs - LUNCH

1230 Hrs - RETURN to BLDG #3245 to meet w/ Drilling Crew
- PAPERWORK
- CHECK IN W/ R. Basinski
- TALK to Donna Z. Regarding EXTENTION on GAS TAG @ MCA (Permit # 4562) - Exp. 8/31
- Get office set up for H&S Site Specific Training for NEW drillers

1400 Hrs - Arrive @ SWMU 16 to Cont sampling 16MWT11

1430 Hrs - Complete Filling of Explosive container

1443 Hrs - Return to BLDG #3245
- Collect Rinsate of Bladder Pump @ 1530 Hrs NERL DI Lot # 1209163 EXP: 12/04
- PAPERWORK & Package samples on CoC # 0085

1720 Hrs - LEFT BLDG # 3245 for FED EX.
- Drop off samples @ FED EX on AB # 844781355455

1750 Hrs

1800 Hrs - SHOP FOR H&S Supplies

1900 Hrs - Return to Motel

Work continued to Page

SIGNATURE [signature] DATE 8/25/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Sampling Summary 9/26/04:

Collected samples @ 16MW705 & 16MW01

Finished collecting sample 16MW711 &

Purged 16MW716.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60635 MADE IN U.S.A.

TITLE NSWC CRANE

J. Goeckt, T. Rojahn, S. Conti, C. Laney

Jim Walsh, J. Dean, C. Mahaffey, K. Boehmer, J. Davis, Joe Wolfenhauer

PROJECT NO. 7448

BOOK NO. 1346

THUR. 8/26/04

Work continued from Page

Weather: Rain all morning

0655 Hrs - Arrive @ BLDG # 3245; Fax CoC 0085 to Lab & Office

Work on IMFA all morning see ARB 1374

1300 Hrs - L. Laney arrived

- Filled in CL on days activities
- Prep. to sample GW @ SWMU 16

1420 Hrs - Arrive @ SWMU 16

Check in w/ S.G.

1500 Hrs - Start collect metals @ 16MWT 11

1545 Hrs - Clean out well vault @ 16MWT 18 & Found Lid - well was damaged during snow removal

1610 Hrs - Arrive @ 16MWT 16

1640 Hrs - Finish clean up @ 16MWT 16 & 18; check on SG.

1700 Hrs - Arrive @ BLDG # 3245

- Refrig Sample
- Unload Vehicles

1730 Hrs - Leave BLDG # 3245 for Lowes

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature]

DATE 8/26/04

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

SAMPLE SUMMARY 8/27/04:

Collected sample @ 16MWT18 & started sampling 16MWT16 (low yield well).

Developed 16MWT19 & 20

Shipped samples on COC # 0087

DRILLING SUMMARY 8/27/04:

Installed 4 WELLS T35, T36, 07 & 18 @ SWMU 12.

SCIENTIFIC STATIONERY PRODUCTS CHICAGO 53535 MADE IN USA

CREWS SAME AS IN PAGE 69

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

FRI. 8/27/04

Work continued from Page WEATHER:

0655 Hrs - ARRIVE @ BLDG #3245
- PAPERWORK
- BRIEF TAILGATE MEETING
- SELECT WELLS FOR SAMPLING
- CALL FED. EX. PACKAGE DELIVERED to Lucks Prior to 0900 Hrs AB# 8447 8135 5454
- PREP to SAMPLE GW & DEIC. WELLS 16MWT19&20

0950 Hrs - ARRIVE @ 16MWT16

1000 Hrs - START SAMPLING

1100 Hrs - WELL DRY will have to RETURN later (TH or JG)

1115 Hrs - LUNCH

1145 Hrs - ARRIVE @ 16MWT18 to drop of Lunch for JG

1205 Hrs - ARRIVE @ 16MWT20 to DEVELOPE

1315 Hrs - FINISH @ 16MWT20.

1316 Hrs - ARRIVE @ 16MWT19 to DEVELOPE

1450 Hrs - FINISH @ 16MWT19

1505 Hrs - DUMP PURGE WATER @ # 327 M.H.

1515 Hrs - ARRIVE @ SWMU12 to check on Drilling
Also, MATT Soltis ARRIVED FOR HES AUDIT

1600 Hrs - RETURN to BLDG #3245
NOTE From J.G. - SECURITY locked up on his AUDIT system

1615 Hrs - CHECKED on JIM @ SWMU16
NEED GAS cylinder & NEED to call security to let them KNOW AUIS IS BRINGING A REPLACEMENT

1630 Hrs - DROPPED OFF GAS @ SWMU16 FOR JG.

1640 Hrs - RETURNED to BLDG #3245
- CALLED SECURITY & T. BRANT to OK AUIS NEW CAT drop OFF / PICK up.
- PAPERWORK, PACKAGE SAMPLES, AUDIT ASSIST etc.

1730 Hrs - LEFT SITE FOR FED. EX. W/ MATT SOLTIS
LEFT JG. KEYS to my SUV ie AUIS had problems

1800 Hrs - DROP OFF SAMPLES ON CAFC #0087 to ship on AB#
8447 8135 5465.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 8/27/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLING Summary 8/29/04:

Collected samples @ 16MWT03 & 01, also purged 16MWT02 (will sample tomorrow). H&S Audit debriefing. Purchased PE Tubing in Bloomington

Drilling Summary 8/29/04:

Set isolation casing @ 12MWT30 & installed shallow well @ 12MWT 19 @ 26'. Severe thunder storms in afternoon (no drilling).

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60635 MADE IN U.S.A.

CREWS same as on Page 67.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

Sat: 08/28/04

Work continued from Page

WEATHER: OVERCAST morning, SEVER thunder storms in the afternoon

0645 Hrs - Arrive @ BLDG #3245
- H&S Tailgate; Went over Work Permits w/ Drillers
- Collected TB @ 700 Hrs
- PREP for GW Samplings
- Select Wells to sample
- Decon (2) WHALER PUMPS
- Stan called B-M personnel need Power @ B#3245 will wait until they arrive for their access.

1000 Hrs - Arrive @ SWMW16; check in on J.G.

1020 Hrs - Start Purge @ 16MWT02; Also H&S Aud.t debriefing.

1425 Hrs - Well dry to intake - will sample tomorrow

1435 Hrs - Finish clean up @ 16MWT02
- Rain delay - SEVER thunder storm

1520 Hrs - Sampled Explosives @ 16MWT16 - 1L g/ass amber ~ 1/3 FULL well cont tomorrow

1535 Hrs - Arrive @ B#3245
Unload VEHICLE - NEED ROOM FOR PURCHASING PE tubing in Bloomington

1600 Hrs - LEFT B-3245 for Bloomington

1730 Hrs - Purchase PE tubing in Bloomington

1800 Hrs - Return to Motel in BEDFORD

END

Work continued to Page

SIGNATURE			DATE
Terry Rock			8/28/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Drilling Summary 8/29/04:

Installed isolation casing @ 12MW-T31 & 32.
Installed Monitoring wells 12MW-T09 & 30
in area of lockout / Tag out.

SAMPLE SUMMARY 8/29/04:

Collected samples @ 16MW-T02, 19 & 20.
Cont sampling @ 16MW-T16.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

Sun 8/29/04

Work continued from Page

WEATHER: Mostly Sunny Temp High 70s

0700 Hrs - ARRIVE @ BLDG #3245
- HES Audit DEBRIEFING @ Tailgate
- PAPERWORK - Prep. WELL SAMPLING SHEETS
- ID ALL WELLS that WERE installed ON SWMU 12 that will cont development today
- Prep. some eq for development

0945 Hrs - Arrive @ SWMU 16

1000 Hrs - Start sampling 16MW T02 03 (TW)

1045 Hrs - Finish CLEAN up @ 16MW T02 03 (TW)

1055 Hrs - ARRIVE @ SWMU 16 - WELL 16MW T20

1355 Hrs - Start Sampling 16MW T20

1530 Hrs - Finish CLEAN up @ 16MW T20

1540 Hrs - Arrive @ BLDG #3245
- CALL R. Basinski (RESPONSE to message) @ Home
- Complete COC # 0086 FOR SAMPLES COLLECTED @ SWMU 16
- Unload ~~vehicle~~ (TW) vehicle
- Pick WELLS to be SAMPLED tomorrow @ SWMU 12

1700 Hrs - LEAVE BLDG #3245 for Motel

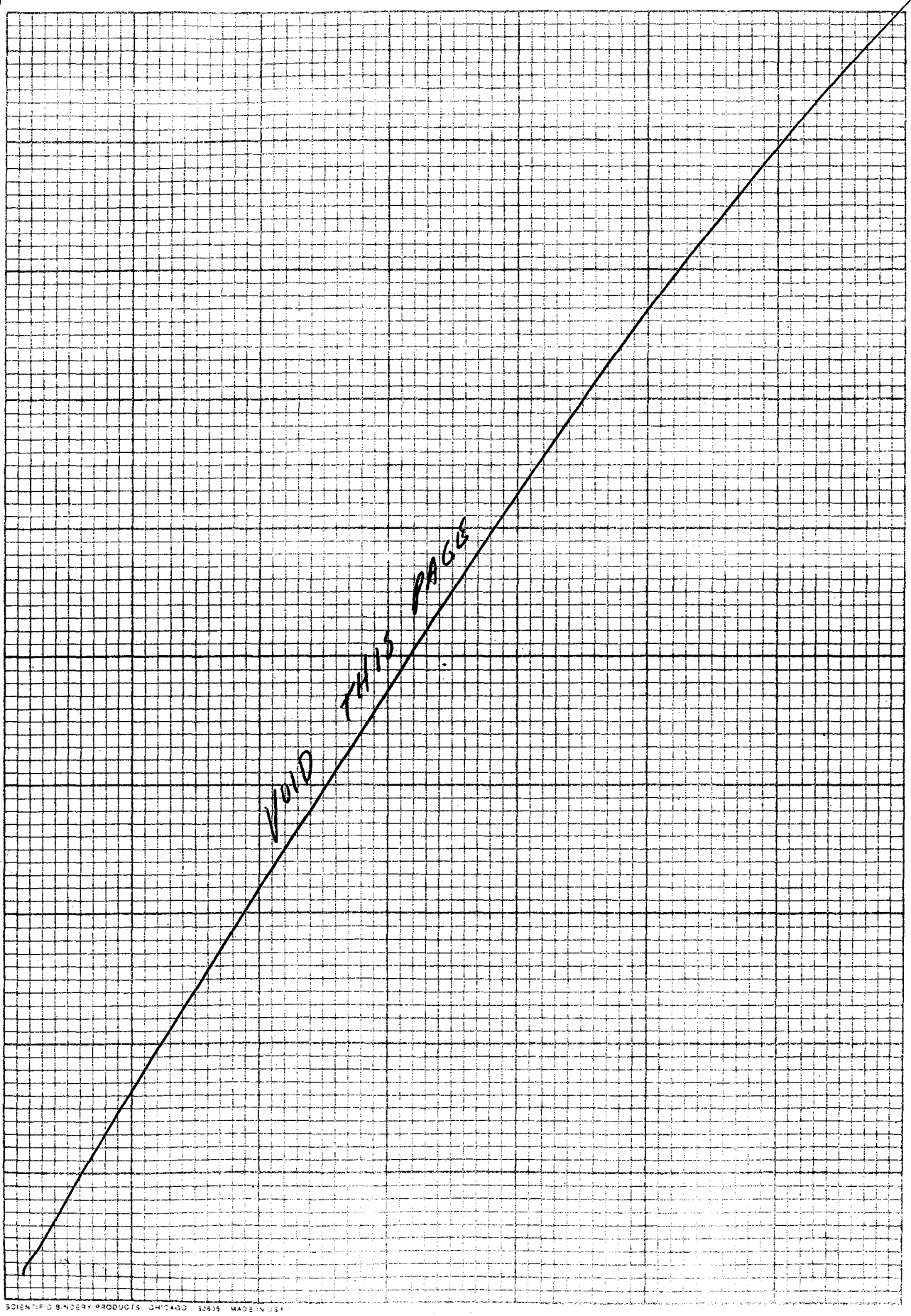
END

Work continued to Page

SIGNATURE [signature]

DATE 8/29/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO 10635 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED. 9/1/04

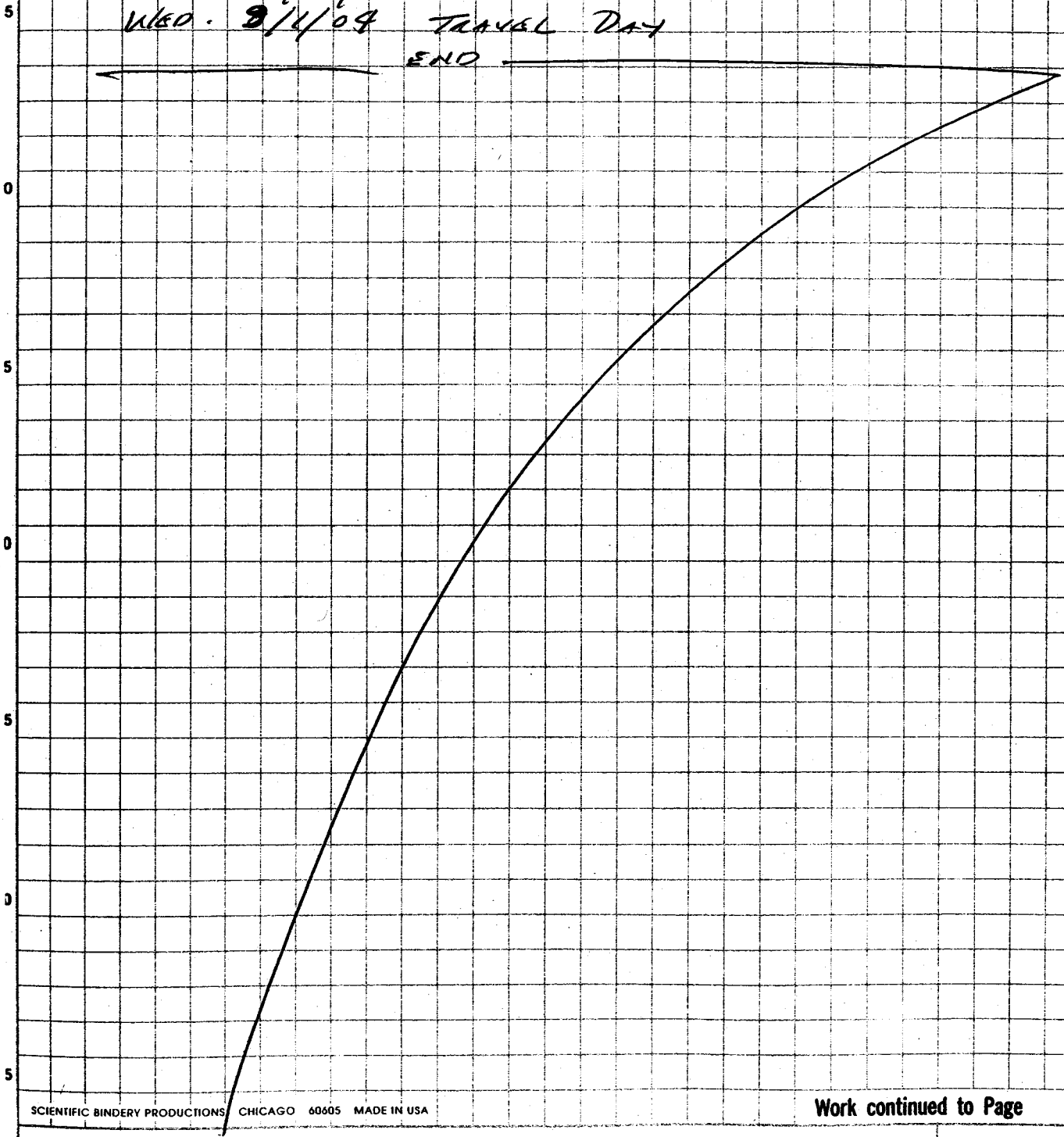
Work continued from Page

Monday 8/30/04 SEE Notebook # 1374 Pg. 357

Tues. 8/31/04 SEE Notebook # 1374 Pg. 357

WED. 9/1/04 TRAVEL DAY

END



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE			DATE
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

SAMPLE SUMMARY 9/20/04:

RECON SWMU 13 FOR VEG SAMPLING LOCATIONS.

SELECTED 9 SAMPLING LOCATIONS.

SCIENTIFIC BINDERY PRODUCTS - CHICAGO 60605 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

79

MON 9-20-04

Work continued from Page

WEATHER: SUNNY & 70S

1100 HRS - ARRIVE @ B3245 - TRAVEL DAY

- PREP. to STAKE OUT VEG. SAMPLING LOCATIONS
- CALL DRY ICE SUPPLIER PACK ENTERPRISES SET UP PICKUP ON TUES OF MIN AMOUNT 67 LBS

1520 HRS - ARRIVE @ SWMU 13

SOF WELL 13MWT50
- 13VEG01 - HERB & SUGAR MAPLE (SM)
- 13VEG02 - HERB & SM

SOF SEWER LINE & MH 298
- 13VEG03 - WHITE OAK (WO)
- 13VEG04 - HERB, WO & SM

NOF MH 298
- 13VEG05 - HERB & WO

W. SLOPE OF RUN 13MWT42 DOWN FROM MH
- 13VEG06 - SM & HERB
- 13VEG07 - WO (UPGRADE FROM 13VEG05 + E OF 13MWT46 & 39)
- 13VEG08 - WO (ACORNES ONLY) @ CLUSTER 13MWT46 & 39
- 13VEG09 - ~75' WEST OF WELL CLUSTER 13MWT37 & 38 WO SAPLINGS

COLLECT HERBACEOUS PLANT FOR ID / VALCER SPECIMEN

1820 HRS - LEFT BLDG #3245 FOR SAMS CLUB

1934 HRS - PURCHASED ~~SUPPLIES~~ (TM) SUPPLIES @ SAMS CLUB

END

Work continued to Page

SIGNATURE Tony Royal DATE 9/20/04

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 9/21/04:

COLLECT 5 HERBACEOUS SAMPLES, 10 LEAF SAMPLES & 1 ACORN SAMPLE (13 UG 001 - 016).
SEE PLANT TISSUE DATA SHEETS & COCS 0095 & 0097 FOR ADDITIONAL INFORMATION.

ACCO BRAND PAPER BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

TUES 9/21/04

Work continued from Page

Weather: Mostly Sunny & Temp High 70s Low 80

0640 Hrs - Arrive @ BLDG #3245
- Unload supplies
- Paperwork
- Prep for Veg. Sampling

0730 Hrs - Chris Freeman needed confirmation sampling preform @ the SWMU 12 Battery site

1300 Hrs - Return to Field Prep for collecting Veg. samples

1330 Hrs - Began sampling Veg. tissue @ SWMU 13

1640 Hrs - Finished collecting Veg. tissue @ SWMU 13 &
- Returned to BLDG #3245

Collected 5 Herbaceous Plant Samples
10 Tree Leaf Samples
1 Acorn Sample
1 Rinsate Sample

See Plant Tissue Sample Log Sheets for detailed information.
- Prep. samples w/ Tags & labels secure in Freezer

1730 Hrs - Left B 3245 for Motel.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Ogle **DATE** 9/21/04

DISCLOSED TO AND UNDERSTOOD BY | **DATE** | **WITNESS** | **DATE**

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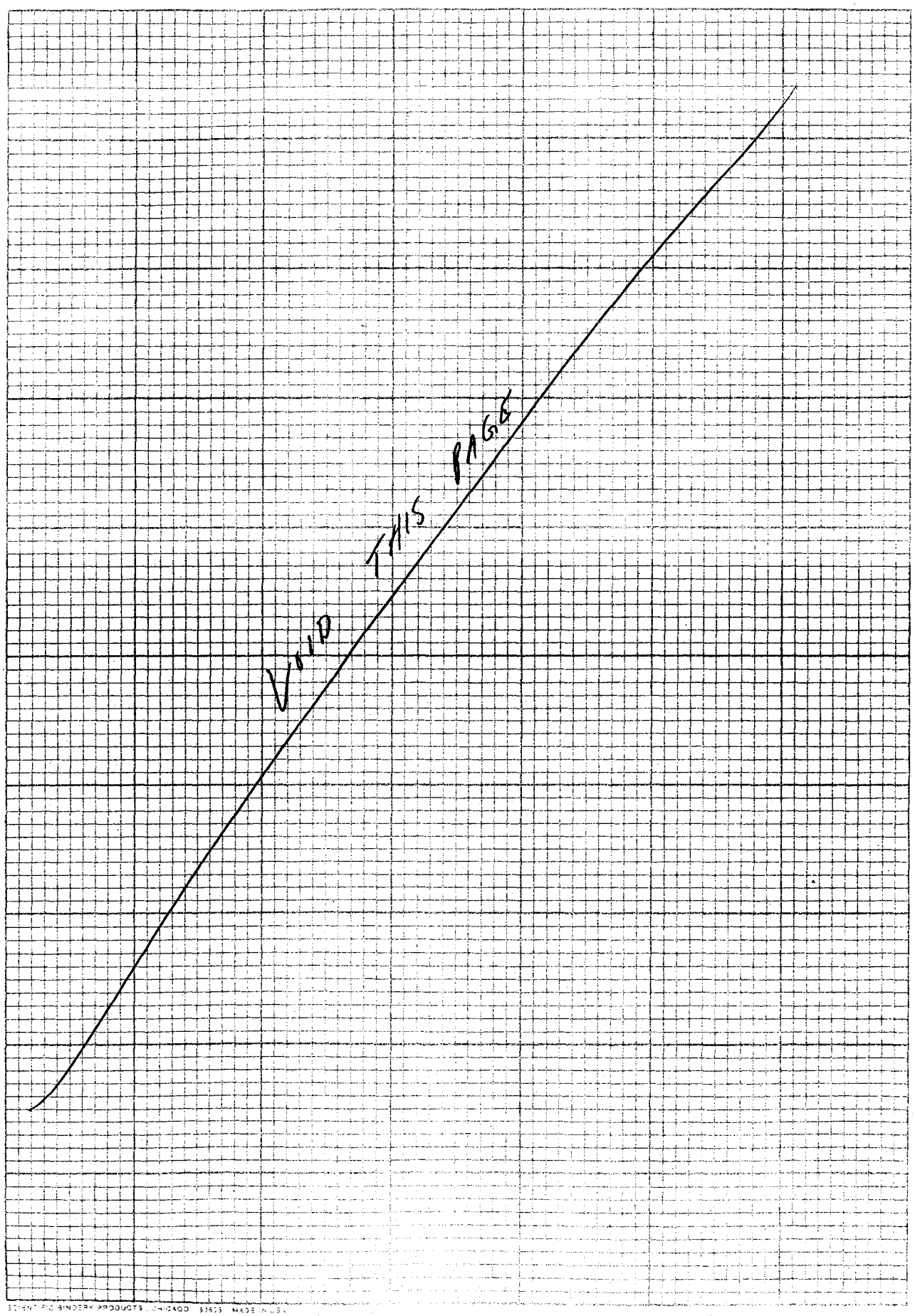


SCIENTIFIC BINDERY PRODUCTS, CHICAGO 31903 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7498

BOOK NO. 1376

9-22-04

Work continued from Page

1600 Hrs - Packaged & shipped plant tissue samples this date; samples on COCs 0095 & 0097
AB# 836323623493 Plant Tissue w/ DRY ICE
AB# 844701355720 Rinsate w/ ICE
1708 Hrs - Left B 3245 Fed. Ex.
1740 Hrs - Dropped off Samples

END

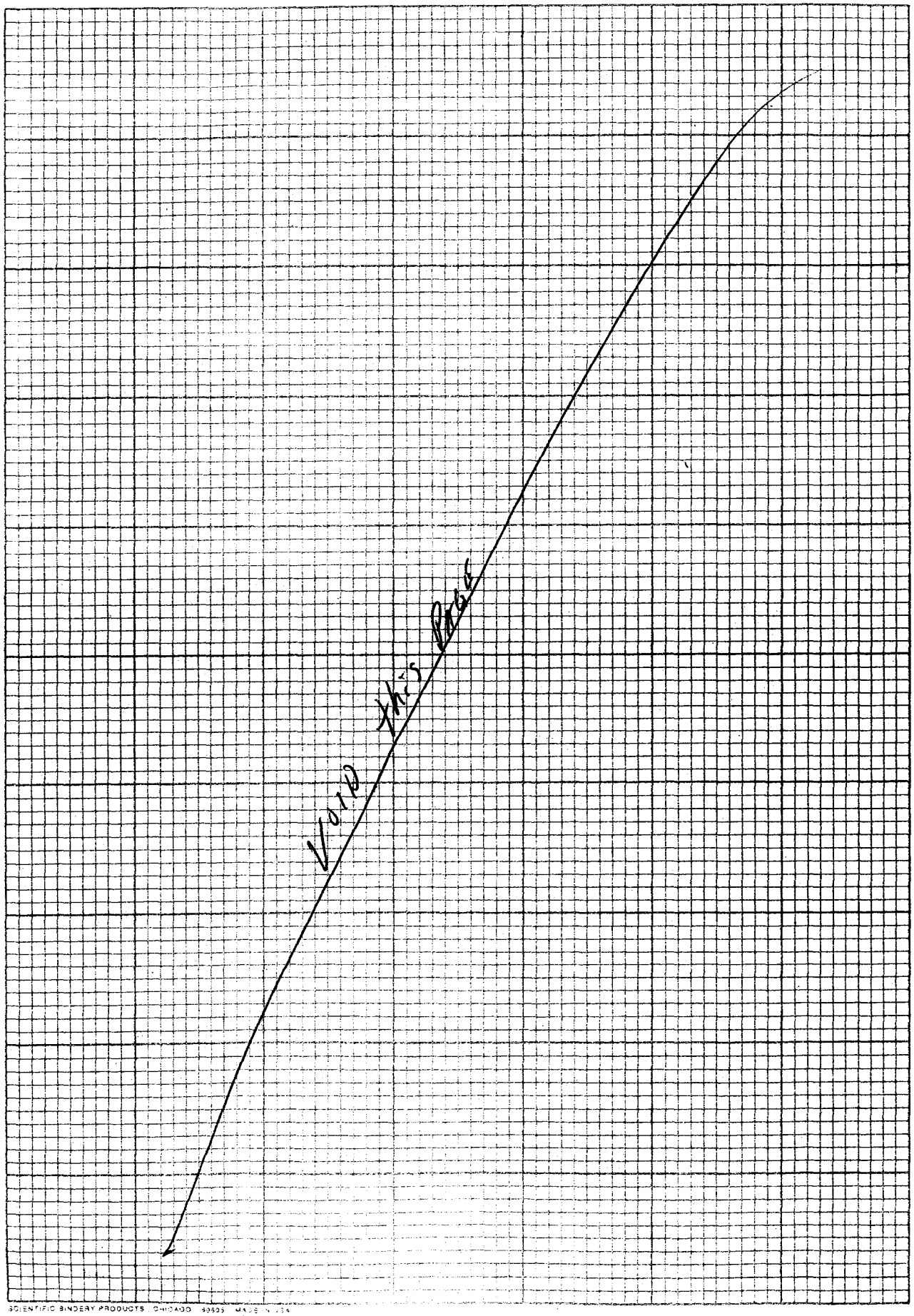
SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 9/22/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN U.S.A.

WED 9/29/04

Work continued from Page

Weather - Mostly Sunny & 60°

0645 Hrs - Arrive @ B-3245

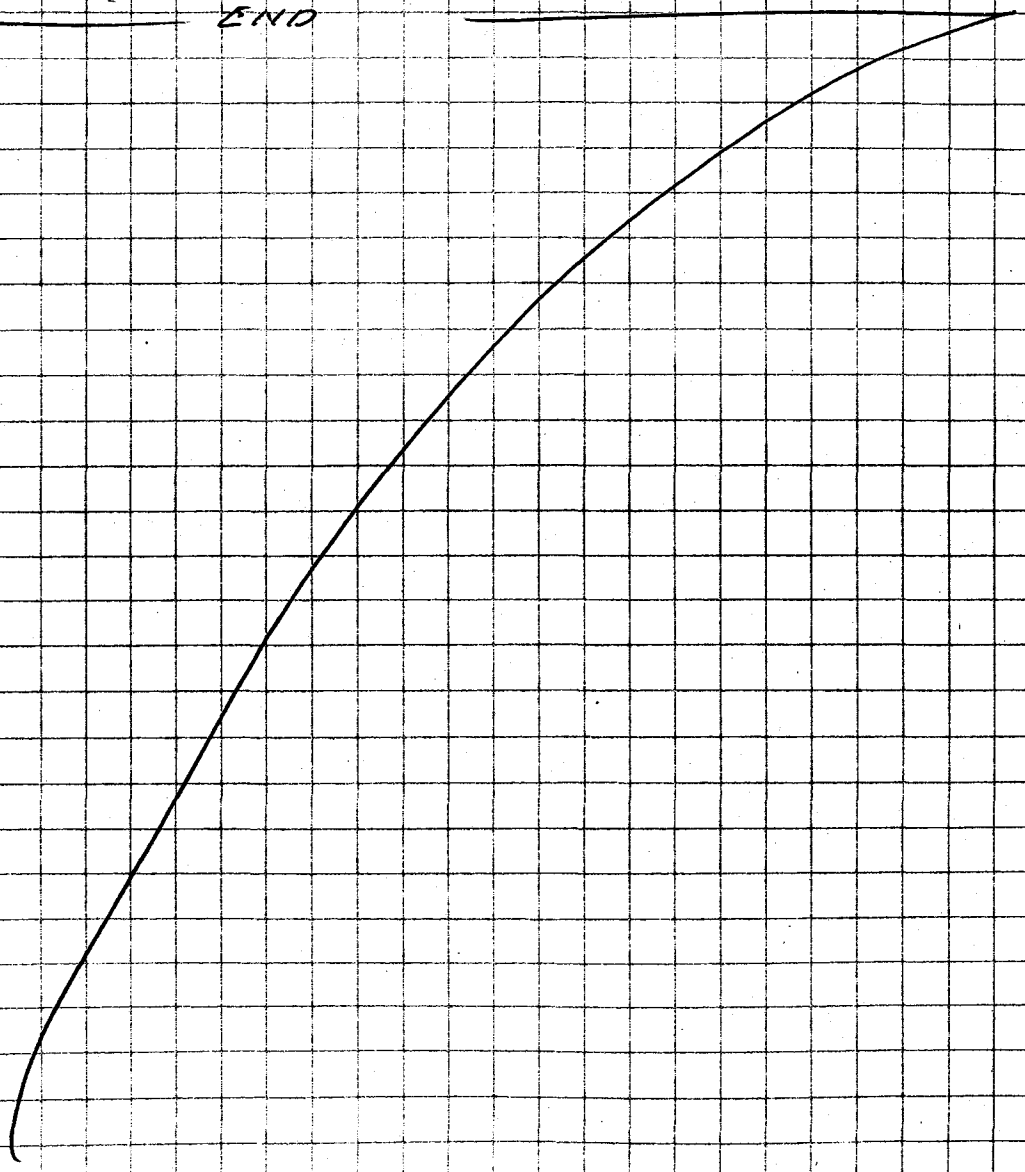
Prep to Dev 16MWT21

0730 Hrs - Start Dev @ 16MWT21

0930 Hrs - End Dev @ 16MWT21

0940 Hrs - Return to B#3245 SEE NB 1374 page 63 FOR REMAINDER OF DAY INFO

END



Work continued to Page

SIGNATURE Ty Mogel

DATE 9/29/04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Sample Summary 10/18/04:

Sampled 1650/1602; and kick off survey of Monitoring wells & Soil Borings @ SWMU 13.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 93605 MADE IN USA

THURS 10-14-04

Work continued from Page

WEATHER OVERCAST W/ PERIODS OF RAIN & 52°S

0700 Hrs - ARRIVE @ B 3245

- FAX CoCs 0119, 0120 & 0121 to LAB & OFFICE (E.S.)
- PREP. FOR SURVEYORS ARRIVE

0800 Hrs - SURVEYORS - Cory ALLEN & GARY Wood ARRIVE @ B-3245

- DISCUSS SURVEY APPROACH & SET (TR) H&S

0830 Hrs - ARRIVE @ SWMU 13

- SHOW CREW MWs & SOIL borings

0935 Hrs - ARRIVE @ SWMU 12

- SHOW SURVEY CREW MWs & SOIL borings ALSO, MARK ACCUAL SAMPLE locations 12 SB 21-24 FROM OFFSET STAKES

1015 Hrs - SURVEY CREW to SET up control - RETURN to OFFICE to do PAPERWORK & PICKED up SUBWAY SUB

1115 Hrs - MEET SURVEY CREW @ SWMU 13 S. GATE - let CREW IN & OVERSIGHT SAME SURVEYING IN ALL NEW SOIL borings.

1200 Hrs - CREW finished inside SWMU 13 W/I/ WORK outside (TR) SWMUs REMAINDER OF day - (A.C. WORK on control and locate 13MW TAB → 51).

- REMAINDER OF DAY T.R. WORKED @ SWMU 12 (ID MONITORING WELLS & 11 OF 12 STAFF GAUGES). ALSO, SAMPLED 165016 @ 1335 & 123028 @ 1540

1710 Hrs - LEFT SITE FOR HOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ted Nash DATE 10/14/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Sample Summary for 10/15/08

Purge only Monitoring Wells

16MWT08 & 21

SCIENTIFIC SINDERY PRODUCTS CHICAGO 53535 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7447 ~~6878~~ (TG)

BOOK NO. 1374

89

FRI - 10/15/04

Work continued from Page

WEATHER - (TG) AM - OVERCAST & COOL - PM PARTLY SUNNY & 5

0700 Hrs - ARRIVE @ B3245
WORK ON SWMU 12 UNTIL 0845 Hrs

0845 Hrs - ARRIVE @ B 3245
- PREP to SAMPLE GW @ SWMU 16
- CAL: INSTRUMENTS

1050 Hrs - ARRIVE @ SWMU 16 - 16MW108
START PURGE - 1130 Hrs <2' OF WATER IN WELL
END PURGE - 1320 Hrs (WELL DRY to PUMP INTAKE)
VOL. REMOVED - only 300ml W/ ~1L IN TUBING

1402 Hrs - START PURGE @ SWMU 16 - 16MW121

1802 Hrs - END PURGE AFTER 4hrs PER PURGING
WILL ALLOW WELL to RECHARGE & SAMPLE TOMORROW
DUE to LATE HOUR & INCREASED TURBIDITY

1825 Hrs - ARRIVE @ B-3245
UNLOAD METERS, ETC.

1845 Hrs - LEAVE B-3245 FOR MOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Hoyt DATE 10/15/04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Staff Gauges Installed 10/16/04:

SG #

SG01 - PK Nail on top of culvert up gradient of 16SW/SD28

SG02 - Green & yellow metal stake NEAR 16SD08

SG03 - " & " " " @ Fence between 16SD06 & 09

SG04 - PK Nail on top of culvert NEAR 16SD05

SG05 - PK Nail on top of culvert @ Fence down gradient of 16SD03

SG06 - 3 holes drilled on top of Poly pipe (Center Pipe) West side of H-77

SG07 - Green & yellow stake on west bank of Stream NEAR 16SW/SD28

SG08 - 3 holes drilled on top of Poly pipe (South Pipe) on the up stream side of H-77

SG09 - Green & yellow metal stake on the west bank of the stream just down gradient of 16SW/SD19

Sample Summary 10/16/04:

Collected 16TB10160401, 16SS860002 (missing sample), 16GWT2106 & Started Sampling 16GWT0802

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

SAT - 10/16/04

Work continued from Page

WEATHER - Partly Cloudy & Cool (50°s)

0700 Hrs - Arrive @ Lowe's - Purchase supplies for marking (TR) the Staff Gauges & installation of Well Tags.

0825 Hrs - Arrive @ B-3245 - Collect 16TB10160401

- Prep to collect GW samples & mark staff gauges & install well tags @ SWMU 16

0945 Hrs - Arrive @ SWMU 16

1000 Hrs - Collect 1655860002

1030 Hrs - Collect 16GWT2101

1130 Hrs - Cont to purge out H2O in tubing @ 16MWT03 to obtain one casing vol.

1154 Hrs - Start collecting Exp. sample for 16MWT08 Collected ~300ml before well was dry to pump.

1315 Hrs - Installed well tag on stick ups at all of the following wells 16MWT07, 08, 09, 10, 11, 12, 13, (TR) & 15 & 17

1425 Hrs - Marked staff Gauges @ SWMU 16 See page 90 & ID monitoring wells T19 & T20

1700 Hrs - Finished Marking staff Gauges OK -09 and Arrive @ B-3245

- Drop off Eq.

1715 Hrs - Leave B-3245 for Motel

END

SIGNATURE Tony Boyd DATE 10-16-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 10-17-04:
UNSUCCESSFULL ATTEMPT @ SAMPLING 16MW109 -
WELL CALL IT DRY.

SCIENTIFIC BINDERY PRODUCTS CHICAGO 50635 MADE IN USA

SUN 10-17-04

Work continued from Page

WEATHER - Mostly Sunny & TEMP 90's

0800 Hrs - ARRIVE @ B-7245

- PAPERWORK
- TRANSFER STAFF GAUGE INFO to SURVEYOR'S MAPS
- PREP to collect additional SAMPLE @ 16GWT08

1085 Hrs - Pick up Subway Sub for Lunch @ WELL

1105 Hrs - ARRIVE @ SWMU 16

- WATER LEVEL FOR 16MWT08 - 96.43 (TO 97.6)
- Prep. 3/4" PUMP FOR WELL 16MWT08

1140 Hrs - Start Pumping to collect SAMPLE

1240 Hrs - NO WATER FROM PUMP tubing

1245 Hrs - Pull Pump - Extract ~~only~~ ~50ml from tubing

Will call WELL DRY - No Samples

Note - WELL RECOVERY in 24 Hrs < 0.2'

WATER column ~4' less than during last Round

1300 Hrs - LEFT SWMU 16 to WORK on SWMU 12 the REMAINDER OF THE DAY.

END

SIGNATURE Tony Nyak DATE 10-17-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Sample summary 10/10/14

- Stake out contingency wells @ SWMU 12
- Ship samples on COCs # 0122 & 0123
  (Sample on COC # 0123 was from SWMU 12)
- Survey was ~~CANCELLED~~ CANCELED (TR) this date due to Rain

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN U.S.A.

MON 10-18-04

Work continued from Page

WEATHER - RAIN, 50°F

0700 Hrs - ARRIVE @ B-3245
- PAINT METAL POSTS FOR STAFF GAUGES
- TRANSFER STAFF GAUGE INFO TO SURVEY MAPS
- PREP FOR STAKING OUT CONTINGENCY WELLS @ SWMU 12
- PREP. TO INSTALL STAFF GAUGES & FREEZE PROTECTION @ SWMUS 13 & 16; FREEZE PROTECTION FOR DEDICATED BLADDER PUMPS
- PAPERWORK

1100 Hrs - LUNCH

1130 - 1425 Hrs - STAKE OUT CONTINGENCY WELLS @ SWMU 12 12MW1 41, 43-50 ALONG RR TRACKS & TRANSMISSION LINE CORRIDOR

1435 Hrs - TALK TO DONNA Z. @ PUBLIC WORKS - DONNA SAID DIG PERMIT SHOULD BE READY BY THE 25TH OF OCT.

1500 Hrs - ARRIVE @ B-3245
- FAX J. SCHUBERT WATER LEVEL READINGS FOR SWMU 12
- FAX COC'S #0122 & 0123 TO OFFICE & LAB FOR THIS DAY'S SHIPMENT
- PREP SAMPLES FOR SHIPMENT ON AIRBILL # 8447 8135 5590

1610 Hrs - LEAVE B-3245 FOR FED. EX.

1650 Hrs - DROP OFF SAMPLE SHIPMENT @ FED. EX.

END

Work continued to Page

SIGNATURE

DATE 10-18-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Drilling Activities 10/19/04:

Survey SB5# Monitoring wells @ SWMU 16

	Arrived	Leave
Cory Allen	0755	1130
Gary Wood	0755	1130

Sampling Activities 10/19/04

Install Fleece Protection @ SWMUs 13 & 16

Install Additional staff Gauges 12 → 18

& revist old staff Gauges and install PK nail @ most culvert locations 1 → 8

SCIENTIFIC SUNDRY PRODUCTS CHICAGO 40605 MADE IN USA

Tues 10/19/04

Work continued from Page

WEATHER : Overcast & 50's

0700 Hrs - ARRIVE @ B-3245
- Paperwork
- Prep. for Staff Gauge installation @ SWMU 13 & FREEZE PROTECTION INSTALLATION @ SWMU 16
- Wait for Survey crew Arrival - Plan on surveying NEW Boring locations & Monitoring WELLS 16MWT19 T20 & T21

0755 Hrs - Surveyors arrive @ BLDG 3245

0815 Hrs - Arrive @ SWMU 16
- Install Freeze Protection @ ALL DEDICATED Bladder Pump Monitoring WELLS

1032 Hrs - Finish Freeze Protection installation @ SWMU 16
- Wait for surveyors to Finish inside Fenced area ~~Hrs~~ @ SWMU 16.

1050 Hrs - Survey Finish inside Fenced Area @ SWMU 16

1055 Hrs - Arrive @ B3245
- Sit surveyor sign out sheet outside of door for surveyors

1100 Hrs - LUNCH

1125 Hrs - Arrive @ SWMU 13 - to install Freeze Protection @ DEDICATED Bladder Pump WELLS
Install ALL WELLS Except 13MWT02 w/ FREEZE Protection - will wait until after hours to install Freeze Protection @ T-1 WHICH is inside B-165 BUFFER ZONE

1410 Hrs - Start installation of Staff Gauges @ SWMU 13

1735 Hrs - Finish Staff Gauge installation & Waited to get Freeze Protection @ 13MWT01

1742 Hrs - Arrive @ B-3245
Drop off Nitrogen Cylinder

1750 Hrs - LEAVE B3245 FOR CAR WASH

END

SIGNATURE Ty Rogers DATE 10/19/04

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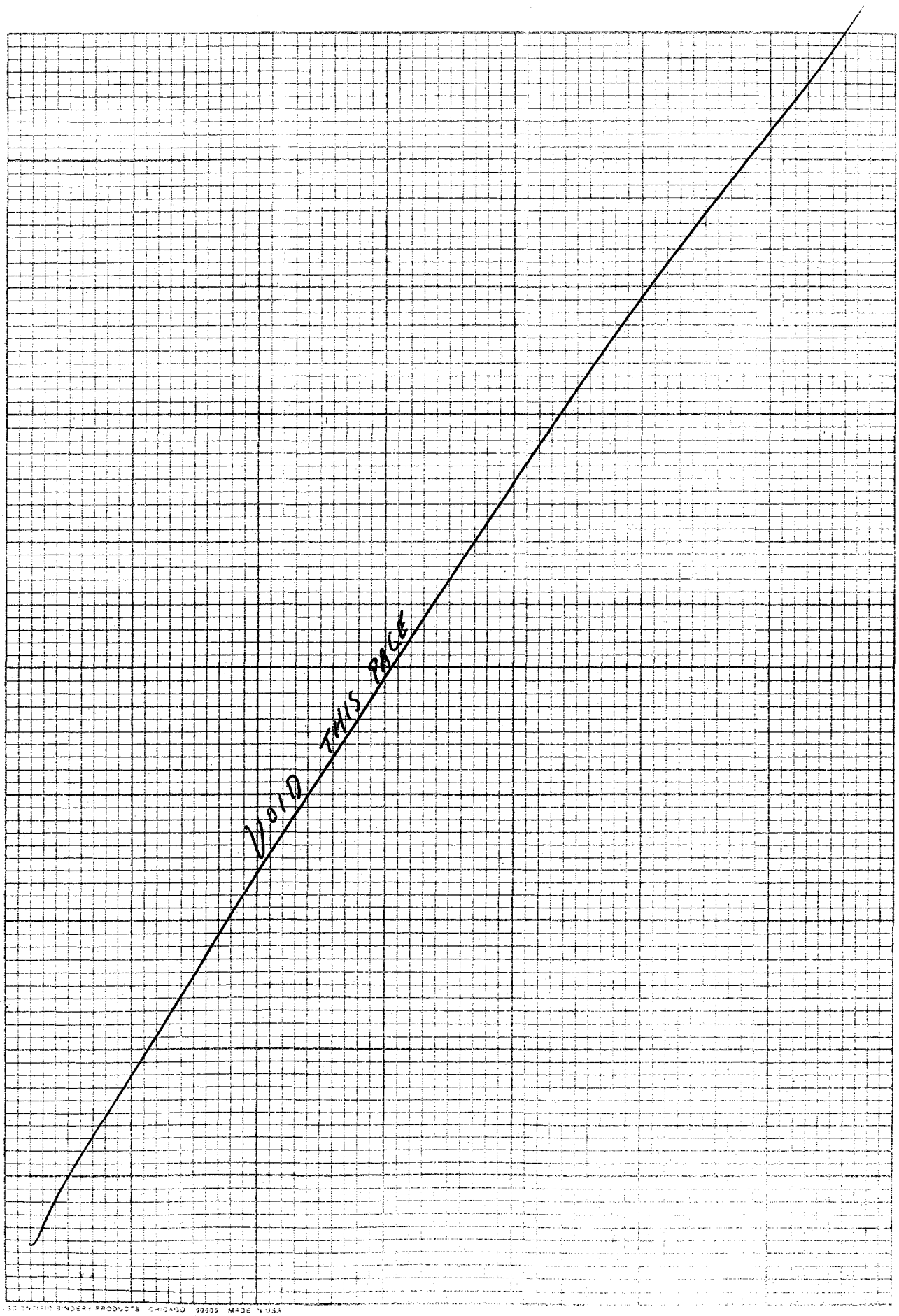

ESSENTRA BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

WEO 10/20/04

Work continued from Page

0730 Hrs - Arrive @ B 3245
- General Clean up
- Decon Bladder Pumps
- Prep. (2) 1 3/4" Pumps & (1) 3/4" Bladder Pumps For Return to U.S Env. on AB# 8447 8135 5605 INSULE BOX A3500
- Prep. Field Paperwork for Return to Pittsburgh
- Clean & mop Floors - Offices, Lab, Hallways & Bathroom
- Clean out SUV

1000 Hrs - Prep. & Leave B 3245 for FED EX

1035 Hrs - Drop off FED. EX Package

Remainder of Day - Travel

END

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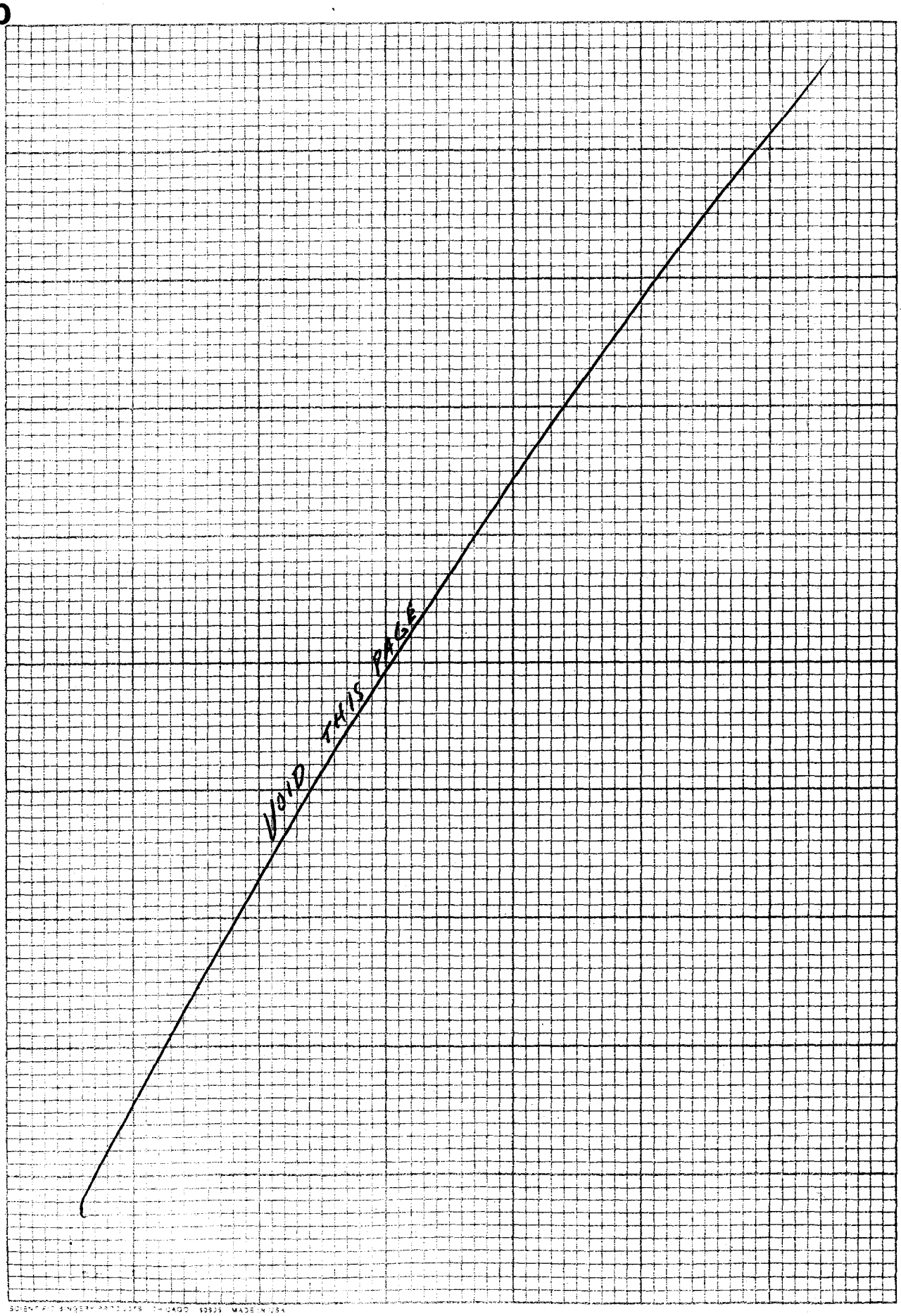

SCIENTIFIC SINGER PRODUCTS CHICAGO 60635 MADE IN USA

MON 10-25-04

Work continued from Page

TRAVEL DAY & WORKED @ SWMU-12

END

SIGNATURE Tracy Rook DATE 10-25-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Sample Summary 10/26/04

Collected SW SAMPLES:

16SW2601, 16SW3001, 13SW3301
13SW3002 & 13SW2802

Day Locations Checked:

16SW19 & 16

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60609 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

TUES 10/26/04

Work continued from Page

WEATHER - AM OVERCAST TEMP 60°S. STEADY RAIN IN PM

0700 Hrs - ARRIVE @ B-3245 16TB10260401 @ 0700 Hrs

- FAX R. Bosinski RR NES Training SIGN OFF SHEET & WATER LEVELS FOR SWMU 12
- CALI. YSI & LA MOTTE
- PREP. to SAMPLE SW @ SWMU 16

0930 Hrs - 16 SW 18 DRY

0955 Hrs - 16 SW 16 DRY

1105 Hrs - 16SW2601 Collected DUP & MS/MSD METALS & NITRATE

1200 Hrs - 16 SW 3001 Collected DUP & MS/MSD EXPLOSIVES

1235 Hrs - LUNCH

1250 Hrs - END LUNCH

1305 Hrs - REQ Flags up @ B-146

1312 Hrs - RETURN to B-3245

- PROCESS SAMPLES collected @ SWMU 16
- PREP. to SAMPLE SW @ SWMU 13

1510 Hrs - Collect 13SW3301 During Rain Event

1535 Hrs - Collect 13SW3002 " " "

1600 Hrs - Collect 13SW2802 DUP & MS/MSD During Rain EVENT

1650 Hrs - RETURN to B-3245

- PROCESS SAMPLES Collected @ SWMU 13

1830 Hrs - PREP. to LEAVE B 3245 FOR Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 10-26-04

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 10-27-04

Collected SURFACE WATER SAMPLES:

13SW14, 15, 16 & 22

SHIPPED SAMPLES ON COCs 0124 & 0125

VIA FED EX AB # 8447 8135 6623

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60635 MADE IN USA

WED 10/27/04

Work continued from Page

Weather Overcast mild & Temp in 60°s

0700 Hrs - Arrive @ B-3245
- Calib YSI & LaMotte
- Prep to sample SW @ SWMUs 13 & 12
- Check in w/ R. Basinski (Pitt office)
- Check in w/ T. Brant

0830 Hrs - C. Allen & G. Wood of BT&R check in with work @ SWMU 13 this Date
- Finish prepping SUV for SW sampling

0920 Hrs - Stop @ Gas Station to Request that the B3245 ice mach be Filled

0950 Hrs - Collected 13SW1502

1028 Hrs - Collected 13SW1402

1055 Hrs - Collected 13SW2202

1125 Hrs - Collected 13SW1602

1215 Hrs - Arrive @ SWMU 12
Finish Collecting SW @ SWMU 13 all proposed locations have been sampled

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

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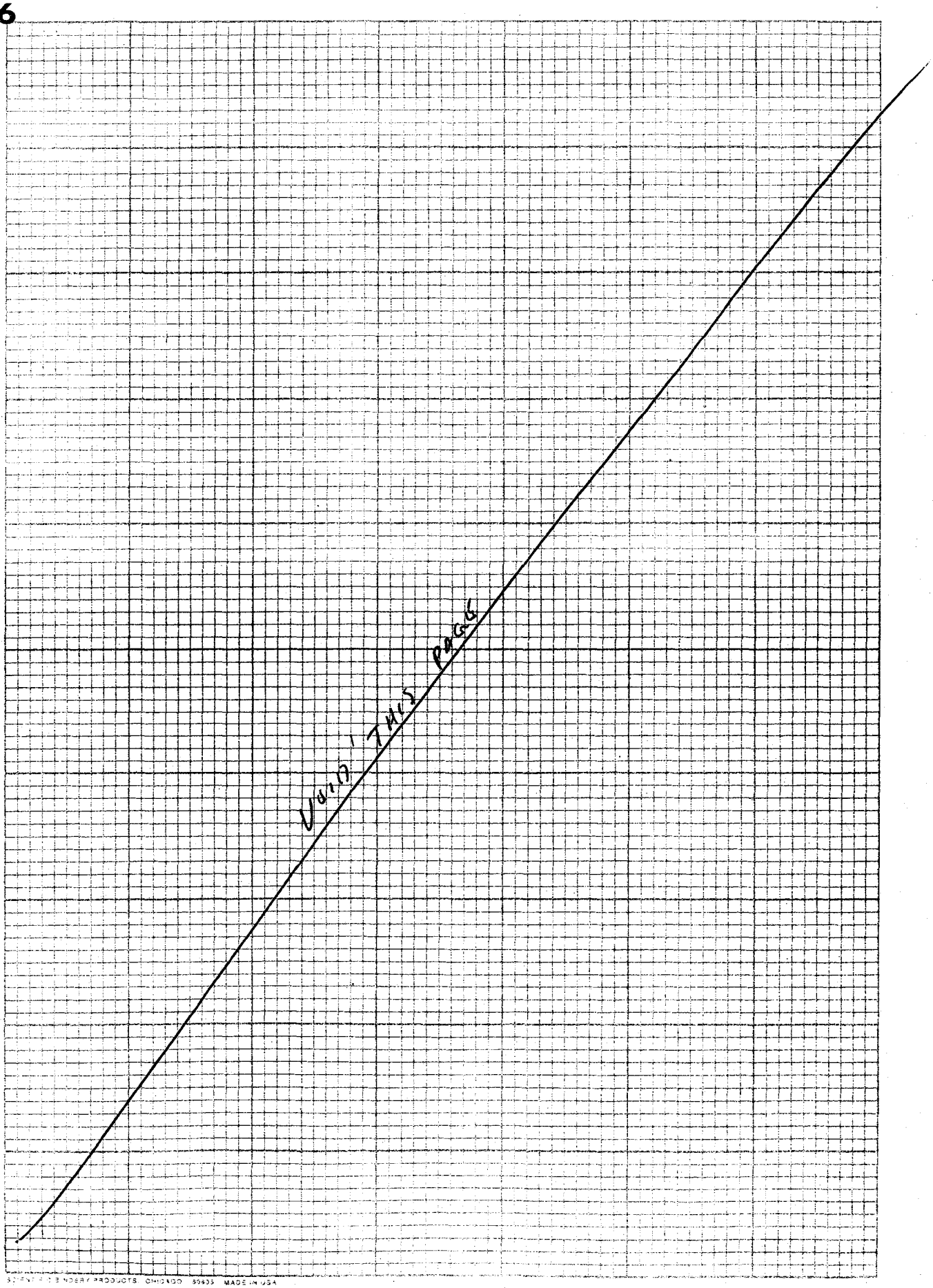

SCIENTIFIC STENDARD PRODUCTS CHICAGO 59935 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SAT. 10/30/04

Work continued from Page

WEATHER: Mostly Sunny & mild (Temp 70°s)

1600 Hrs - Start sampling @ 16MW108

1700 Hrs - FINISH @ 16MW108

WELL NEEDS to RECHARGE, will continue tomorrow

1710 Hrs - Arrive @ B 3245

SECURE all samples in Fridge

Drop off EQ

1730 Hrs - LEAVE B 3245 for Hotel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 10/31/00 @

Continued SAMPLING @ 16 MWT 08

SUN 10-31-04

Work continued from Page

WEATHER: Partly Cloudy Temp 60's

1615Hrs - ARRIVE @ SWMU 16

- Continue sampling for EXPLOSIVES @ 16MW108 w/ ½ bailer - collect 200ml (Total vol. collected (TR) ~~1650Hrs~~ - 1 SINCE 10/30/04 = ~700ml)

1650Hrs - Return to bldg 3245

REFRIGERATE Samples containers

Note: most of this date worked @ SWMU 12

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 10-31-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

Sample Summary 11/02/04 :

Collect surface water samples @
165W103, 06, 09, 12, 13, 16, 19 & 27

Ship samples on COCs # 0131, 0132 & 0133
Via FED EX AB # 8997 8135 6601.

COC # 0132 for SWMU 12 Groundwater Sample
From 12 MW T34

TUES 11-02-04

Work continued from Page

WEATHER: RAIN & 60's

0650 Hrs - Arrive @ B3245
- Cal: Meters (YSI & LaMotte)
- CHECK in w/ R Basciski
- FAX CoCs 0129 & 0130 to OFFICE & LAB
- Prep. for SURFACE WATER sampling @ SWMU 16

1000 Hrs - Collected SURFACE WATER @ 165W19
1045 Hrs - Collected " " @ 165W16
1110 Hrs - Return to B-3245
- Drop off SAMPLES

1130 Hrs - Lunch
1215 Hrs - Arrive @ Visitors Center Rm Picture Badge
1305 Hrs - Arrive @ B-3245
- Prep for Additional SURFACE WATER SAMPLING
- Don RAIN GEAR

1330 Hrs - Arrive @ SWMU 16
1405 Hrs - Collect SW SAMPLE 165W13
1420 Hrs - Collect " " 165W27
1440 Hrs - Collect " " 165W12
1500 Hrs - Collect " " 165W09
1520 Hrs - Collect " " 165W06
1530 Hrs - Collect " " 165W03
1550 Hrs - RETURN to B-3245
- PROCESS SAMPLES
- PACKAGE SAMPLES ON CoCs 0131, 0132 & 0133 FOR SHIPMENT ON AB# 8447 8135 6601

1720 Hrs - LEAVE B-3245 for FED EX.
1800 Hrs - Drop off SAMPLES @ FED EX. → Go to Car Wash
END

Work continued to Page

SIGNATURE Terry Rogers DATE 11-02-04

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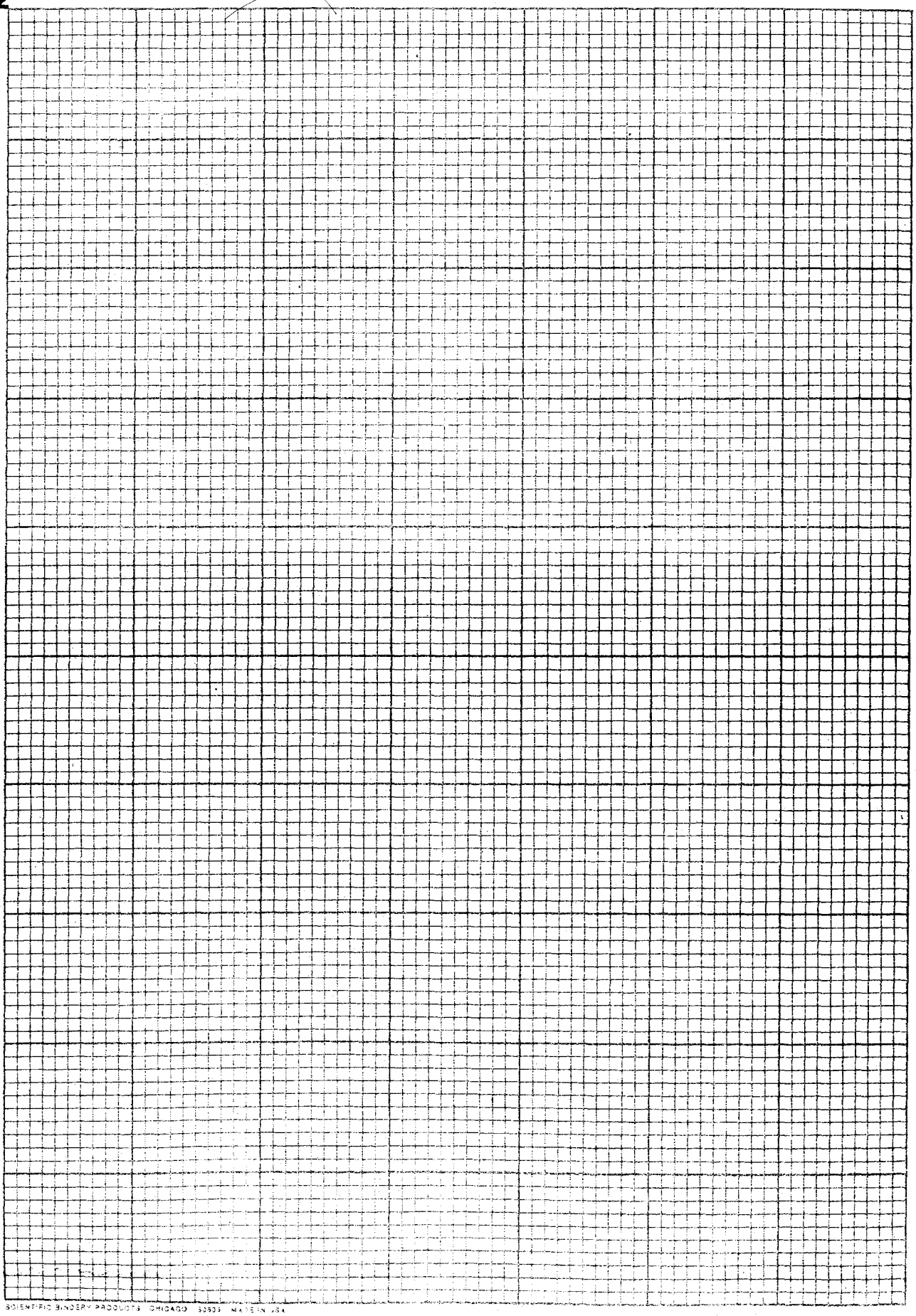
SCIENTIFIC BINDERY PRODUCTS CHICAGO 50633 MADE IN USA

WED 11-03-04

Work continued from Page

0720 Hrs - ARRIVE @ B-3245

- FAX CofCs to LAB & OFFICE (0131 & 0153
- LEAVE Daily Summary MESSAGE ON R. BASINSKI'S VOICE MAIL
- CLEAN OFFICE, LAB, hallways & bathroom
- CLEAN OUT Control Can inside
- Prep. PAPERWORK & OFFICE to TRAVEL to Pittsburgh

0930 Hrs - LEAVE B-3245 FOR Airport

TRAVEL Reminder of the day

END

Work continued to Page

SIGNATURE [signature] DATE 11-03-04

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SAMPLE SUMMARY 11-11-04:

COLLECTED SURFACE WATERS @

12SW 04, 05, 08, 10, 11, 23, 28 & 29

SHIP SAMPLES ON COCs 0135 & 0136 VIA

FED. EX. AB # 8947 8135 6586

SCIENTIFIC BINDERY PRODUCTS CHICAGO 63603 MADE IN USA

THURS 11-11-04

Work continued from Page

WEATHER: RAIN 40's High 51°

0645 Hrs - ARRIVE @ B3245
- CALI. YSI & LAMOTTE
- PREP to SAMPLE SURFACE WATER
- PAPERWORK

0910 Hrs - ARRIVE @ SWMU 16 Collected (FR) ~~grab~~ SURFACE WATER SAMPLES @ 16SW04, 05, 08, 10, 11, 23, 28 & 29 SEE COCs 0135 & 0136 for additional details

1215 Hrs - RETURN to B-3245
Drop off EQ & SAMPLES (REFRIGERATE)

1235 Hrs - LUNCH @ SUBWAY

1259 Hrs - RETURN to B 3245
- PROCESS SAMPLES FOR SHIPMENT ON COCs 0135 & 0136.
- PAPERWORK
- ORGANIZE OFFICE / CLEAN

1700 Hrs - LEAVE B 3245 FOR FED. EX.

1730 Hrs - DROP OFF SAMPLE SHIPMENT ON AB# 8447 8135 6586 @ FED EX

1810 Hrs - FAX OFFICE & LAB COPIES OF COCs FROM HOTEL

END

SIGNATURE Tony Ogil

DATE 11-11-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 11-14-04 :

SYNOPTIC WATER LEVELS MEASURED @ SWMU 13 - SEE PAGE 117 &

STAFF GAUGES MEASURED SEE PAGE 119.

SCIENTIFIC BINDER / PRODUCTS CHICAGO 60605 MADE IN USA

Work continued from Page

WEATHER: Mostly Sunny & 40's

1205 Hrs - PREP & SAMPLE W.L. @ SWMW 13

MW ID	W.L.	TIME	PID READING
13MWT01*	7.56	1649	0.0
T02	15.88	1644	0.0
T03	12.17	1652	0.0
T04	15.42	1619	0.0
T05	8.73	1629	0.8
T06	14.78	1655	0.0
T07	4.84	1616	0.0
T08	3.87	1623	0.0
T09	8.64	1701	0.0
T10	16.11	1626	0.0
T11*	8.82	1608	0.0
T12	11.50	1602	0.0
T13*	4.40	1258	0.0
T14*	14.69	1735	0.0
T15*	15.49	1556	0.0
T16	14.23	1541	0.0
T17*	9.04	1538	7.9
T18	20.52	1553	0.0
T19	11.31	1728	0.0
T20	5.23	1704	0.0
T21*	9.20	1534	7.9
T22	9.13	1523	0.4
T23	9.25	1706	0.0
T24	10.04	1709	0.0
T25	6.79	1515	0.0
T26	11.09	1512	0.2
T27	9.86	1559	0.0
T28*	78.38	16:58	13.6
T29	5.46	1255	0.0
T30	11.37	1732	0.0

MW ID	W.L.	TIME	PID
T31	10.74	1720	0.0
T32	10.55	1716	0.0
T33	11.54	1725	0.0
T34*	6.45	1527	16.1
T35 (Bailer)	64.40	1605	0.0
T36	19.56	1433	0.0
T37*	14.71	1439	57.0
T38	62.33	1436	0.1
T39	13.84	1444	1.2
T40*	18.74	1454	13.5
T41 (Bailer)	67.05	1456	1.9
T42	21.21	1500	0.4
T43	9.70	1637	0.0
T44	64.80	1634	0.0
T45*	69.83	1530	31.0
T46*	58.25	1446	0.3
T47*	7.02	1240	0.2
T48	10.02	1315 SC	0.0
T49	7.21	1315 SC	0.0
T50	~~3.77~~ 7.02 (E)	~~1319~~ 1400 (E)	0.0
T51	3.77	1315 SC	0.0

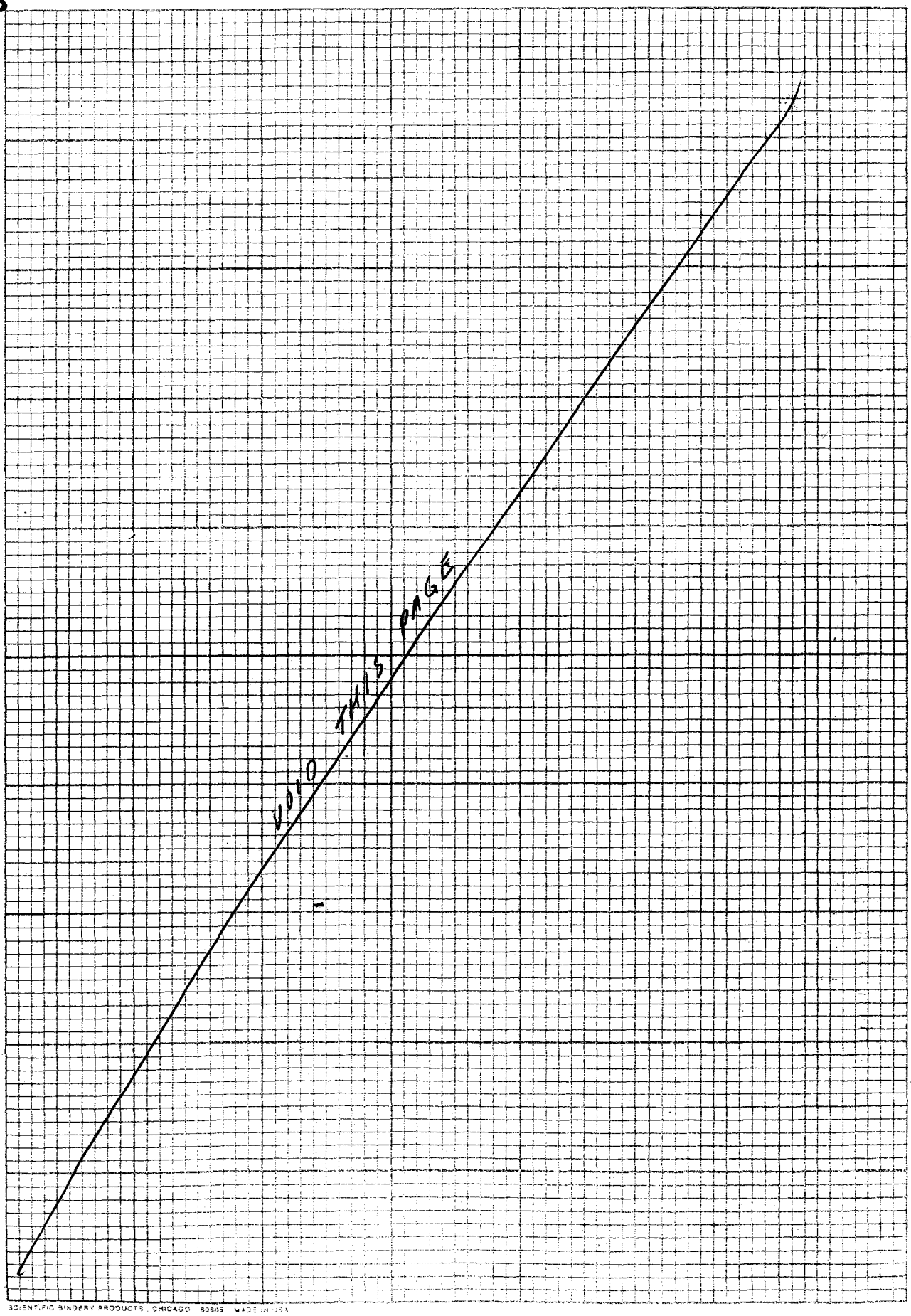
* = DEDICATED Bladder Pump WELLS

SC = got W.L. from S. Conti

Work continued to Page

SIGNATURE Terry Appel **DATE** 11-14-04

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**



SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

SUN 11-14-04 Cont'

Work continued from Page

STAFF GAUGE ID	WATER LEVEL	TIME	FLOW gpm ↓	FLOW: MEAS. OR ESTIMATE
1356 01	1.76	1643	<1gpm	<1gpm
02	3.71	1641	~5	~5-10gpm
03	1.95	1234	<5	~~<5 TPM~~ (RC) <5gpm
04	2.46	1254	1.5	SAME FLOW AS SG11 1.5
05	3.92	1301	<1	<1gpm
06	2.35	1304	<1	<1gpm
07	1.55	1712	—	STAGNANT / MARSH
08	5.18	1520	5-20	5-20gpm
09	4.18	1549	12	0.03' x 0.9 1ft/sec Bottom of Rocks
10	4.96	1613	5	0.03' x 0.8 ~~2ft~~ 23cc/ft
11	2.30	1246	1.5	1.5gpm MEAS. FLOW @ APP
12	6.87	1836	162	0.03 x 12' 1'/sec
(TA) ~~13~~ 14	6.37	1324	20-30	~20-30gpm
(TA) ~~14~~ 13	5.87	1356	15	15gpm (Bucket meas.)
15	3.97	1409	682	0.08 x 19' 1scc/ft
16	DRY	1416	—	DRY
17	DRY	1420	—	DRY
18	8.16	1310	242	0.03' x 18' 1scc/ft

1748 Hrs - Arrive @ B-3245

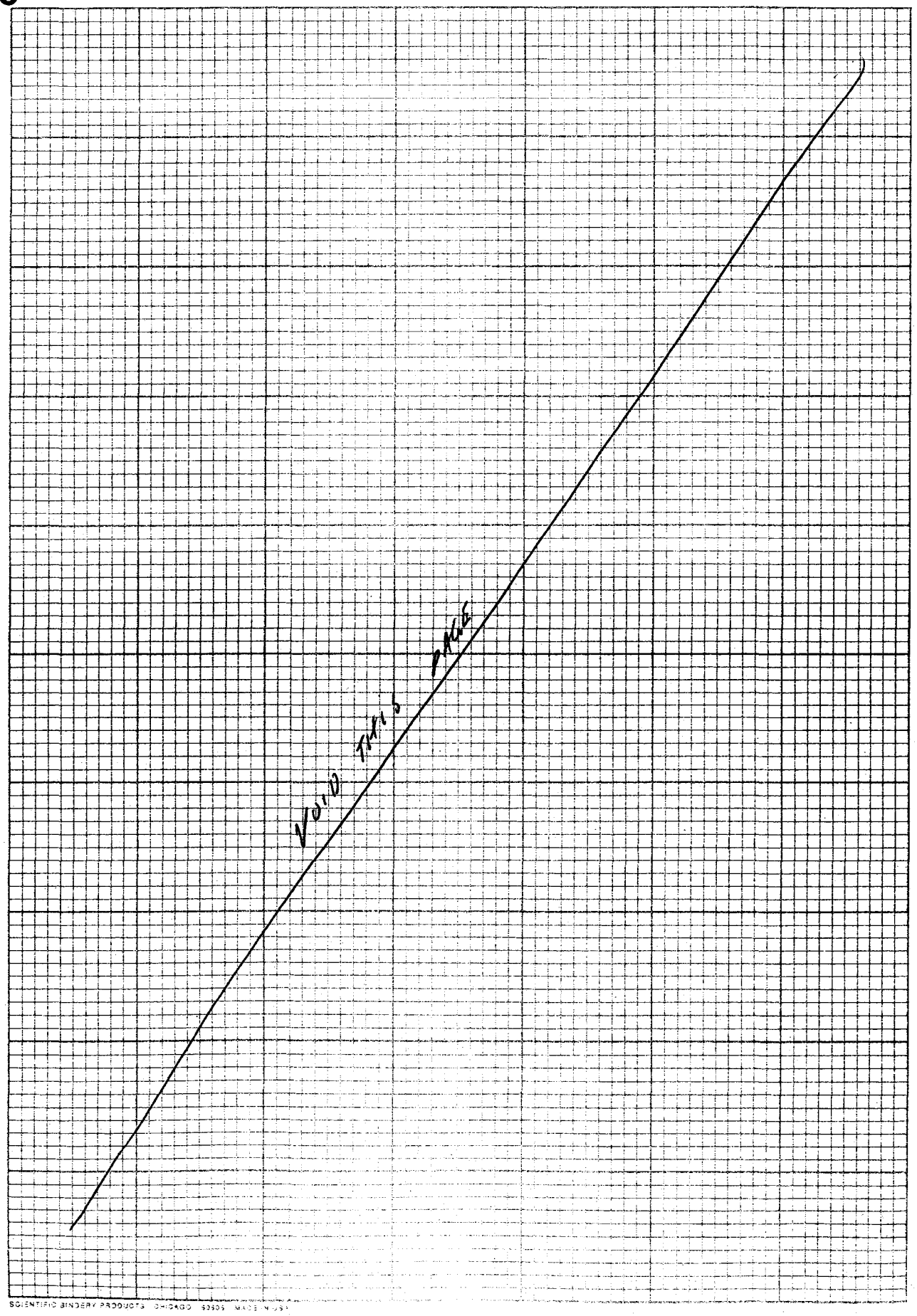
• Unload Pick up - Secure Eq.

1800 Hrs - Leave B 3245 for Bloomington

END

SIGNATURE Tony Ryan DATE 11-14-04

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

WED. 12/15/04

Work continued from Page

0700 HRS - ARRIVE @ B-3245, PREP. TO MEASURE STAFF GAUGES @ SWMU 16.

STAFF GAUGE	W.L.	TIME	VOL. EST.
165G01			
02			
03			
04			
05			
06	3.20	8:24	30-50 gpm
07	44.7+1.64	9:30	3.5" x 3.5' 25cc/ft
08	3.86	817	20-30 gpm (bucket) - BOTH PIPES
09	DRY	819	

0830 HRS - STOP @ BASIC ROOM TO CHECK ON STATUS OF B-146 - PAM CALLED SUPERVISOR B-146 IS IN RUN MODE FOR THE NEXT COUPLE OF MONTHS - NEED TO DO W.L. & STAFF GAUGES ON A WEEK END.

END

Work continued to Page

SIGNATURE	DATE
[signature]	12/15/04
DISCLOSED TO AND UNDERSTOOD BY	DATE / WITNESS / DATE

APPENDIX D.1.4
SWMU 13
DAILY ACTIVITY RECORDS
EXTERNAL SUMP/DRAINAGE INVESTIGATION

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	2/13/06	**Weather/Temp**	Mostly sunny & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D. Hickey;T. Rojahn	**Created Date**	2/13/06
TtNUS Project #	112GN6878			**Modified By**	James Goerdt
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;J. McFall	**Modified Date**	9/7/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/13/06	06:00	Terry Rojahn	Arrive at PIT airport - TRAVEL DAY
2/13/06	13:45	Terry Rojahn	Arrive at NSWC Crane, Bloomington Gate - obtain gate pass
2/13/06	14:00	Terry Rojahn	Arrive at B-3245:
2/13/06	15:10	Terry Rojahn	DH to show J. McFall soil boring sampling locations.
2/13/06	17:30	Terry Rojahn	Left B-3245 for Sam's Club.
2/13/06	18:49	Terry Rojahn	Check out at Sam's Club - purchased field supplies.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	2/14/06	**Weather/Temp**	Mostly sunny & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D. Hickey;J. Goerdt;T. Rojahn	**Created Date**	2/14/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;J. McFall	**Modified Date**	8/17/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/14/06	07:00	Terry Rojahn	Arrive at B-3245:
2/14/06	09:00	Terry Rojahn	TR organize office - wait for Digging Permits - Branda Chen to call office when the permits are ready.
2/14/06	10:00	Terry Rojahn	Pick up Digging Permits @ Public Works:
2/14/06	10:15	Terry Rojahn	Deliver Digging Permit 4961 for MFB to DH @ MFB.
2/14/06	10:30	Terry Rojahn	Return to B-3245:
2/14/06	12:50	Terry Rojahn	Lunch
2/14/06	13:10	Terry Rojahn	Arrive at MFB
2/14/06	13:50	Terry Rojahn	Start purging 13TW002.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/14/06	14:10	Terry Rojahn	Start collecting temporary well sample 13GWTW002.
2/14/06	16:40	Terry Rojahn	Start purging 13TW001.
2/14/06	17:25	Terry Rojahn	Start collecting temporary well sample 13GWTW002 (MS/MSD) and 13FD02140602 (DUP).
2/14/06	18:10	Terry Rojahn	Finish clean up at SWMU 13 (MFB).
2/14/06	18:20	Terry Rojahn	Arrive at B-3245:
2/14/06	18:30	Terry Rojahn	Leave site for Bloomington:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/15/2006	**Weather/Temp**	Cloudy & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D. Hickey;J. Goerdt;T. Rojahn	**Created Date**	2/15/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;J. McFall	**Modified Date**	2/17/06
WBS Code #	0000	**Visitors**		**Printed By**	James Goerdt
Client	SOUTHDIV	**Status**	Archive	**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
2/15/06	06:50	Terry Rojahn	Arrive at B-3245:
2/15/06	08:45	Terry Rojahn	Arrive @ MFB - check in w/ DPT crew
2/15/06	09:05	Terry Rojahn	Start purging 13TW003 - converted from soil boring 13SB68.
2/15/06	09:08	Terry Rojahn	End purging - 13TW003 dry after purging ~400ml.
2/15/06	09:55	Terry Rojahn	Start purging 13TW004 - converted from soil boring 13SB70.
2/15/06	10:50	Terry Rojahn	Start collecting temporary well sample 13GWTW004.
2/15/06	11:45	Terry Rojahn	Check in with DPT crew.
2/15/06	12:10	Terry Rojahn	Lunch

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/15/06	12:35	Terry Rojahn	Arrive at B-3245:
2/15/06	16:45	Terry Rojahn	Left B-3245 for Bloomington Fed. Ex
2/15/06	16:55	Terry Rojahn	Drop off soil and temporary well samples on the above COC at Fed. Ex.
2/15/06	17:15	Terry Rojahn	SAMPLE SUMMARY THIS DATE - 1) Completed 14 soil borings 13SB52 - 59, 60, 61,and 64 - 67. 2) Installed seven temporary wells at borings 13SB59, 57, 56, 64, 52, 54 and 60. 3) Sampled one temporary well 13TW004 at 13SB70 and began sampling 13TW003 at 13SB68.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/16/2006	**Weather/Temp**	Cloudy & 50s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D. Hickey;J. Goerdt;T. Rojahn	**Created Date**	2/16/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;J. McFall	**Modified Date**	2/18/06
WBS Code #	0000	**Visitors**		**Printed By**	James Goerdt
Client	SOUTHDIV	**Status**	Archive	**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
2/16/06	06:55	Terry Rojahn	Arrive at B-3245:
2/16/06	09:50	Terry Rojahn	Arrive at 13TW003 (began sampling on 2/15)- removed ~400ml of ground water sample.
2/16/06	10:10	Terry Rojahn	Temporary well 13TW005 installed at soil boring 13SB59 was dry - NO SAMPLE
2/16/06	10:30	Terry Rojahn	Start purge at 13TW006 (installed at soil boring 13SB57).
2/16/06	10:35	Terry Rojahn	Dried out temp well 13TW006 - saved ground water for sample ~700ml
2/16/06	10:50	Terry Rojahn	Start purge at 13TW007 (installed at soil boring 13SB56).
			Dried out temporary well

2/16/06	10:55	Terry Rojahn	13TW007 - saved ground water for sample ~1000ml
2/16/06	11:45	Terry Rojahn	Slow recharge at 13TW007 - collected an additional 200ml - will return tomorrow for additional volume.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/16/06	12:00	Terry Rojahn	Start purge at 13TW010 (installed at soil boring 13SB54).
2/16/06	12:40	Terry Rojahn	Finish purge at 13TW010.
2/16/06	12:45	Terry Rojahn	Start collecting groundwater sample 13GWTW010.
2/16/06	13:30	Terry Rojahn	Start purge at 13TW009 (installed at soil boring 13SB52).
2/16/06	13:35	Terry Rojahn	Dried out temp well 13TW009 - saved ground water for sample ~800ml
2/16/06	14:55	Terry Rojahn	Start purge at 13TW008 (installed at soil boring 13SB64).
2/16/06	15:15	Terry Rojahn	Dried out temp well 13TW008.
2/16/06	15:25	Terry Rojahn	Start collecting groundwater sample 13GWTW008 - well recharging.
2/16/06	15:25	Terry Rojahn	Start collecting groundwater sample 13GWTW008 - well recharging.
2/16/06	17:23	Terry Rojahn	Finish sampling and clean up at 13TW008.
2/16/06	17:32	Terry Rojahn	Arrive at B-3245:
			Leave B-3245 for

2/16/06	18:00	Terry Rojahn	Bloomington. SAMPLE SUMMARY THIS DATE - 1) Completed 13 soil borings 12SB40, 44, 45, 51-55, 59, 60 and 68-70. 2) Installed four temporary wells at borings 12SB40, 53, 69 and 70. 3) Sampled two temporary wells 13TW008 at 13SB64 and 13TW010 at 13SB54 and began sampling 13TW006 at 13SB57, 13TW007 at 13SB56 and 13TW009 at 13SB52

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	2/17/06	**Weather/Temp**	Mostly sunny & 20s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;D. Hickey;T. Rojahn	**Created Date**	2/17/06
TtNUS Project #	112GN6878			**Modified By**	James Goerdt
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;J. McFall	**Modified Date**	7/25/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/17/06	07:05	Terry Rojahn	Arrive at B-3245:
2/17/06	08:55	Terry Rojahn	Return to temporary well 13TW006 to obtain additional volume for ground water sample 13GWTW006.
2/17/06	09:43	Terry Rojahn	Finish clean up at 13TW006
2/17/06	09:50	Terry Rojahn	Return to temporary well 13TW007 to obtain additional volume for ground water sample 13GWTW007.
2/17/06	10:10	Terry Rojahn	Finish clean up at 13TW007.
2/17/06	10:15	Terry Rojahn	Return to temporary well 13TW009 to obtain additional volume for ground water sample 13GWTW009.

2/17/06	11:00	Terry Rojahn	Finish clean up at 13TW009.
2/17/06	11:10	Terry Rojahn	Check on DPT crew.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/17/06	11:30	Terry Rojahn	Lunch
2/17/06	11:50	Terry Rojahn	Arrive at B-3245:
2/17/06	17:15	Terry Rojahn	Leave B-3245 for Fed Ex.
2/17/06	17:50	Terry Rojahn	Drop off samples on the above COC at Fed Ex.
2/17/06	18:00	Terry Rojahn	SAMPLE SUMMARY THIS DATE - 1) Completed 11 soil borings 12SB46-50 and 61-66. 2) Installed six temporary wells at borings 12SB46, 48, 50, 63, 64 and 66.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	2/18/06	**Weather/Temp**	Cloudy, snow and temp in the teens	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC			**Created Date**	2/18/06
TtNUS Project #	112GN6878	**TtNUS Personnel**	D. Hickey;J. Goerdt;T. Rojahn	**Modified By**	James Goerdt
Task/Contract #	CTO 0357			**Modified Date**	7/25/06
WBS Code #	0000	**Subcontractor Personnel**	EFS:;J. McFall	**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/18/06	07:00	Terry Rojahn	Arrive at B-3245:
2/18/06	09:45	Terry Rojahn	Rig hydraulics frozen - CANCEL DPT work until Monday.
2/18/06	10:00	Terry Rojahn	Office prep to sample soil boring 12SB67 w/hand auger.
2/18/06	10:40	Terry Rojahn	Arrive at SWMU 12 - prep to sample soil boring 12SB67
2/18/06	11:08	Terry Rojahn	Collect soil sample 12SS670002.
2/18/06	11:30	Terry Rojahn	Made 2 attempts at acquiring a deeper sample at 12SB67 and got refusal at 3' both times.
2/18/06	12:10	Terry Rojahn	Lunch
2/18/06	12:30	Terry Rojahn	DH & TR prep to check sump locations at SWMU 12 and 13. JG prep to sample

			temporary wells.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/18/06	13:10	Terry Rojahn	Arrive at SWMU 12 : Check all 11 sumps and catch basins clear away debris, determine method of sampling and loosen grates and covers.
2/18/06	14:50	Terry Rojahn	Arrive at SWMU 13: Check all 9 sumps and catch basins clear away debris, determine method of sampling and loosen grates and covers.
2/18/06	16:10	Terry Rojahn	Finish checking sumps and catch basins at SWMU 13 and check on JG at SWMU 12.
2/18/06	16:30	Terry Rojahn	Return to B-3245:
2/18/06	17:00	Terry Rojahn	Leave B-3245 for Lowe's
2/18/06	17:56	Terry Rojahn	Finish shopping at Lowe's.
2/18/06	18:15	Terry Rojahn	SAMPLE SUMMARY THIS DATE - 1) Completed 1 soil boring 12SB67 w/hand auger - Rig froze up. 2) Sampled one temporary well 12TW002 at 12SB70 and began sampling 12TW001 at

			12SB53 (~900ml), 12TW004 at 12SB40 (~800ml), 12TW006 at 12SB50 (~400) and 12TW007 at 12SB48 (~500ml)

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/19/2006	**Weather/Temp**	Mostly sunny and 20s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;D. Hickey;T. Rojahn	**Created Date**	2/19/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**		**Modified Date**	3/8/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/19/06	07:15	Terry Rojahn	Arrive at B-3245:
2/19/06	10:20	Terry Rojahn	Arrive at SWMU 12 - Collected aqueous samples within two sumps (locations 12SU/SL005 and 008) and one catch basin (location 12SU/SL001). Sample sediment within all catch basins (locations 12SU/SL001-004, 006, 007, 009 and 010) and sumps (locations 12SU/SL005, 008 and 011).
2/19/06	12:15	Terry Rojahn	Lunch
2/19/06	12:45	Terry Rojahn	Process SWMU12 sump water and sediment samples.
			Arrive at SWMU 13. Collected aqueous samples within

2/19/06	14:30	Terry Rojahn	one sump (locations 13SU/SL009) and one catch basin (location 13SU/SL007). Sample sediment within all catch basins (locations 13SU/SL001, 002 and 004-008) and sumps (locations 13SU/SL003 and 009).
2/19/06	16:10	Terry Rojahn	Return to B-3245:
2/19/06	17:30	Anonymous	Left B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/20/2006	**Weather/Temp**	Cloudy and 20s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;D. Hickey;T. Rojahn	**Created Date**	2/20/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**	EFS:;Josh Dutton	**Modified Date**	3/8/06
WBS Code #	0000	**Visitors**		**Printed By**	James Goerdt
Client	SOUTHDIV	**Status**	Archive	**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
2/20/06	07:01	Terry Rojahn	Arrive at B-3245:
2/20/06	10:45	Anonymous	Arrive at SWMU 12
2/20/06	11:10	Anonymous	Start purging temporary well 12TW011.
2/20/06	12:30	Anonymous	End purge at 12TW011.
2/20/06	12:32	Anonymous	Start collecting ground water sample 12GWTW011.
2/20/06	13:05	Anonymous	Completed the sampling of temporary well 12TW001 initiated on 2/18.
2/20/06	13:12	Anonymous	Completed the sampling of temporary well 12TW006 initiated on 2/18.
2/20/06	13:16	Anonymous	Continued the sampling of temporary well 12TW007 initiated on 2/18 acquired ~100ml.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/20/06	13:30	Anonymous	Continue to collect sample volume at 12TW003 initiated on 2/19.
2/20/06	13:50	Anonymous	Sampling completed at temporary well 12TW003.
2/20/06	14:20	Anonymous	Completed the sampling of temporary well 12TW004 initiated on 2/18.
2/20/06	14:35	Anonymous	Arrive at B-3245:
2/20/06	18:05	Anonymous	Leave B-3245 for Fed Ex.
2/20/06	18:45	Anonymous	Drop off samples at Fed Ex.
2/20/06	19:00	Anonymous	SAMPLE SUMMARY THIS DATE - 1) DH and JG completed soil borings 12SB41-43, 56 -58 and 67. 2) Installed five temporary wells (12TW011 at 12SB67, 12TW012 at 12SB57, 12TW013 at 12SB56, 12TW014 at 12SB42 and 12TW015 at 12SB41). 3)TR sampled one temporary well 12TW011 at 12SB67

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/21/2006	**Weather/Temp**	Mostly sunny & 30s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;D. Hickey;T. Rojahn	**Created Date**	2/21/06
TtNUS Project #	112GN6878			**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Subcontractor Personnel**		**Modified Date**	3/8/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	2/6/07
		Status	Archive		

Daily Activity

Date	Time	Author	Notes
2/21/06	07:10	Terry Rojahn	Arrive at B-3245:
2/21/06	09:55	Terry Rojahn	Arrive at temporary well 12TW007.
2/21/06	10:37	Terry Rojahn	Finish clean up at 12TW007 - collected ~100ml.
2/21/06	10:50	Terry Rojahn	Return to B-3245:
2/21/06	11:50	Terry Rojahn	Lunch
2/21/06	12:25	Terry Rojahn	Return to B-3245:
2/21/06	17:00	Terry Rojahn	Prep to leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/28/2006	**Weather/Temp**	Mostly sunny and 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	2/28/06
TtNUS Project #	112GN6878	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Visitors**		**Modified Date**	3/8/06
WBS Code #	0000	**Status**	Archive	**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
2/28/06	07:05	Terry Rojahn	Arrive @ B-3245:
2/28/06	09:30	Terry Rojahn	Check in at B-2531 - OK to access temp wells @ SWMUs 12 & 13.
2/28/06	09:40	Terry Rojahn	Meet Corey Allen out side cafe - give CA maps and print out survey location tables for SWMUs 12 & 13 - planned on Thursday recon of soil boring and sump locations.
2/28/06	10:00	Terry Rojahn	Start collecting water levels at SWMU 12.
2/28/06	11:36	Terry Rojahn	End collecting water levels at SWMU 12.
2/28/06	11:55	Terry Rojahn	Start collecting temporary well sample 13GWTW005 (~100ml).
2/28/06	12:20	Terry Rojahn	Finish clean up at 13TW005 (acquired

			~100ml).
2/28/06	12:40	Terry Rojahn	Start collecting temporary well sample 12GWTW013 (Dry at ~600ml).

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
2/28/06	13:55	Terry Rojahn	Finish collecting temporary well sample 12GWTW013 - acquired 2000ml after well dried out - allowed well to recharge several times.
2/28/06	14:08	Terry Rojahn	Start collecting temporary well sample 12GWTW008 (Dry @ ~600ml).
2/28/06	14:28	Terry Rojahn	End collecting temporary well sample 12GWTW008 - well played out, collected ~900ml.
2/28/06	14:45	Terry Rojahn	Start collecting temporary well sample 12GWTW012 (Dry @ ~500ml).
2/28/06	15:25	Terry Rojahn	End collecting temporary well sample 12GWTW012 - well played out, collected ~900ml
2/28/06	15:33	Terry Rojahn	Start collecting temporary well sample 12GWTW014 (Dry @ ~400ml).
2/28/06	15:43	Terry Rojahn	End collecting temporary well sample 12GWTW014 - well played

			out, collected ~400ml.
2/28/06	15:50	Terry Rojahn	Start collecting temporary well sample 12GWTW015 (Dry @ ~400ml).
2/28/06	16:15	Terry Rojahn	End collecting temporary well sample 12GWTW015 - well played out, collected ~800ml.
2/28/06	16:24	Terry Rojahn	Return to 13TW005 - got zero additional volume.
2/28/06	16:35	Terry Rojahn	Start collecting temporary well sample 13GWTW012 (Dry @ ~200ml).
2/28/06	17:20	Terry Rojahn	End collecting temporary well sample 13GWTW012 - well played out, collected ~500ml.
2/28/06	17:30	Terry Rojahn	Arrive at B-3245:
2/28/06	17:45	Terry Rojahn	Left B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	02/27/2006	**Weather/Temp**	Mostly sunny and 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	2/27/06
TtNUS Project #	112GN6878	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Visitors**		**Modified Date**	3/8/06
WBS Code #	0000	**Status**	Archive	**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
2/27/06	12:45	Terry Rojahn	Arrive @ B-3245 (Travel Day):
2/27/06	13:47	Terry Rojahn	Attempted to check in w/ Mr. Mike Roach (production supervisor) - he was gone for the day - will access MFA tomorrow after check in.
2/27/06	13:59	Terry Rojahn	Start collecting water levels at SWMU 13.
2/27/06	14:41	Terry Rojahn	Finish collecting water levels at SWMU 13.
2/27/06	14:55	Terry Rojahn	Arrive @ B-3245:
2/27/06	15:00	Terry Rojahn	Leave B-3245 for Bloomington.
2/27/06	17:00	Terry Rojahn	Prep surveying tables for SWMUs 12 & 13 for surveyors to track completed survey locations.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	03/01/2006	**Weather/Temp**	Mostly Cloudy and 60s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	3/1/06
TtNUS Project #	112GN6878	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Visitors**		**Modified Date**	3/8/06
WBS Code #	0000	**Status**	Archive	**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
3/1/06	07:15	Terry Rojahn	Arrive at B-3245:
3/1/06	09:00	Terry Rojahn	Investigate B-2773 for J. Schubert - empty paint locker.
3/1/06	09:15	Terry Rojahn	Start measuring water levels of wells and staff gauges at SWMU 8.
3/1/06	11:10	Terry Rojahn	Finish measuring water levels of wells and staff gauges at SWMU 8.
3/1/06	11:30	Terry Rojahn	Fax water level measurements to Jeff Schubert.
3/1/06	11:50	Terry Rojahn	Arrive at SWMU 12.
3/1/06	12:00	Terry Rojahn	Returned to temporary well 12TW008 for additional sample volume.
3/1/06	12:25	Terry Rojahn	Acquired an additional ~100ml from temporary well

			12TW008.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
3/1/06	12:35	Terry Rojahn	Returned to temporary well 12TW012 for additional sample volume.
3/1/06	14:10	Terry Rojahn	Acquired an additional ~1100ml from temporary well 12TW012.
3/1/06	14:20	Terry Rojahn	Returned to temporary well 12TW014 for additional sample volume.
3/1/06	14:45	Terry Rojahn	Acquired an additional ~400ml from temporary well 12TW014.
3/1/06	14:50	Terry Rojahn	Returned to temporary well 12TW015 for additional sample volume.
3/1/06	15:20	Terry Rojahn	Acquired an additional ~150ml from temporary well 12TW015.
3/1/06	15:35	Terry Rojahn	Acquired an additional ~25ml from temporary well 13TW005 - well played out!.
3/1/06	15:45	Terry Rojahn	Returned to temporary well 13TW012 for additional sample volume
3/1/06	16:15	Terry Rojahn	Acquired an additional ~500ml from temporary well 13TW012.

3/1/06	16:30	Terry Rojahn	Start purge at temporary well 13TW011.
3/1/06	17:10	Terry Rojahn	End purge at temporary well 13TW011.
3/1/06	17:15	Terry Rojahn	Start collecting ground water sample 13GWTW011.
3/1/06	17:40	Terry Rojahn	Finish clean up at 13TW011 (collected an MS/MSD).
3/1/06	17:50	Terry Rojahn	Arrive at B-3245:
3/1/06	18:20	Terry Rojahn	Leave B-3245 for Bloomington:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Project Information

Activity Date	03/02/2006	**Weather/Temp**	Mostly cloudy, windy & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	3/2/06
TtNUS Project #	112GN6878	**Subcontractor Personnel**	BR&G:;Corey Allen;Eli Cook	**Modified By**	Terry Rojahn
Task/Contract #	CTO 0357	**Visitors**		**Modified Date**	3/8/06
WBS Code #	0000	**Status**	Archive	**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
3/2/06	06:55	Terry Rojahn	Arrive at B-3245:
3/2/06	08:30	Terry Rojahn	Surveyors arrive at B-3245.
3/2/06	08:40	Terry Rojahn	Arrive at MFA - introduce CA & EC to Mr Mike Roach & Mr Tom Flynn (NSWC Crane production supervisors) for access info and approval POCs.
3/2/06	08:45	Terry Rojahn	Begin to show surveyors SWMU 12 & 13 soil boring and sump survey locations.
3/2/06	10:15	Terry Rojahn	Finish showing surveyors all soil boring and sump survey locations.
3/2/06	10:30	Terry Rojahn	Returned to temporary well 12TW014 for additional sample volume.
3/2/06	11:00	Terry Rojahn	Acquired an additional ~200ml from

			temporary well 12TW014.
3/2/06	11:10	Terry Rojahn	Returned to temporary well 12TW015 for additional sample volume - collected an additional 50ml - top off 1L bottle as well played out!

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 12 and 13 External Sump/Drainage Investigation - February 2006 - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
3/2/06	11:20	Terry Rojahn	Finish at temporary well 12TW015.
3/2/06	11:35	Terry Rojahn	Returned to temporary well 13TW005 for additional sample volume.
3/2/06	11:45	Terry Rojahn	Acquired an additional ~25ml from temporary well 13TW005 - well played out.
3/2/06	11:50	Terry Rojahn	Lunch
3/2/06	12:25	Terry Rojahn	Return to B-3245:
3/2/06	13:00	Terry Rojahn	Arrive at MFA to abandon temporary wells.
3/2/06	15:10	Terry Rojahn	Complete temporary wells abandonment at both MFA and MFB.
3/2/06	15:20	Terry Rojahn	Return to B-3245:
3/2/06	17:30	Terry Rojahn	Leave B-3245 for Bloomington Fed Ex.
3/2/06	18:00	Terry Rojahn	Drop off Fed Ex shipments.

- End of Report -

APPENDIX D.1.5
SWMU 13
DAILY ACTIVITY RECORDS
PCB DELINEATION INVESTIGATIONS

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	05/31/2006	**Weather/Temp**		**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	6/1/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 377	**Visitors**		**Modified Date**	6/1/06
WBS Code #	TP00050125	**Status**	Archive	**Printed By**	James Goerdt
Client	SouthDiv			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
5/31/06	15:00	Terry Rojahn	Arrive at Bloomington gate - obtain 10 day pass. Flight in was delayed almost 2Hrs.
5/31/06	15:15	Terry Rojahn	Arrive at B-3245:
5/31/06	16:45	Terry Rojahn	Leave B-3245 for Sam's Club to pick up supplies (paper towels,copy paper & drinking water).
5/31/06	17:44	Terry Rojahn	Check out at Sam's Club.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	06/02/2006	**Weather/Temp**	lt. rain - overcast & 60s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	6/2/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 377	**Visitors**		**Modified Date**	6/2/06
WBS Code #	TP00050125	**Status**	Archive	**Printed By**	James Goerdt
Client	SouthDiv			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/2/06	07:10	Terry Rojahn	Arrive at B-3245:
6/2/06	09:15	Terry Rojahn	Checked on dig permits @ public works (Mr Ryan Roberts and Mr Steve Reddick) -up dated SWMU 9 - told above that holes would be installed via DPT to ~11' and that two additional holes were added 1 between each cluster of 2.
6/2/06	09:45	Terry Rojahn	Stopped @ Mr Mike Roach and Mr Tom Flynn's office to check on SWMU 13 activity - Mike and Tom were both gone. Checked in office down stairs - got in touch w/ Mr Dave Baker - OK to access MFB this week and next.
			Arrive at

6/2/06	10:00	Terry Rojahn	monitoring well 13MWT01.
6/2/06	10:15	Terry Rojahn	Start purge at monitoring well 13MWT01.
6/2/06	11:25	Terry Rojahn	Finish purge at monitoring well 13MWT01.
6/2/06	11:30	Terry Rojahn	Start collecting ground water sample 13GWT0108.
6/2/06	11:54	Terry Rojahn	Finish clean up at monitoring well 13MWT01.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
6/2/06	12:00	Terry Rojahn	Start purge at monitoring well 13MWT11.
6/2/06	13:10	Terry Rojahn	Finish purge at monitoring well 13MWT11.
6/2/06	13:15	Terry Rojahn	Start collecting ground water sample 13GWT1108.
6/2/06	13:38	Terry Rojahn	Finish clean up at monitoring well 13MWT11.
6/2/06	13:50	Terry Rojahn	Start collecting ground water sample 13GWT4507 purged 6-01-06.
6/2/06	15:00	Terry Rojahn	Finish clean up at monitoring well 13MWT45.
6/2/06	15:12	Terry Rojahn	Return to B-3245:
6/2/06	16:55	Terry Rojahn	Prep to leave B-3245 for Fed Ex.
6/2/06	17:30	Terry Rojahn	Drop off samples for shipment at Fed Ex.
6/2/06	17:43	Terry Rojahn	Purchase supplies at Kroger to decon soil core sampler.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	06/01/2006	**Weather/Temp**	Overcast & 70s.	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	6/1/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 377			**Modified Date**	6/1/06
WBS Code #	TP00050125	**Visitors**		**Printed By**	James Goerdt
Client	SouthDiv	**Status**	Archive	**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/1/06	07:15	Terry Rojahn	Arrive at B-3245: Complete 5/31/06 daily log.
6/1/06	08:45	Terry Rojahn	Arrive at monitoring well 13MWT40.
6/1/06	09:00	Terry Rojahn	Start purge at monitoring well 13MWT40.
6/1/06	10:20	Terry Rojahn	Finish purge at monitoring well 13MWT40.
6/1/06	10:25	Terry Rojahn	Start collecting ground water sample 13GWT4007.
6/1/06	11:15	Terry Rojahn	Finish clean up at monitoring well 13MWT40.
6/1/06	11:30	Terry Rojahn	Lunch
6/1/06	11:50	Terry Rojahn	Stopped @ Mr Mike Roach and Mr Tom Flynn's office to check on SWMU 13 activity - Mike and Tom were both gone. Will check again later.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
6/1/06	12:00	Terry Rojahn	Arrive at monitoring well 13MWT21.
6/1/06	12:15	Terry Rojahn	Start purge at monitoring well 13MWT21.
6/1/06	13:15	Terry Rojahn	End purge at monitoring well 13MWT21.
6/1/06	13:20	Terry Rojahn	Start collecting ground water sample 13GWT2108.
6/1/06	13:58	Terry Rojahn	Finish clean up at monitoring well 13MWT21.
6/1/06	14:10	Terry Rojahn	Start purge at monitoring well 13MWT45.
6/1/06	16:05	Terry Rojahn	End purge at monitoring well 13MWT45.
6/1/06	16:24	Terry Rojahn	Finish clean up at monitoring well 13MWT45.
6/1/06	16:34	Terry Rojahn	Arrive at B-3245:Ret
6/1/06	17:25	Terry Rojahn	Prep to leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	06/03/2006	**Weather/Temp**	Mostly sunny & 80s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	6/3/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 377	**Visitors**		**Modified Date**	6/3/06
WBS Code #	TP00050125	**Status**	Archive	**Printed By**	James Goerdt
Client	SouthDiv			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/3/06	07:15	Terry Rojahn	Arrive at B-3245:
6/3/06	08:20	Terry Rojahn	Arrive at monitoring well 13MWT09.
6/3/06	08:45	Terry Rojahn	Start purge at monitoring well 13MWT09.
6/3/06	09:55	Terry Rojahn	End purge at monitoring well 13MWT09.
6/3/06	10:00	Terry Rojahn	Start collecting ground water sample 13GWT0909 (MS/MSD).
6/3/06	10:55	Terry Rojahn	Start purge at monitoring well 13MWT28.
6/3/06	13:41	Terry Rojahn	End purge at monitoring well 13MWT28 will sample 6/04/06.
6/3/06	14:00	Terry Rojahn	Return to B-32435

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
6/3/06	14:45	Terry Rojahn	Arrive at monitoring well 13MWT51.
6/3/06	15:05	Terry Rojahn	Start purge at monitoring well 13MWT51.
6/3/06	15:45	Terry Rojahn	End purge at monitoring well 13MWT51.
6/3/06	15:50	Terry Rojahn	Start collecting ground water sample 13GWT5106.
6/3/06	16:47	Terry Rojahn	Finish clean up at monitoring well 13MWT51.
6/3/06	17:00	Terry Rojahn	Start purge at monitoring well 13MWT34.
6/3/06	18:30	Terry Rojahn	End purge at monitoring well 13MWT34.
6/3/06	18:35	Terry Rojahn	Start collecting ground water sample 13GWT3407 & FD06030601.
6/3/06	19:21	Terry Rojahn	Finish clean up at monitoring well 13MWT34.
6/3/06	19:30	Terry Rojahn	Arrive at B-3245:
6/3/06	19:50	Terry Rojahn	Prep to leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	06/04/2006	**Weather/Temp**	Mostly sunny and 70s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	6/4/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	CTO 377	**Visitors**		**Modified Date**	6/5/06
WBS Code #	TP00050125	**Status**	Archive	**Printed By**	James Goerdt
Client	SouthDiv			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/4/06	07:10	Terry Rojahn	Arrive @ B-3245:
6/4/06	08:10	Terry Rojahn	Arrive at monitoring well 13MWT31.
6/4/06	08:25	Terry Rojahn	Begin purging monitoring well 13MWT31.
6/4/06	09:35	Terry Rojahn	End purging monitoring well 13MWT31.
6/4/06	09:40	Terry Rojahn	Begin collecting ground water sample 13GWT3107.
6/4/06	10:19	Terry Rojahn	Finish clean up at monitoring well 13MWT31.
6/4/06	10:30	Terry Rojahn	Begin collecting ground water sample 13GWT3107 (purged 6/03/06).
6/4/06	11:00	Terry Rojahn	Finish clean up at monitoring well 13MWT28.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
6/4/06	11:25	Terry Rojahn	Begin purging monitoring well 13MWT17.
6/4/06	12:25	Terry Rojahn	End purging monitoring well 13MWT17.
6/4/06	12:30	Terry Rojahn	Begin collecting ground water sample 13GWT1708.
6/4/06	12:55	Terry Rojahn	Finish clean up at monitoring well 13MWT17.
6/4/06	13:10	Terry Rojahn	Begin purging monitoring well 13MWT15.
6/4/06	15:10	Terry Rojahn	End purging monitoring well 13MWT15.
6/4/06	15:28	Terry Rojahn	Begin collecting ground water sample 13GWT1508.
6/4/06	16:05	Terry Rojahn	Finish clean up at monitoring well 13MWT15.
6/4/06	16:15	Terry Rojahn	Returned to B-3245:
6/4/06	17:30	Terry Rojahn	Prep to leave B-3245 for Bloomington. SAMPLPE SUMMARY FOR THIS DATE - FINISH GROUND WATER SAAMPLING AT SWMU 12 WITH THE COLLECTION OF GROUND WATER SAMPLES AT MONITORING WELLS

			13MWT25, 17, 28 & 31.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	6/5/06	**Weather/Temp**	Mostly sunny & 70s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D. Hickey;T. Rojahn	**Created Date**	6/5/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	James Goerdt
Task/Contract #	CTO 377	**Visitors**		**Modified Date**	9/8/06
WBS Code #	TP00050125	**Status**	Archive	**Printed By**	James Goerdt
Client	SouthDiv			**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/5/06	07:00	Terry Rojahn	Arrive @ B-3245:
6/5/06	07:50	Terry Rojahn	Arrive @ Public Works - check on MFB dig permit. Talked to Mr Ryan Roberts - he thinks that all utilities been cleared, but a few signatures are needed on the permit - said to stop back at lunch time and the permit should been ready.
6/5/06	08:20	Terry Rojahn	Return to B-32435:
6/5/06	11:45	Terry Rojahn	Lunch
6/5/06	12:15	Terry Rojahn	Stop at Public Works - no one around - water wasn't signed off on as of yet.
6/5/06	12:35	Terry Rojahn	Return to B-3245:
6/5/06	13:55	Terry Rojahn	Pick up dig permit at Public Works - cancel permit request

			for SWMU 9.
6/5/06	14:20	Terry Rojahn	Arrive at SWMU 13: Collect sediment samples at locations 13SD46, 48 through 50 and 54. Sediment location 13SD47 was a catch basin/culvert w/ a concrete bottom - voil of any sediment material. Also, collect surface soil sample at location 13SB76 inside inclosed transport corridor w/ concrete floor.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
6/5/06	15:45	Terry Rojahn	Return to B-3245:
6/5/06	17:30	Terry Rojahn	Leave B-3245 for Fed Ex.
6/5/06	18:05	Terry Rojahn	Drop off rental equipment and ground water samples for shipment on the above AB#s at Fed Ex.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMUs 12 (Round 6) and 13/16 (Round 8) MNA Routine Sampling (May 2006) - CRANE NSWC

Project Information

Activity Date	6/6/06	**Weather/Temp**	Sunny, Humid & 80s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	D.Hickey;T.Rojahn	**Created Date**	6/6/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	John Wright
Task/Contract #	CTO 377			**Modified Date**	6/10/06
WBS Code #	TP00050125	**Visitors**		**Printed By**	James Goerdt
Client	SouthDiv	**Status**	Archive	**Printed Date**	2/6/07

Daily Activity

Date	Time	Author	Notes
6/6/06	07:00	Terry Rojahn	Arrive at B-3245
6/6/06	08:30	Terry Rojahn	Arrive at SWMU 13 - collected sediment samples at 13SD51 through 53 and soil samples at boring locations 13SB73, 75 and 77.
6/6/06	11:55	Terry Rojahn	Return to B-3245:
6/6/06	12:10	Terry Rojahn	Lunch at cafe
6/6/06	12:35	Terry Rojahn	Return to B-3245:
6/6/06	16:10	Terry Rojahn	Return to SWMU 13: Collected soil samples at boring locations 13SB74, and 78 through 84.
6/6/06	18:45	Terry Rojahn	Return to B-3245:
6/6/06	19:45	Terry Rojahn	Prep to leave B-3245 for Bloomington.

- End of Report -

APPENDIX D.2.1
SWMU 13
FIELD NOTEBOOK
ROUND 1

NSWC CRANE

N9060

CTO 0279

SWMU: 13 + 16

2555

DRILLING

START: 3/24/03

END:

TABLE OF CONTENTS

Subject	Page

TITLE CRANE

PROJECT NO. 9060

BOOK

Work continued from Page — SUNNY 70's

MON 3/24/03

1345 ARRIVE @ BLDG 3245. UN-PACK SUPPLIES.

1500 BOWSER MORNER ON-SITE T. BOEHMER HAS CREW UN-LOAD MATERIALS AT BLDG. 3245.

1555 T. ROBAHN STARTS W+S TRAINING W/ DRILLERS

1735 DRILLERS LEAVE SITE. WILL MEET @ BLDG 3245 @ 0700

1820 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bellmer — **DATE** 3/24/03

WITNESS — **DATE**

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page SUNNY 50's

TUES 3/25/03

0650 ARRIVE @ BLDG 3345

0700 DRILLERS SHOW UP START BULLDOZING DRILL PAD.

0735 CONDUCT R2G INSPECTION W/ DAVE S. ON THE RUTOSONIZE R26.

0800 GO TO MEETING W/ PLANT PERSONNEL TO DISCUSS ACCESS FOR 13+16.

0850 BACK @ BLDG. 3345. UNABLE TO WORK @ SUMM 16 TILL THURS. CAN SET UP @ SUMM 13 BUT NEED TO WAIT FOR UTILITY CLEARANCE 2 DAY START.

1055 FINISH WALK THRU. DRILLERS SET UP ON 13 MW 15.

1226 START DRILLING W/ 5" SAMPLE CUP TO BEDROCK.

1245 DRILLERS @ 15'. HIT SILTSTONE @ 13'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 3/25/03

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page SUNNY 60's

TUES 3/25/03

1305 DRILLERS START W/ 6" CASING

1316 DRILLERS @ 15'. SET UP TO REAM W/ 5" BIT TO 25' TO SEE IF WE HAVE A H_2O PRODUCING ZONE.

1326 START REAMING THE HOLE

1335 DOWN TO 25'. W2H FLUSH OUT HOLE AND SEE WHERE WATER COMES TO

1345 WATER UP TO 17' BGS AND STILL RISING.

1352 WL @ 17' BGS. DRILLERS TO SET WELL @ 25'

1355 START TO THUNDER + LIGHTNING. STOP DRILLING.

1506 RAIN STOPPED START SETTING WELL

1600 WELL SET @ 25' SAND TO 13' (15-W CHIPS VOL CLAY 30'. HYDRATED BENT. TO 11'-4'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

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TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page RAZOR 50's. WINDY

TUES 3/25/03

— MATERIAL USED:
GLOBAL #5 SAND
PURE GOLD MED CHIPS BENTONITE:
QUIK GROUT BENT. POWDER
- BOART LONGYEAR ASTM F480-88A
↳ PIPE + SCREEN PVC SCH 40.
SLOT SIZE .20

1610 DRILLERS PULL OFF. WILL DECON CASING BEFORE NEXT HOLE.

1621 DRILLERS SETTING UP ON: 13MW718.

1724 DOWN TO 20' CONT. SAMPLE.

1750 BACK @ BLDG. 3245 GOING OVER QUIK W/ DRILLERS

TODAY'S TOTALS:
OVB W/ SAMPLE 35'
ROCK W/O SAMPLE 10'
WELL INST. 25' 13MW715

1800 HEAD TO BLOOMINGTON GATE TO GET ANOTHER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner DATE 3/25/03
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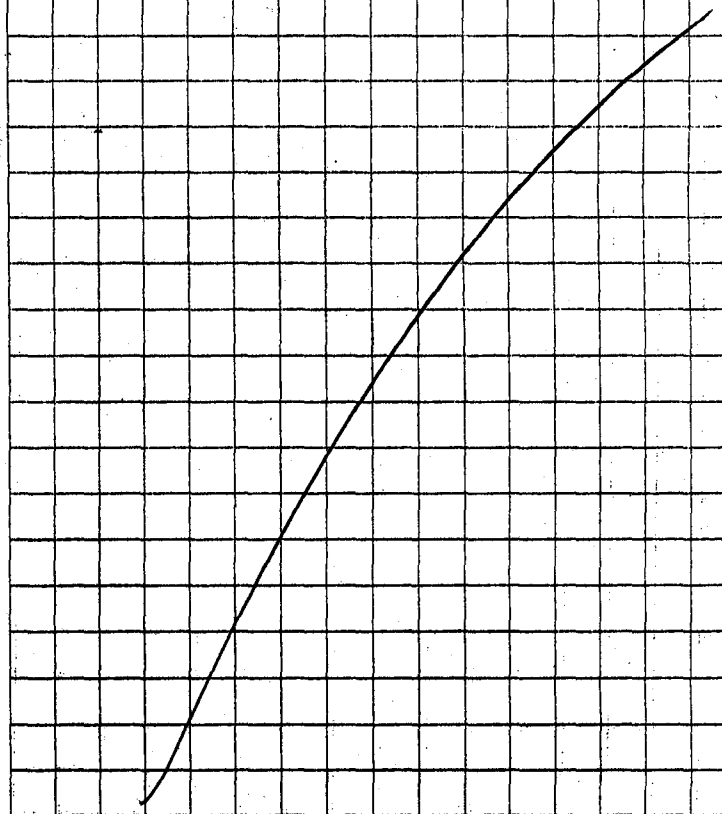
TITLE CRANE PROJECT NO. 9060
BOOK 2555

Work continued from Page

TUES 3/25/03

PASS PER DAVES

1615 LEAVE SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bulkner DATE 3/25/03
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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 3555

Work continued from Page COOL 50's + SUNNY.

WED 3/26/03

0648 ARRIVE @ GATE. VEHICLE SEARCHED BY SECURITY

0650 ARRIVE @ BLDG 3345. DAVE S. + JOHN F. INSPECT

0730 BALL @ BRAWTIS SETTING UP TO CORE.

0751 START CORING.

0804 DRILLERS CORED TO 30'. WE RUN 12:50 MINUTES WITH FLUSH OUT HOLE W/ AIR THEN BREAK UP CORE RUN.

0841 WL @ 13.0' BGS. WELL SET @ 30'. SEEMS TO BE A GOOD H20 ZONE FROM 24.5'-25' V-WET.

0848 WL @ 11.0' BGS ON 13BRWT15

0946 13BRWT18 SET @ 30' 125 gal used
SAND TO 18'
BENT CHIPS TO 16'
VOLCLAY TO 3'

0946 DRILL STUCK. DAVE S. CALLS T. BOEHMER

Work continued to Page

SIGNATURE Robert Balkenee DATE 3/26/03

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 3555

Work continued from Page 60's + BREEZY

WED 3/26/03

WILL TRY TO GET A BACK HOE OR TWO TRUCK OUT.

1000 NEED TO GET A DOZER OUT TO THE SITE. A 4,000 LB A DAY UNDER SITE. DAVE S. WILL COORDINATE AND HAVE ONE DELIVERED TO THE SITE.

1030 TOLD T. ROJAHN ABOUT SITUATION. WILL WORK W/ M. COCHRAN + CONTINUE W/ ODT

1047 M. COCHRAN AGREES THAT WE SHOULD HAVE THE DRILLERS SEND A DOZER TO THE SITE.

1050 WE HEAD BACK TO BLDG 3345 TO SEE IF PUBLIC WORKS CAN SEND OUT A WRECKER TO PULL US OUT.

1100 M. COCHRAN TALKS W/ CHRIS A WRECKER WILL BE SENT TO MINE FIELD.

1115 ARRIVE @ MINE FIELD B. SECURITY SAYS WE NEEDED WRECKER. GO TO TRACK DOWN.

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TITLE CRANE **PROJECT NO.** 9060

BOOK 2555

Work continued from Page Sunny 60's.

WED 3/26/03

1130 Cut @ base while we have wrecker ready after lunch

1230 Wrecker on-site.

1320 Sampled 135807 0002 w/ M.E.

1330 Sampled 135807 0810 w/ M.E.

1335 Back w/ Sonic Rig. Steel stuck

1425 Rig unstuck

1433 Drillers Decon Equip

1448 Drillers set up on BMW T17.

1520 Drillers stop they need to help Opt Rig.

1535 Drillers back. Start Drilling.

1550 Drilled to 8' w/ 6" 5' from 8'-18' Flush out hole

Work continued to Page

SIGNATURE Robert Balkovec DATE 3/26/03

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TITLE CRANE **PROJECT NO.** 9060

BOOK 2555

Work continued from Page

WED 3/26/03

1558 Water to 11' will install well @ 18'.

1627 Well set @ 18' w 130 gal used
Sand to 6'
Bent chips to 3'
Vol calc to — NA —

1630 Well set @ 17.5' some collapse.

1636 Drillers pull off + head to Decon.

1656 Drilling Totals.

Cuts w/ sampling 15'
Rock drilling w/o sample 3'
Rock coring 10'
Well installation 47.5'

1700 Back @ 3245 w/ Dave S.

1735 Drillers leave site

1740 Leave site to get gas (End of Day)

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SIGNATURE Robert Balkovec DATE 3/26/03

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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page — Cool 40's - Sunny

THURS 3/27/03

0640 ARRIVE @ GATE

0650 ARRIVE @ BLDG 3345 CH P2O3

0705 DRILLERS ARRIVE ON SITE.

0740 ARRIVE @ SUMMIT B. DRILLERS NEED TO FINISH DECON. RAN OUT OF WATER YESTERDAY.

0745 @ B3MWT17 WL = 6.7

0800 SET UP ON B3MWT16. HAVE DRILLERS BLOW DOWN TO 15' BASED ON B3MWT17.

0802 RIG DOWN. DRILLERS HEAR SOMETHING FUNNY W/ THE RIG.

0812 RIG BACK UP. DRILLERS PROBE GREASE TO THE DRIVE SHAFT.

0817 START DRILLING. USING 6" CASING.

0836 DRILLERS DOWN 15' WILL START TO SET WELL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balkan — DATE 3/27/03
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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page — WARM 60's - SUNNY

THURS 3/27/03

0902 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO NEED FOR VOL CLAY DUE TO SHALLOW DEPTH.
* HARDER DRILLING @ 13'

0913 DRILLERS PULL OFF AND SET UP ON B3MWT12

0934 HIT ROCK @ 7'. WEATHERED S.S. CORED TO 10' WILL SET S.S @ 10'

1014 CORED TO 15' 10-14.5' HAVE WET SEDIMENT ~~GUNCKING~~ FLUSHED OUT HOLE

1025 WATER @ 11' BGS WILL DRILL TO 20' AND SET WELL

1050 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 4'
WILL NOT USE VOL. CLAY. -

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balkan — DATE 3/27/03
WITNESS — DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page WARM 70° SUNNY

THURS 3/27/03

1100 DRILLERS PULL OUT + HEAD TO DECEW.

1219 DRILLERS @ BLDG 3245 FILLING UP W/ WATER

1245 BACK @ SUNNY 13.

1300 DRILLERS SETTING UP ON 13 NW T10.

1314 REFUSAL @ 3' HIT CONCRETE.

1320 OFFSET A 2ND TIME + HIT CONCRETE

1328 OFFSET A 3RD TIME

1337 DOWN TO 5'.

1414 DOWN TO 15' PUSS. SAT @ 12-12.5' WILL SIT FOR A HALF HOUR TO SEE IF WATER COMES IN.

1432 HOLE STILL DRY. DOZER STARTS UP ON-SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltrus DATE 3/27/03

WITNESS DATE

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page WARM 70S

THURS 3/27/03

1442 HOLE IS DRY. WILL SEND 6" TO 15' THEN 5' REAM TO 20'.

1520 REAMED 15'-20' WL @ 14' AFTER FLUSH

1530 REAMED 20'-25' WL @ 14.2 AFTER FLUSH WILL SET WELL @ 25'

1620 WELL SET @ 25' SAND TO 13' BENT CHIPS TO 11' VOL MIX TO 2'

1625 DRILLERS NEED TO DECEW.

1700 DRILLERS @ BLDG 3245. GO OVER DAILY ACTIVITIES.

1730 DRILLERS LEAVE SITE

1750 LEAVE FOR FED-EX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltrus DATE 3/27/03

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13

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page Cool 50's V. Windy Some Clouds

FRI. 3/28/03

0640 ARRIVE @ FRANK GATE

0650 ARRIVE @ BLDG 3245 CAL P-70's

0715 DRILLERS ON SITE, LOADING UP WELL SUPPLIES.

0725 HEAD TO SWMU 13.

0730 BATTERY DEAD ON RIG.

0755 DRILLERS SETTING UP ON 13MWT22.

0839 4" SAMPLERS TO 15' NX @ 6'. APPEARS TO BE A COLD ZONE FROM 60'-5' POSSIBLE WATER. WILL LET HOLE SET TO SEE IF WATER COMES IN.

0849 WATER @ 14' BGS. WILL HAVE DRILLERS SET 6" TO 7' AND REAM 5" TO 15'. (7'-15')

0911 BLEW OUT HOLE TWICE WL=13' BGS WILL SET WELL @ 15'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page 50's Cloudy & V. Windy

FRI. 3/28/03

0934 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO VOL CLAY -

0953 WILL SET UP ON 13MWT11 [redacted] BLOW DOWN TO 15' - SET WELL BASED ON 13MWT12 T.D 20' WL @ 7.1' BGS 13MWT16 T.D 15' WL @ 7.0' BGS

1000 SET UP ON 13MWT11 DRILLERS TO SET 6" TO 5' THEN 5" REAM TO 15'.

1004 START W/ 6"

1008 DOWN TO 5'. START W/ 5" REAM

1017 DOWN TO 15'. DRILLERS FLUSH OUT HOLE.

1040 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
- NO VOL CLAY -

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TITLE CRANE **PROJECT NO.** 9060
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Work continued from Page V. WTHDR 20 DEGREES 67°

FRI 3/28/03

1050 SET UP ON 13MW T24.
WILL REAM W/ 5" TO 15' AND SET WELL
BASED ON 13MW T17 WL = 10.1' BGS

1105 REAMED TO 15'. WILL FLUSH OUT HOLE.

1120 WELL INSTALLED @ 15'
SAND TO 4'
BENT. CHIPS TO 2'
DRILLER TELLS ME HE LOST MUD CIRCULATION @ 14'-15'. SHOULD BE GOOD PRODUCER

1127 DRILLERS HEAD TO DECON.

1135 BREAK FOR LUNCH

1200 BACK @ BLDG 3345 DOING PAPERWORK

1240 BACK @ SWMU 13 DRILLERS DECON R26.

1255 SET UP ON 13MW T25.

1323 DOWN TO 14'. WILL REAM W/ 4" CASING.
POSSIBLE STRUCTURE @ 8' WILL 5" REAM

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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FRI 3/28/03

TO 15' & FLUSH OUT HOLE.

1338 WL @ 13' BGS WILL LET SET TO SEE IF MORE COMES IN NOT SURE IF BLOW OUT REMOVED ALL OF THE DRILLING WATER

1406 WATER @ 13.25' AND RISING. WILL SET WELL TO SCREEN THE 8' WET ZONE.
SUSPECT IT WILL PRODUCE.

1417 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'

1435 CHECKED ON 13MW T32. WL = 10.0' BGS
DRILLERS WILL SET UP ON 13MW T26.

1447 DRILLERS SET UP ON 13MW T26
WILL SAMPLE OVB TO 10' THEN CORE TO 20'

1455 STAFF IN OVB @ 16' WILL GO TO 15' W/ 4" CASING

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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FRI 3/28/03

1553 DOWN TO 20' FLUSHED OUT HOLE.
WL @ 14' AND RISING WELL SET WELL.

1600 WELLSET @ 20'
SAND TO 8'
BENT CHIPS TO 3'
VOLCLAY TO -NA+

1610 STARTING TO THUNDER + LIGHTNING.

1658 DRILLING TOOLS

49' OF OVB + ROCK SAMPLING (5' RUN)
14' OVB NS
17' ROCK NS
80' WELLHOST
3 SANDBY
1 DAK DOZER

GO OVER DAILY W/ DAVE S.

1705 DRILLERS OFF SITE.

1730 LEAVE FOR FED-EX.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 3/28/03
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TITLE CRANE **PROJECT NO.** 9060
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Work continued from Page COULD 30's + OVERCAST

SAT 3/29/03

0650 ARRIVE @ SITE

0705 DRILLERS ON-SITE.

0730 LEAVE FOR SUMMIT B. DRILLERS STILL NEED TO DECON

0750 CHECK W/ MONTANA KUNESNER BLDG 165 SUPERVISOR

0800 D&L SET UP ON BMW107

0846 OVB TO 5' CORE 5'-15'
WELL @ 8' WILL SET 15' WELL

0900 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'
-NO VOLCLAY.
WILL SET UP ON BMW7
AND BLOW DOWN TO 16' & SET WELL

0917 SET UP ON BMW105 BLOW TWELVE FROM

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

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SAT 3/29/03

13MWT05 WILL SET WELL @ 16'.

0435 WELL SET @ 16'
SAND TO 4'
BENT CHAPS TO 2'

0455 DRILLERS HEAD OVER TO BLDG. 3245 TO GET WATER TRUCK.

1024 SET UP ON 13MWT02.

1152 OVB TO 17' RUN CASE TO 17'
FLUSH OUT HOLE AND LET SET.

1355 WL = 16.7' BGS .3' FEET OF WATER.
WILL GO DEEPER.

1452 DOWN TO 27'. LAST RUN HAD HYDRAULIC FRACTURED SHALE @ 23'. (WATER-BEDDED)
LOOKS LIKE A GOOD PRODUCING ZONE.
W.L @ 23' BGS AFTER FLUSH OUT
WELL SET WELL.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page Clear 48° Clear

SAT. 3/29/03

1543 WELL SET @ 27'
SAND TO 15'
BENT CHAPS TO 13'
VOL CLAY TO 4'

1550 DRILLERS HEAD TO DECON.

1630 DECON FINISHED DRILLERS WASH WATER INTO RIG. DRILLERS WILL TRY TO SET THE RIG UP ON 13MWT08 WITH ACCESS.

1636 RAINING.

1654 RIG STUCK. DRILLERS GET DOZER.

1758 RIG SET-UP ON 13MWT08 HAD TO MOVE 2160' TOWARDS BLDG 165 DUE TO MUDDY CONDITIONS

1757 HEAD TO BLDG. 3245 TO GO OVER DAILY ACTIVITIES. & FILL UP W/ WATER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Bellhouse DATE 3/29/03

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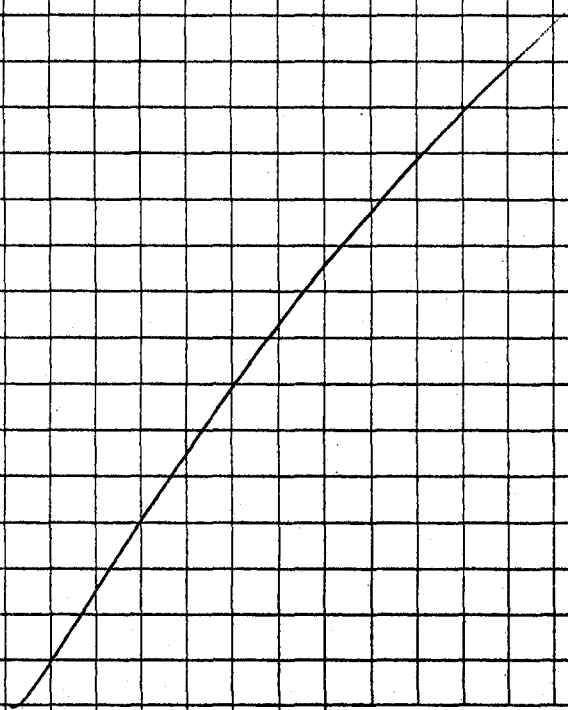
TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

SAT 3/29/03

1900 DRILLERS LEAVE SITE

1900 LEAVE SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 3/29/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page WIND 31°

SUN 3/30/03

0655 ARRIVE @ SITE

0700 DRILLERS ON-SITE FILLING UP DECON TANK

0735 START DRILLING ON 13MW108

0755 DOWN TO 10' POSS SAT @ 8' WELL TO 10'

0811 DOWN TO 15' W/4" SAMPLER. WET ALONG TWO SIDES OF THE HOLE WELL SET 6' TO 5' THEN REAM (5") 5'-15'.

0830 DOWN TO 15'. DRILLER LOSING WATER FLUSHED HOLE. WL 2 9' BGS. WELL SET WELL

0910 WELL SET @ 15'.
SAND TO 4'
BENT CHIPS TO 2'

0924 DRILLERS SET UP ON 13MW104.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 3/30/03

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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page CONT BD'S. V-WAY

SUN 3/30/03

0930 START DRILLING.

0945 DOWN TO 8'. HIT REFUSAL WELL SET 6" @ 5' RETURN ABOVE POSS. SATURATION @ 7-7.5'.

1030 PULL TO 15' W/ 5" WELL FLUSH OUT HOLE. WATER @ 15' AND RISING WELL SET WELL @ 15'

1017 WELL SET @ 15'
SAND TO 4'
BENT CHIPS TO 2'

1030 DRILLERS HEAD TO DEGEN RIG.

1120 SETUP ON B1MW101
CHECKED WL ON B1MW102 WL= 22' BGS.

1150 DOWN TO 40'- DIFFERENT LITH. THAN B1MW102- POSS MOZEMBIQUE @ 8'. HOLE COLLAPSED TO 6' DRILLERS WILL OPEN HOLE BACK UP & LET SET TO SEE IF THE WEATHERED S.S WELL MAKE WATER.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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TITLE CRANE **PROJECT NO.** 9060
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Work continued from Page CONT WD'S

SUN 3/30/03

1200 DRILLERS TAKE A BREAK. HOLE OPEN TO 10'. WILL LET SET TO SEE IF WATER COMES UP.

1254 WATER @ 6.5' BGS. WILL SET WELL @ 15'.

1335 WELL SET @ 15'
SAND TO [redacted] 3'
BENT CHIPS TO [redacted] 1'

1340 PULL OFF. WILL DRIVE OVER AND DECON TOOLING

1410 DRILLERS TRYING TO SET UP ON B1MW103.

1423 NOT BACK FAR ENOUGH OFF OF THE WATER LINE. RIG STUCK.

1510 RIG PULLED OUT. WILL INSTALL WELL NEAR THE ROAD.

1512 WILL SEND 5" TO 15'. BASED ON B1MW101 DETAILS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SMW 3/30/03

1540 WELL SET @ 15'
SAND TO 3'
BENT TO 1'
- DRILLERS CLEAN UP. HEAD OVER TO DEGEN. PLAN TO MOB DOZER OUT OF FENCED AREA.

1728 DOZER + R26 SET-UP ON 13 MW-14.

1740 HEAD TO BLDG 3245.

1800 DRILLERS LEAVE SITE.

1830 LEAVE SITE. NEED TO FUEL UP VEHICLES

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkovec DATE 3/30/03

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page CONT HAZWOPER

MWH 3/31/03

0655 ARRIVE @ BLDG. 3245

0700 DRILLERS ON SITE.

0750 BACK @ 13MW-14.

0852 DOWN TO 17.5' RETRIEVE POSS. WATER @ 9' BGS WELL LET HOLE SIT TO SEE IF WATER COMES IN.

0912 WATER COMING IN THE HOLE. M-SCRAPE CAME UP WET, 2.1' WATER. SCRAPED THE SIDE WALLS 2.8' OF SATURATION ALONG THE SIDE WALLS.

0948 TALKED W/ M. COCHRAN. REGARDING THE PLACEMENT OF 13MW-14. HE SUGGESTS CASING 5' MORE FEET THEN PULLING OFF THE HOLE. DRILLERS TO BEGIN 17.5 - 23'.

1023 DOWN TO 23'. FLUSHED OUT HOLE. WATER LEVEL @ 20' AND RISING. WILL SET WELL @ 23'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkovec DATE 3/31/03

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TITLE NSWC CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page Cont 27° + Sunny

MON 3/31/03

1050 Well set @ 23'
Sand to 11'
Bent chips to 9'
[redacted] Vol clay. to 2'.

1120 Clean up + break

1230 Set up on 13MWT19.

1252 Down to 9'. Hard @ 8'-9'. Will core the rest.

1426 Down to 19'. WL @ 17' after flush out. Will install @ 19' to screen possible saturation @ 13'.

1500 Well set @ 19'
Sand to 7'
Bent chips to 2'

1530 Pulled out rig. Drillers head to Detwn

1640 Drillers take rig over and try to set up on 13MWT13.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 3/31/03
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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page

MON 3/31/03

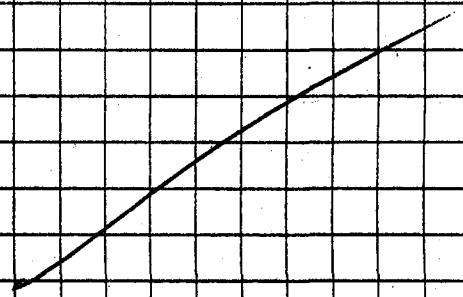
1615 Rig Stuck.

1650 Rig out. M. Cochran re-set 13MWT13 Tuesday the road T. Rottman needs to clear utilities before we continue.

1700 Drillers go over and drop off Rig.

1736 Head to Bldg. 3245 to go over daily activities

1815 Leave Site. Drillers leave site



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 3/31/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page — WARM 50's - WIND.

TUES 4/1/03

0655 ARRIVE @ SITE.

0705 DRILLERS ON-SITE

0720 LOU W/ M-CARRON TO TALK ABOUT LOCATION FOR 13MW103 + 13MW104. 13MW103 MOVED TOWARDS THE ROAD. T. ROSMANN NEEDS TO CONTACT PUBLIC WORKS.

0750 @ 13MW104 LOCATION. WILL NEED TO USE THE DOZER. M-CARRON WILL HELP.

0813 START DRILLING @ 13MW104

0850 DOWN TO 15'. WATER COMING IN. WILL WAIT TO SEE WHERE WATER COMES IN.

0909 WATER LEVEL @ 13.3' BLS

0925 DOWN TO 20'. WILL SET WELL + SATURATION THE 13' SATURATION

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balthaser — DATE 4/1/03

WITNESS — DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page

TUES 4/1/03

0937 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 7'

0943 DRILLERS HEAD TO DECON.

1007 DRILLERS SETTING UP ON 13MW109.

1040 DOWN TO 20'. LOGGED CUTTINGS. WILL SET WELL @ 20'. BASED ON 13MW110. + LITHOLOGY SEEN @ 13MW114.

1050 WELL SET @ 20'
SAND TO 8'
BENT CHIPS TO 7'
WL ON 13MW110 = 14.5' BLS

1104 DRILLERS PULL OUT RIG. WILL CLEAN UP + SET UP ON 13MW123.

1215 DRILLERS SET UP ON 13MW123.

1312 SAMPLED TO 22'. WATER @ 16'?
2.5' OF WATER IN HOLE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balthaser — DATE 4/1/03

WITNESS — DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

TWES 4/1/03

1320 WELL SET @ 21.5'
SAND TO 4.5'
BENT TO 7.5' WORK TO 2'.

1337 SET UP ON B7MWT24
WILL SET WELL @ 22' BASED ON
B7MWT23 + B7MWT26. W.L @ B7MWT26
=14.8 BLS.

1345. START DRILLING

1410 DOWN TO 22'. CUTTINGS ARE LOOKING
SIMILAR TO BOTH T26 + T23.
W/L @ 19' AFTER BLOW OUT WELL
SET WELL.

1420 WELL SET @ 22'
SAND TO 10'
BENT TO 2'
PULL OFF + DECON.

1425 T. BRENT + CHRIS ON-SITE.
SHOW THEM FINISHED WELLS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/1/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

TWES 4/1/03

1443 T. BRENT + CHRIS LEAVE SITE

1500 DRILLERS FINISHED DECON. HEAD
TO BLDG 3245

1610 DRILLERS LEAVE SITE.

1730 LEAVE FOR FEDEX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/1/03
WITNESS DATE

TITLE CRANE

PROJECT NO. 9060

BOOK 2555

Work continued from Page

WED 4/8/03

0700 ARRIVE @ SITE

0930 LEAVE FOR FED EX. 1400 FLIGHT

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

WITNESS

DATE 4/8/03

DATE

TITLE CRANE

PROJECT NO. 9060

BOOK 2555

Work continued from Page

COOL 50° & OVERCAST

MON 4/7/03

0730 ARRIVE @ SITE

0810 DRILLERS ON-SITE OILING RODS.

1500 RECEIVED GO AHEAD FROM PW. TALKED W/ MR. KLUESNER @ BLDG. 165 O.K. TO START @ 1630 ON B-MW-06. JUST NEED TO CHECK IN @ 1630 FIRST.

1600 DRILLERS RUNNING UP EQUIPMENT.

1700 SET UP ON B-MW-06 AFTER TALKING W/ MARTIN K. DRILLERS ALLOWED TO KEEP OILING ALSO.

1729 DOWN TO 15'. POSSIBLE SATURATION @ 6.5'. WILL SET WELL @ 15'.

1800 DRILLERS OVER @ DERM. DOZER WARMED UP B-MW-06 SET @ 15'

SAND TO 3'

BENT TO 1'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill

WITNESS

DATE 4/7/03

DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2355

Work continued from Page Cont. 50's - Overcast

MON 4/7/03

1830 @ Block 3245 Talking w/ Dave S. of B.M.

1840 Drivers off-site

1910 Leave Site

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 4/7/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2355

Work continued from Page Cont. 40's

TUES 4/8/03

0720 Arrive @ Block 3245 Cut D.D.

0725 Drivers All on-site.

0730 Head to Swmu 13. Will set up on 13mw T13.

0740 Surveyors on-site. Direct them to Block 3245.

0830 Drivers unable to set up on 13mw T13 will need to re-locate or block traffic @ Night to set well. Will head to Block 3245 to see about getting into Swmu 16.

1000 @ Swmu 16. Drivers setting up on 16mw T01 Talked w/ Matt Cushman regarding the movement of 13mw T13. He suggests that we move mw closer to the road. If not, we may eliminate.

1030 Start drilling @ 16mw T01.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Bulkner DATE 4/8/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page — COLD 40's - OVERCAST.

TUES 4/8/03

1147 @ 19' WELL FLUSH OUT HOLE + BREAK FOR LUNCH.

1300 BACK @ 3245 NEED TO TALK W/ T. BRENT ABOUT RECENT SWMU 13 ISSUES RETARDING ACCESS AND NO-WORK ZONES

1330 BACK @ SWMU 16. W/L @ 16MW104 = 16.9' BGS. WELL CURB 5 MORE FEET.

1331 RIG DOWN. ELECTRICAL PROBLEMS.

1344 BACKUP + RUNNING. WELL CURB TO 24'.

1400 WELL WELL BE SET @ 24'

1420 WELL SET @ 24'
SAND TO 12'
BENT. CHIPS TO 11'
VOL CLAY - 4'

1430 HEAD OVER TO DESIGN

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Bellmore
WITNESS

DATE 4/8/03
DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page

TUES 4/8/03

1510 BACK @ SWMU 16
NEED TO MOVE 2 DUMPSTERS IN ORDER TO SET UP ON 16MW104.

1528 RIG SET UP ON 16MW104.

1530 START DRILLING.

1535 HIT ROCK @ 4'. REFUSAL @ 5'

1637 DOWN 20'. FLUSHED OUT HOLE. WILL SEE WHERE WATER COMES TO OVERNIGHT

1645 BACK @ BASE 3245. GO OVER DAILY W/ DRILLERS

1710 DRILLERS OFF-SITE

1715 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Bellmore
WITNESS

DATE 4/8/03
DATE

TITLE CRANE — **PROJECT NO.** 9060 — **BOOK** 2555

Work continued from Page — CRANE 30'S UNDERCUT

WED 4/9/03

0700 ARRIVE @ SITE. DRILLERS ON-SITE UX P.J.D

0738 BACK @ 16MW-WH. WL IN HOLE @ 15' BGS WILL REAM TO 35' & SET WELL. VERY RAINY LIMIT TO MAKE SURE THE WELL WILL PRODUCE IN DRY SEASON.

0829 WELL SET @ 25'
SAND TO 13'
BENT CHIPS TO 12'
VOL CUK TO 2'.

0845 DRILLERS HEAD TO DEGUSSA

START COLLECTING SOIL SAMPLES W/ T. RUSSELL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Bultman — DATE 4/9/03

WITNESS — DATE

TITLE CRANE — **PROJECT NO.** 9060 — **BOOK** 2555

Work continued from Page

WED. 4/9/03

1120 DRILLERS DRIVE TO 4' @ 16MW-WH
BREAK FOR LUNCH

1300 BACK @ 16MW-05.

1330 CHECKED WL FOR 14-05-83 = 30.65' BGS & 14-01-83 : 28.5' BGS. BOTH WELLS SET @ 45'.

1431 DRIVE TO 40'. WELL SET WELL THERE BASED ON NEARBY WELLS.

1510 WELL SET @ [redacted] 39'
SAND TO 28'
BENT CHIPS TO 25'
VOL-CUK TO 2'

1515 HEAD TO BLDG. 3345 TO DEGUSSA DISCUSS THE INSTALLATION OF 13MW-13. WILL HAVE TO INSTALL IT ON SUNDAY.

1625 SET UP RIG ON 16MW-03. WILL DRILL TOMORROW.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Bultman — DATE 4/9/03

WITNESS — DATE

TITLE CRANE

PROJECT NO. 9066

BOOK 2555

Work continued from Page

WED 4/9/03

1655 LET DRILLERS IN @ SWMW 13. CHECKED IN W/ THE GUARD. WILL BE ABLE TO ACCESS RESTRICTED AREA @ 1730. T. RUSHIN WANTS ME TO HANG AROUND UNTIL DRILLERS LEAVE. DRILLERS WORK ON LINES OUTSIDE BUFFER ZONE.

1730 GRANTED ACCESS INSIDE BUFFER ZONE. DRILLERS START DIGGING PADS

1905 2 MORE PADS TO DIG.

1940 DRILLERS FINISH LAST PADS.

2000 LEAVE SITE. WILL TAKE CARE OF PAPERWORK TOMORROW. SWMW 13 SECURED

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Baltrusis **DATE** 4/9/03

WITNESS **DATE**

TITLE CRANE

PROJECT NO. 9066

BOOK 2555

Work continued from Page

WED 30° & SUNNY

THURS 4/10/03

0740 ARRIVE ON-SITE.

0750 DISCUSS POSSIBILITY OF USING A TRACK RIG TO INSTALL 13MW713. M. GOEMANN WILL COORDINATE W/ J. NOSOWSKI OF BUNSER MURINER.

0805 SET UP ON 16MW703 PREVIOUSLY SAMPLED TO 3' W/ 16SB36. DRILLERS SETTING WATER TUB.

0940 DOWN TO 29'. LOOKS WET AROUND 20' WILL CORE TO 34'.

0943 DOWN TO 34'. FLUSH OUT HOLE

1023 WELL SET @ 35'
SAND TO 23'
BENT. CHIPS TO 20'
VOL CLAY TO 2'
*DRILLER OVERDRILLED A FOOT BY MISTAKE. DURING CLEAN OUT OF HOLE.

1040 PULL OFF & HEAD TO DECON.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Baltrusis **DATE** 4/10/03

WITNESS **DATE**

TITLE CRANE

PROJECT NO. 4060

BOOK 2555

Work continued from Page 55° + SUNNY

THURS 4/10/03

0700 CEMENT TRUCK ARRIVES @ SWIMM 13. DRILLERS WILL START W/ 13 AND T300 AND WORK BACK TOWARDS THE SOUTH GATE

1406 DAVE S. OFFSITE TO MEET W/ GUNBAL SUPPLY TRUCK.

1420 T. BRENT + C. FREEMAN ON-SITE TO CHECK ON THINGS. WANTED TO KNOW IF WE HAD PROBLEMS W/ CONCRETE TRUCK GETTING INTO SWIMM 13.

1433 T. BRENT + C. FREEMAN OFF-SITE.

1500 FINISHED ACCESSIBLE PADS. WILL TRY TO POUR THE 2 BY THE BUS STOP OUTSIDE OF SWIMM 13.

1515 HEAD OUTSIDE TO POUR THE LAST TWO PADS.

1760 BACK @ BLDG 3346. GO OVER DAILY ACTIVITIES W/ DOTTIE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belknap **DATE** 4/10/03

WITNESS **DATE**

TITLE CRANE,

PROJECT NO. 4060

BOOK 2555

Work continued from Page

THURS 4/10/03

1720 LEAVE FOR ROD EX.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Belknap **DATE** 4/10/03

WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

FRI 4/4/03

0700 ARRIVE @ SITE

0710 DRILLERS ON SITE.

0743 @ SWMU16.

0755 SET UP ON 16MW02. W.L @ 16MW03 =25' BGS.

0819 DOWN TO 13' WET @ 2' 10.5'

0838 DOWN TO 16' WATER LEVEL @ 16'.863 YOU CAN HEAR WATER RUNNING INTO THE HOLE. WILL SET WELL @ 16' TO STRADDLE THE 10' WET ZONE.

0854 WELL SET @ 16'
SAND TO 6'
BENT CHIPS TO 2'

0903 DRILLERS PULL OUT + HEAD TO DEION. THEY WILL MOB BOBCAT BACK TO SWMU16 TO FINISH DRILLING PADS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkema **DATE** 4/4/03
WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

FRI 4/11/03

1000 BEAR UP TO DEVELOP W/ TROJAHN

1815 LEAVE SITE. DRILLERS LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkema **DATE** 4/11/03
WITNESS **DATE**

TITLE CRANE PROJECT NO. 4060
BOOK 2555

Work continued from Page Cool 45° Sunny

SAT. 4/19/03

0635 Arrive on-site

0640 Drillers on-site Concrete truck supposed to show up @ 0700 to pour pads @ SWMU 13.

0650 Drillers go to meet concrete truck. will develop w/ T. Rozhan Refer to logbook 1363 for development details

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltimore DATE 4/19/03
WITNESS DATE

TITLE CRANE PROJECT NO. 4060
BOOK 2555

Work continued from Page Cloudy 40's

TUES 4/22/03

0650 Arrive @ site. Gear up to collect GW samples

0755 Set up on 16MW701 to start sampling

0800 Start sampling 1

0807 Well dry only able to collect 4 VOCs.

0820 Set up on 16MW702

0828 Start Pumping

0946 Sampled @ 16GW702.

1230 Set up on 16MW704.

1243 Start Pumping

1437 Sampled 16GW704.

1612 [illegible] 16MW701 Dry Leave for

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltimore DATE 4/22/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page

TUES 4/22/03

BLDG 3245.

1720 CHECK CALIBRATION FOR YSI

1730 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill **DATE** 4/22/03

WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page COND 35°

WED. 4/23/03

0630 ARRIVE @ SITE. DENNY UNABLE TO MAKE IT TODAY. WILL ARRIVE ON-SITE TOMORROW.

0700 HEAD

0720 SET UP ON WES. 14-4-83

0723 START PUMPING

0811 START SAMPLING 16MW0401

0430 HEAD TO BLDG. 3245 TO PROCESS SAMPLES DRILLERS SHOULD BE ON-SITE @ 1000.

1020 DRILLERS ARRIVE ON-SITE
JOHN KEEFER
CHAD MAHAFFY
DENNIS SHAW
GO OVER JHA + CONDUCT RIG INSPECTION.

1100 DRILLERS BREAK FOR LUNCH.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill **DATE** 4/23/03

WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page SWING - 60°

WED 4/23/03

1216 DRILLERS BACK + FINISH DECON. HEAD TO SWAMP. WILL SET UP ON 13MWT13.

1230 SET UP ON 13MWT13. WILL SPLIT SPOON TO REFUSAL THEN ROLLER BIT.

1238 START DRILLING

1336 WATER @ 10'. HIT SPOON REFUSAL @ 13' WILL DRILL TO 18' + SET WELL

1350 ADVANCED TO 19' WILL SET WELL @ 18'.

1500 WELL SET @ 18' SAND TO 6' BENT TO 2' 6" HOLE 0-19'

1510 DRILLERS CLEAN UP + START TO DRIVE OUT PAD.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltzer DATE 4/23/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page

WED 4/23/03

1600 DRILLERS OFF-SITE

1630 HEAD FOR FEDEX + GAS FOR VEHICLE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Baltzer DATE 4/23/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page Cover 4W'S

THURS 4/24/03

0630 ARRIVE. TO MEET W/ DENNY TO OFF-LOAD HWY

0900 ARRIVE BACK @ BUDA 3 HRS
T. JOHNSTON WANTS TO REINSTALL 16MWTW1

0930 TALK W/ T. BOEHMER. WILL AGREE TO SEND MORE SUPPLIES DOWN FOR AN ADDITIONAL 6.5 HR FOR 8 HOURS.

1000 HEAD TO SWAMP 16. TO SET UP ON 16MWTW1B REDRILL

1034 DRILLERS SET UP ON 16MWTW1B

1040 SET UP ON WES 14-02-83

1041 START PUMPING NEED 8.5 L FOR 1 VOL

1055 CHECKED ON DRILLERS DOWN TO 17' W/ HSA. WERE DRILLING AROUND 9'.

1122 DRILLERS DOWN TO 23'
HIT WATER @ 9' THEN DRY AFTER AROUND 16'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Boehmer DATE 4/24/03

WITNESS DATE

54

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page SO'S SLIGHT DRIZZLE

THURS 4/24/03

1130 DRILLERS BREAK

1201 START SAMPLING 16MWTW1 16MWTW1 0 201.

1240 DRILLERS BACK. WILL CLEAN OUT HOLE & WAIT FOR MORE AUGER FLIGHTS

1330 HOLE OPEN TO 23'.
WATER 5' BGS. NOT SURE WHY 1ST 16MWTW1 IS DRY.

1345 FINISHED SAMPLING

1430 SET UP ON WES-14-03-83

1433 START PUMPING

1510 TALKED W/ JOHNSTON HE WANTS TO SET REDRILL 16MWTW1 @ 24'.

1515 DRILLERS ANCHORED TO 25' W/ 4-25' AUGERS W/ 2 SET WELL @ 25' TO STRADDLE (16S-17)

1630 WELL SET @ 25'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Boehmer DATE 4/24/03

WITNESS DATE

55

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page

THURS 4/24/03

SAND TO 13'
BENT TO 4'
- CHIPS TO 11'
- VOLCLAY TO 4'

1632 START SAMPLING VBMW0301.

1719 DRILLERS HEAD OVER TO BLDG 3345 TO CLEAN UP. T. RUSHIN GOES OVER TO VBMW101 REGROUT TO FIGURE OUT HOW BIG A PAD WE CAN INSTALL

1834 CLEAN UP + HEAD TO BLDG 3345-

1910 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balhuse DATE 4/24/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page 403 - RAZORBACK.

FRI 4/25/03

0630 ARRIVE @ SITE.

0720 HEAD FOR SWMU 13.

0850 SET UP ON BMW736

0804 START PUMPING

1122 SAMPLING 13BMW736DUP

1105 SET UP ON 13MW735

1110 START PUMPING.

1157 WELL PUMPED DOWN TO TURBINE INTAKE 3.75L PUMPED OUT 7L+ 1 vol. WELL LOWER TURBINE AND PUMP OUT WELL. WELL DID NOT STABILIZE.

1210 WELL DRY - REMOVED 3.75L + 2 vols. WILL MOVE ON TO BMW731.

1230 SET UP ON 13MW731

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balhuse DATE 4/25/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060 **BOOK** 2555

Work continued from Page 50' + RAIN

FQ2 4/25/03

1237 START PUMPING.

1346 START SAMPLING 13GWT21D1
COLLECT DUP FD04250301

1458 FINISHED SAMPLING

1730 HEAD TO FEDEX

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Robert Balkwill DATE 4/25/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060 **BOOK** 2555

Work continued from Page WARMING UP'S

SKY 4/26/03

0630 ARRIVE @ SITE. LOAD UP TO SAMPLE @ SWMU 13.

0718 BACK @ 13MWT25.
WL = 17.31' TD 18.02'
ORIGINAL WL = 14.76 22% RECOVERY
≥ 438 ml TO WELL.
WAIT TILL 800 AND RE-CHECK

0740 SETUP ON 13MWT03

0745 START PUMPING

0855 REMOVED WQ PARAMETERS NOT STABLE

1145 HAD TO PUMP FOR 4 HRS WELL NOT STABLE WITHIN 10%

1146 START SAMPLING 13GWT03D1

1236 END SAMPLING HEAD OVER TO 13MWT25 TO CHECK ON WL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/26/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page — Warm 703

SAT 4/26/03

1228 WL @ 17.24' .07' RISE IN 5 HRS + 10 MIN.

1230 START SAMPLING FOR EXPLOSIVES.

1232 WELDOK FILLED 2 1/2 L.
WELL HEAD TO 13MWT02

1246 START PUMPING ON 13MWT02.

1535 END PURGE TURBIDITY 4.0 NTUs

1536 START SAMPLING.

1546 WELL RAN DRY BEFORE SAMPLING COULD BE COMPLETE. WELL ALLOW FOR RECHARGE.

1605 WL @ 13MWT25 = 17.90'. WELL CHECK TOMORROW.

1700 HEAD OVER TO SUNN 16 TO DEBRIEF 16MWT06.

1800 LEAVE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balhorn DATE 4/26/03
WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page — Warm 503

SUN 4/27/03

0730 ARRIVE @ SITE

0825 21.35' = WL @ 13MWT02
2 GAL RECOVERY. WILL FINISH SAMPLING.

0830 RESUME SAMPLING. 6.0 NTUs

0940 SETUP ON 13MWT04

0946 START PUMPING

1051 START SAMPLING 13MWT04D1

1150 13MWT40 = 13MWT41 BOTH UNDER PRESSURE. J-PLUG ON TOP TIGHT WL RESTORE ON BOTH. WILL COME BACK LATER.

1313 @ 13MWT25 WL = 17.31'
WILL COLLECT [redacted] NURE WL FOR EXP.

1330 WELL DRY. RETRIEVED 2 400 mls

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 — Work continued to Page

SIGNATURE Robert Balhorn DATE 4/27/03
WITNESS DATE

TITLE CRANE PROJECT NO. 4060
BOOK 2555

Work continued from Page Summit 205

SWW 4/27/03

1240 SET UP ON 13MWT11 WL STABLE.

1245 START PUMPING.

1505 END PURGE REMOVED 12.3L 12inch

1506 START SAMPLING 13MWT11.

1556 SET UP ON 13MWT10.

1 START PUMPING

1811 SAMPLING 13BGWT1001

1940 MOVED OVER TO BLDG 3245

1942 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultman DATE 4/27/03

WITNESS DATE

TITLE CRANE PROJECT NO. 4060
BOOK 2555

Work continued from Page Summit 205

MW 4/28/03

0630 ARRIVE @ SITE. GROUP TO GW SAMPLE

START PUMPING @ 13MWT09

0911 SAMPLING 13MWT09 + FD04282301

1320 BACK @ 13MWT25. RESUME SAMPLING WL = 17.28'

1325 WELL DRY. REMOVED 2 WELLS FOR METALS.

1305 SET UP ON 13MWT24

1311 START PUMPING

1456 START SAMPLING 13GWT2401.

1530 FINISHED SAMPLING

1537 RELEASE TRAILER. CONTINUE ON 13MWT20

1606 START SAMPLING 13GWT2001

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Bultman DATE 4/28/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060 **BOOK** 2555

Work continued from Page RETURNED 60'S

MW

4/28/03

1740 FINISH SAMPLING

1745 SETUP TO SAMPLE 13 MW TIH WITH TNT TO FILL METALS

1751 WELL DRY STARTED SAMPLING @ 1748 3 400 mls. WZH CHECK ON SURVEYORS

1825 SURVEYORS FINISHED. LEAVE SWMW13. HEAD TO 3245 TO UNLOAD SAMPLES + EQUIP.

1900 LEAVE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/28/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060 **BOOK** 2555

Work continued from Page FORM 56'S

TUES.

4/29/03

0630 ARRIVE @ SITE. CHECK CAL ON YSI

0750 SET UP ON 13MW TIH.

0755 START PUMPING.

0925 END PURGE: PARAMETERS STABLE

0926 SAMPLING 13GWTIH01.

1023 BACK @ 13MW TIS. WL=17.38' WZH CONTINUE TO SAMPLE METALS.

1032 WELL DRY. 2 400 mls RECOVER

1130 WZH WORK W/ T.P. DEVELOPING + WELL RESTORATION

1630 LEAVE FOR FED-EX.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Balkwill DATE 4/29/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060

BOOK 2555

Work continued from Page 603 - SUNNY

TUES 5/6/03

0640 ARRIVE @ SITE

0715 CAL YSZ - LAMOTTE.

0730 HEAD TO SWMU 13 TO CONTINUE GW SAMPLING.

0748 START PUMPING ON 13MW-16

0842 START SAMPLING 13GWT1601.

0930 SETUP ON 13MWT18

0938 START PUMPING

1342 SAMPLING 13GWT1801. NOTED FLOATING DEBRIS

1440 @ 13MWT25 WL: 11.20 FINISH SAMPLING AMMONIA

1445 SET-UP - START PUMPING 13MWT15.

1702 START SAMPLING 13GWT1501.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Baltrus **DATE** 5/6/03

WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 9060

BOOK 2555

Work continued from Page

TUES 5/6/03

1800 HEAD BACK TO BLDG 3245

1830 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Robert Baltrus **DATE** 5/6/03

WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page 68 + CONT

WED 5/7/03

0640 ARRIVE @ SITE

0705 HEAD OVER TO SWMU 13.

0720 SET UP ON 13MWT1B

0730 START PUMPING

0947 START SAMPLING 13 GWT1301 + QUALITY DUP FD05070301.

1100 HEAD OVER TO BLDG 3345 TO DROP OFF SAMPLES

1150 SET-UP ON 13MWT19

1155 START PUMPING

1347 SAMPLING 13GWT1901.

1450 HEAD OVER TO BLDG 3345-

1700 @ 13MWT06. F-24 DISS. METALS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 5/7/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page

1730 LEAVE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Robert Balkwill DATE 5/7/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page 70's + [redacted]

5/8/03 THURS

0600 ARRIVE @ YARD MAKE PREL. UP SUPPLIES.

0740 GET LOAD OF TOP SOIL FROM NURSERY W/ T.R.

0810 ARRIVE @ SITE WITH RESERVE WELL LOCATIONS + COLLECT REMAINING SW SAMPLES

1730 HEAD FOR FEDEX

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Burbank **DATE** 5/9/03
WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page 70's + [redacted]

5/9/03 FRI.

0600 GEAR UP TO CONDUCT SLUG TESTS

0730 SET UP ON 13MW-17.

0900 FINISHED

0917 @ 13MW-17S WAITING FOR WL TO STABILIZE WL 9.09' INITIAL WL @ 8.71'

0938 @ 13MW-15 INITIAL WL 12.50' 12.30' W/ X-DUR. WELL WAIT FOR STABILIZE

0958 WL @ 8.85' ON 13MW-24.

1002 @ 13MW-11. WELL SET UP WL @ 7.28. INITIAL WL @ 7.6' WELL ALLOW WL TO STABILIZE

1019 WL @ 8.97' ON 13MW-24

1103 @ 13MW-24 WL 9.08' START FALLING HEAD TEST.

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SIGNATURE Robert Burbank **DATE** 5/9/03
WITNESS **DATE**

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page 725 + Hwmon

5/9/03 5/9/03

1143 START 13MW07S FALLING HEAD TEST.

1208 START 13MW07N FALLING HEAD TEST

1235 FINISH FALLING HEAD TEST @ 13MW07S

1240 START RISING HEAD TEST

1255 STOP FALLING HEAD TEST FOR 13MW11

1259 START RISING HEAD TEST FOR 13MW11.

1347 @ 13MW15.

1350 STOP TEST.

1410 CHECKING ON 13MW11.

1416 STOP TEST WL= 7.78'

1436 END TEST ON 13MW12A 97% RECOVERED
START RISING WL= 8.67'

1438 START RISING HEAD TEST.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 5/9/03

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

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FROM 5/9/03

1730 FINISH TEST. ACCIDENTLY TURNED OFF TEST

1735 SET XDCRS ON 13MW07S + 13MW02
HEAD BACK TO BLDG 3345

1800 LEAVE SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 5/9/03

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TITLE CRANE **PROJECT NO.** 9060
BOOK 2555

Work continued from Page COOL 50's + RAINING

SAT 5/10/03

0700 ARRIVE @ SITE
CONTINUE TO RUN SKILL TESTS:

CONDUCTED FAUNA HEAD TESTS FOR

- 13 MW T00
- 13 MW T02 - FROZEN 5/1/03
- 13 MW T08
- 13 MW T14

CONDUCTED RZSM HEAD TESTS FOR

- 13 MW T00
- 13 MW T08
- 13 MW T14

HELPED TIRUJAHN W/ WELL RESTORATION THROUGH OUT THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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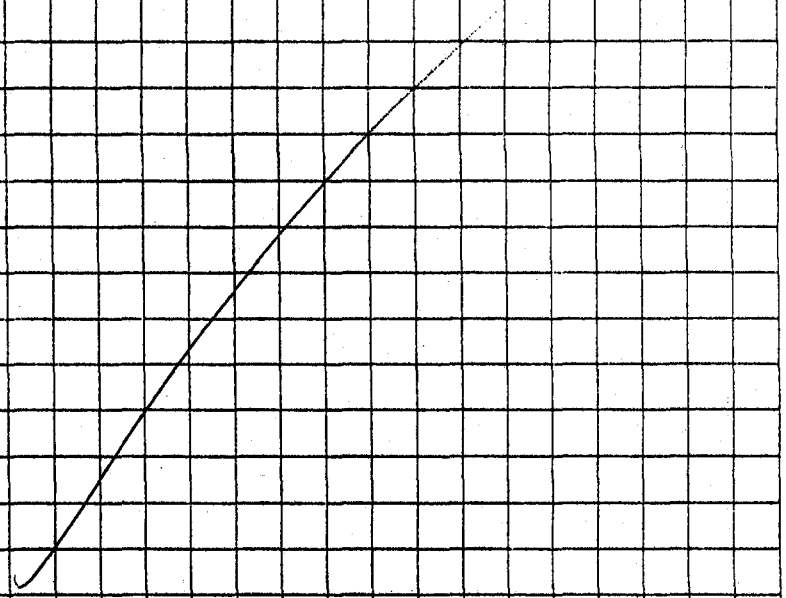
1800 LEAVE SITE. WILL CHECK ON 13 MW T02 TOMORROW



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balhuse DATE 5/10/03

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TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page 60's WINNIE + SUNNY

SUN 5/1/83

0640 ARRIVE @ SITE.
GEAR UP TO CONTINUE SLUG TESTS @ SUNNILLO.

0810 SET-UP + START FALLING HEAD TEST ON 16MW702

0816 END TEST

0817 START RISING HEAD TEST @ 16MW702

0835 SET-UP + START FALLING HEAD TEST @ 16MW705.

0900 SET-UP @ 16MW704 WAIT FOR W/L TO STABILIZE.

0908 SET-UP + START PUMPING ON 16MW705
NEED TO RE-SAMPLE SVOCs.

0924 START FALLING HEAD TEST @ 16MW704

0930 FALLING HEAD TEST FINISHED @ 16MW705

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 5/1/83

WITNESS DATE

TITLE CRANE **PROJECT NO.** 9060 **BOOK** 2555

Work continued from Page 60's + V. WINNIE

SUN 5/1/83

START RISING HEAD TEST

1005 FINISH FALLING HEAD TEST @ 16MW704
START RISING

1012 RISING HEAD TEST @ 16MW705 COMPLETE

1044 FINISH RISING HEAD TEST ON MW704
FINISH REMOVING FORMS ARMOR'D PADS

1349 SAMPLING 16GW702.
SVOCs ONLY

1330 HEAD OVER TO SUNNILLO. TO HEAD TR. W/
WL MEASUREMENTS.

1540 FINISH UP. HEAD TO SUNNILLO TO SET UP
ON WES - 14-02-83

1550 START PUMPING

1732 SAMPLING 16GW0702
SVOCs + METALS ONLY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill DATE 5/1/83

WITNESS DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

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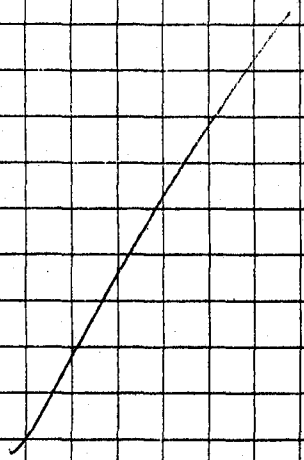
SUN 5/11/03

1838 LEAVE SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill
WITNESS

DATE 5/11/03
DATE

TITLE CRANE **PROJECT NO.** 4060
BOOK 2555

Work continued from Page SUNSET & LOWELL 60'S

MON 5/12/03

0830 ARRIVE @ SITE. START PARKING EQUIP

1000 GO W/ T.R TO FINISH RESTORATION

1630 BACK @ SUNSET 13. NEED TO DO WELL REPAIR ON 702-703.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Robert Balkwill
WITNESS

DATE 5/12/03
DATE

APPENDIX D.2.2
SWMU 13
FIELD NOTEBOOK
ROUND 2

NSWC
CRANE

2565

10-21-03

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0700 - ON SITE

FTNUS H+S TRAINING CONDUCTED.

DISCUSSED DUMPING DECON WATER/ PURGE WATER AT SUMMIT - TOM BRENT TO GET PERMISSION

ACCESS TO ADDITIONAL DRILL LOCATIONS NEEDED - T ROJAHN + M.G. COCKRAN TO CHECK

0800 H+S TRAINING COMPLETED

GO TO CHECK DRILL LOCATIONS

1000 CHECK WITH P. WORKS ON UTILITY CLEARANCE FOR TRUCK MOUNTED RIG. NO CLEARANCE GRANTED UNLESS ANY ACCESS ROAD CAN BE BUILT TO CLEARED AREAS. NO OTHER ACCESS IS GRANTED AT THIS TIME BASED ON DISCUSSION W/ P. WORKS

SCIENTIFIC ENDERY PRODUCTIONS CHICAGO 60605

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TITLE 10-21-03 (CONT.) PROJECT NO. BOOK

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1100 - ~~1200~~ 1130 LUNCH.

1130 - RETURN FROM LUNCH. INSTRUCTED DRILLERS TO SET UP DECON PADS + BUILD FORMS. MET W T. BRENT. WILL MEET @ 2:00 TO DISCUSS W FORESTER POSSIBILITY OF BUILDING ROADS FOR ACCESS TO DRILL LOCATIONS

~~1200~~ 1300 MGC + F. WUDKWYCH. GO TO CHECK FOR SEEPS @ SWMU 13

1400 RETURN TO OFFICE. DISCUSS ACCESS ISSUES W T BRENT + B. GATES. ASKED PERMISSION TO USE BULL DOZER TO CLEAR LOCATIONS @ SWMU 13.

1500 T. BRENT INDICATES OK TO CLEAR LOCATIONS W DOZER IF TREES @ 5" Ø NOT TOUCHED + SHAG BARK HICKORY NOT IMPACTED

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1515 MGC + FCW GO TO SWMU 13 TO DIG SEEP AREAS W B-M + BACKHOE. DUG SEEPS AT 3 LOCATIONS -

1) 13 SW 15
2) SEEP DOWNSTREAM OF 13 SW 15
3) 13 SW 29

+ ALL LOCATIONS WILL BE SAMPLED TOMORROW @ SWMU 13 AFTER LOCATIONS ARE ALLOWED TO STABILIZE FROM DIGGING

1700 RETURN TO OFFICE. PROVIDE UPDATE TO OFFICE.

1730 LEAVE SITE FOR DAY

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0700 ON-SITE, SET UP TO START SAMPLING SURFACE WATER/SEDS @ SWMU 13. SAMPLED THRU A.M.

1100-1130 LUNCH

1130 RETURNED TO SWMU 13 TO CONTINUE SAMPLING

1630 RETURNED TO OFFICE TO PACK SAMPLES FOR DAY.

1800 LEAVE SITE FOR DAY - DRIVE TO FED EX TO DROP OFF SAMPLES

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0700 ON SITE, SET UP TO CONTINUE SW/SD SAMPLING @ SWMU 13

0800 START SAMPLING ACTIVITIES

1130-1200 LUNCH

1200 CONTINUE SAMPLING @ SWMU 13

1600 QUIT SAMPLING FOR DAY. PACK SAMPLES

1700 LEAVE SITE FOR DAY. DRIVE TO FED EX TO DROP SAMPLES.

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0700 ON-SITE. PREP TO SAMPLE SURFACE WATER SEDS.

0850 DISCUSSED POSSIBILITY OF DISCHARGING CUTTINGS/DRILL WATER TO WOODS NEAR DRILL LOCATIONS. TOM BRENT + MGC INDICATED THAT WOULD BE ACCEPTABLE:

- ~ 250 GALLONS H_2O + 30 GALLONS OF WATER/CUTTINGS is GENERATED FOR DEEP WELLS, LESS IS GENERATED FOR SHALLOW WELLS.
- DRILL WATER IS MOSTLY POTABLE THAT IS BEING DISCHARGED FROM HOLE.

0800 WENT TO SWMU 13 TO RESUME SAMPLING

0930 RETURN TO OFFICE, SET

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UP TO START SAMPLING @ SWMU 16.

1000 WENT TO SWMU 16 TO START SAMPLING.

1145 - 1205 LUNCH

1205 RESUME SAMPLING ACTIVITIES.

1600 STOP SAMPLING FOR DAY, START PACKING SAMPLES

1700 SAMPLES PACKED, MGC HELPS F. RAMSER PACK CORE BOXES T. ROJAN + F. WUDKWYCH TAKE SAMPLES TO FED EX.

1830 LEAVE SITE FOR DAY

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0700 ON SITE

0800 MGC + FCW COLLECT REMAINDER OF SURFACE WATER / SED SAMPLES @ SWMU 16

1130 RETURN TO OFFICE W/ SAMPLES

1200-1230 LUNCH

1230 SETUP TO PERFORM GW SAMPLING AT SWMU 16

1400 GO TO SWMU 16 TO START GW SAMPLING

1730 COMPLETED SAMPLING FOR DAY, RETURN TO OFFICE

1830 QUIT FOR DAY, LEAVE SITE

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0700 ON-SITE, SETUP TO CONTINUE GW SAMPLING.

0830 MGC SETS UP ON 16GW01 TO SAMPLE

1630 COMPLETED SAMPLING FOR DAY AT 16GW01. MGC HELPS F. WUDKWYCH W/ WELL SAMPLING

1730 RETURN TO OFFICE

1800 LEAVE FOR DAY

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0700 ON-SITE. SETUP TO COLLECT SURFACE WATER ~~[illegible]~~ SAMPLES AT SWMU 13.

0800 GO TO COLLECT SW SAMPLES @ SWMU 13

1130-1200 LUNCH

1230 RETURN TO ~~[illegible]~~ OFFICE. DROP OFF SAMPLES, RETURN TO SWMU 13 TO COLLECT SW SAMPLES

1500 RETURN TO OFFICE, PACK SAMPLES FOR SHIPMENT.

1700 MOC CHECKS ON F. RAMSER.

1745 RETURN TO OFFICE.

1800 LEAVE SITE FOR DAY

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0700 ON-SITE. SETUP EQUIPMENT

0800 SET UP TO SAMPLE @ SWMU 13. PURGED AND SAMPLED WELL 13 MWT24 IN THE A.M.

1200-1230 LUNCH

1230 RETURN. SET UP TO SAMPLE 13 MWT 19.

1700 13 MWT 19 SAMPLED. RETURN TO OFFICE TO UNPACK EQUIPMENT.

1815 LEAVE SITE FOR DAY

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1400 ON-SITE LOAD EQUIPMENT

1500 DRILLERS ON SITE FOR ATV RIG.

JAMES WALSH
JOSHUA DEAN

T ROJAHN PERFORMS H&S TRAINING

1545 TRAINING COMPLETED, SETUP TO FILL H2O TRUCK

1615 MOBILIZE TO DECON PAD TO CLEAN ATV RIG

1715 MOVE TO 13MWT29 TO SETUP.

1810 LEAVE SITE FOR DAY

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0700 ON-SITE.

0730 ON-SITE AT 13MWT29 TO START DRILLING.

1030 13MWT29 DRILLED & INSTALLED, DRILLERS TEAR DOWN & GO TO DECON

1130-1200 LUNCH

1200 RETURN, DRILLERS GET EQUIPMENT FOR WELL INSTALLATION

1300 SETUP ON WELL 13MWT41

1730 QUIT DRILLING FOR DAY, DRILLERS PLAN ON GETTING LARGER COMPRESSOR TO REMOVE CUTTINGS MORE EFFICIENTLY

VOID

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0700 ON-SITE PREP EQUIPMENT & SETUP TO CONTINUE DRILLING.

0800 RESUME CORING @ 13MWT31

0900 LOST BIT IN HOLE, STARTED TO TEAR DOWN, WILL MOVE ROTASONIC ON HOLE TO OVERDRILL & FISH OUT BIT.

1000 SETUP ON WELL 13MWT36 TO DRILL & INSTALL.

1230 WELL 13MWT36 INSTALLED

1230-1300 LUNCH

1300 RETURN TO TAKE DOWN RIG & DECON

1400 DECON RIG

1430 MOVE ONTO LOCATION 13MWT31 TO START DRILLING

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1700 13MWT31 DRILLED & INSTALLED. DRILLERS TEAR DOWN & MOVE TO DECON. MGC RETURNS TO DO PAPERWORK IN OFFICE

1800 LEAVE SITE

VOID

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0700 ON SITE, SET UP EQUIPMENT & COMPLETE DAILY ACTIVITIES

0815 SET UP ON 13MWT33 TO START DRILLING

1130 13MWT33 DRILLED & INSTALLED TAKE LUNCH

1200 RETURN FROM LUNCH, DRILLERS DECON RIG

1330 MOVE ONTO LOCATION 13MWT30 TO START DRILLING

1345 PULLED OFF HOLE TO TOW ROTASONIC RIG OFF HOLE

1430 BACK AT 13MWT30 TO START DRILLING

1600 13MWT30 INSTALLED. MGC CHECKS ON SITE 16 CLEARANCE

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1600 (CONT.) CHRIS FREEMAN INDICATED THAT UTILITY CLEARANCE IS MADE FOR SITE 16 DRILLERS DECON & WILL MOVE TO SITE 16 TO STAGE EQUIP. FOR A.M. START.

1700 DRILLERS MOB TO OFFICE W/ EQUIPMENT

1800 LEAVE SITE FOR PAY

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DATE 11-6-03

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0700 ON SITE, DISCUSS APPROACH FOR DRILLING SWMW 16

0730 MOB TO SWMW16, SET UP ON WELL 16MWT14 TO START DRILLING

1030 16MWT14 DRILLED & INSTALLED DRILLERS TAKE RIG BACK TO DECON PAD TO FIX ANTIFREEZE LEAK & TO DECON AUGERS

1130 - 1200 LUNCH

1200 RETURN FROM LUNCH, DRILLERS WELD BIT.

1330 RETURN TO SWMW 16, SETUP ON 16MW T12 TO START DRILLING

1630 16MWT12 DRILLED & INSTALLED, GO TO DECON

1800 LEAVE SITE

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0700 ON SITE, PREP EQUIPMENT FOR DAY

0745 SET UP ON 16MWT09 TO DRILL & INSTALL WELL

1000 WELL INSTALLED SETUP ON 16MWT17.

1200 - 1230 LUNCH

1230 RETURN FROM LUNCH, CONTINUE WELL INSTALLATION

1430 16MWT09 INSTALLED. RETURN TO DECON

1500 LEAK IN RADIATOR, DRILLERS TO REPAIR WITH RADIATOR STOP LEAK.

1700 LEAK REPAIRED, MOVED ONTO LOCATION 16MWT10.

1800 LEAVE SITE FOR DAY

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0700 ON SITE. SET UP EQUIP. TO DRILL.

0730 MOB TO SWMU 16 16MWT10

0915 16MWT10 DRILLED. MOB TO 16MWT16 LOCATION TO DRILL WELL (NOTE: 16MWT16 IS DRY AT 25 FEET). IT WAS DECIDED TO INSTALL A DEEPER WELL AT THIS LOCATION TO MONITOR DEEPER GW.

1180 LUNCH

1200 RETURN FROM LUNCH; CONTINUE DRILLING @ 16MWT16

1530 16MWT16 INSTALLED, CLEAN UP SITE 16 AREA

1700 RETURN TO OFFICE

1800 LEAVE SITE FOR DAY

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0700 ON SITE. SET UP EQUIPMENT.

0800 MOB TO SWMU 13 TO DRILL 13MWT44

1230 LUNCH

1300 RETURN FROM LUNCH, CONTINUE DRILLING 13MWT44

1800 WELL INSTALLED

1830 LEAVE SITE FOR DAY

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0700 ON SITE SETUP EQUIP. TO DRILL FOR DAY, WAIT MOB TO SWMU 13 (13MWT34) TO DRILL SHALLOW WELL. MOVED EQUIP & RIG OFF OF 13MWT44 LOCATION.

1030 13MWT34 INSTALLED MOB TO DECON

1100-1130 LUNCH

1300 MOB TO SWMU 16 TO DRILL 16MWT13

1500 16MWT13 COMPLETE, MOB TO 16MWT07 TO DRILL

1700 16MWT07 DRILLED, CLEANED AREA & RETURN TO OFFICE W/ PAPERWORK

1800 LEAVE SITE FOR DAY

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1400 ON SITE, SETUP EQUIPMENT TO START DRILLING

1545 MOB TO WELL 13MWT35 TO START CORING. CLEANED OUT HOLE TO START CORING.

1700 QUIT FOR DAY

1800 LEAVE SITE

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0700 ON SITE, MOB EQUIP TO START DRILLING.

0800 SET UP AT 13MWT35. RAIN STEADY. DRILLERS WILL WAIT UNTIL RAIN DECREASES

1100 RAIN CONTINUES, DRILLERS DECIDE TO QUIT FOR DAY.

1100-1130 LUNCH

1130 RETURN FROM LUNCH, SETUP TO COLLECT SW & GW SAMPLES @ SWMU 13

1330 SETUP TO SAMPLE #13SW11

1430 13SW11 SAMPLED, SETUP TO DEVELOP 13MWT41.

1530 13MWT41 DEVELOPED, RETURN TO OFFICE TO PACK SAMPLES

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1800 LEAVE SITE FOR DAY

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0700 ON-SITE, SET UP EQUIPMENT TO DRILL @ SWMU 13 13MWT35

1100 LUNCH

1130 RETURN FROM LUNCH, CONTINUE DRILLING 13MWT35

1330 WELL INSTALLED, DRILLERS DECON, MGC GETS TOW TRUCK AT MAINTENANCE TO PULL OUT STUCK ROTASONIC RIG

1430 ROTASONIC RIG PULLED OUT

1530 SET UP ON 13MWT47 TO START DRILLING

1730 QUIT FOR DAY

1800 LEAVE SITE

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0700 ON-SITE, PREP EQUIPMENT.

0800 RESUME DRILLING 13MWT47

0900 13MWT47 INSTALLED, ~~MGBC~~ CHECK ON DRILLERS INSTALLING PADS & PRO CASINGS

0930 MGC & T BOEMER (B-M) DRIVE TO MGBC TO SCOPE DRILL LOCATIONS

1030 RETURN TO SWMU 13, MGC GETS TOW TRUCK TO PULL OFF RIG FROM 13MWT47

1100-1130 LUNCH

1130 RETURN FROM LUNCH, ASSIST J. GOERET WITH WELL SAMPLING

1330 CONCRETE TRUCK ARRIVES,

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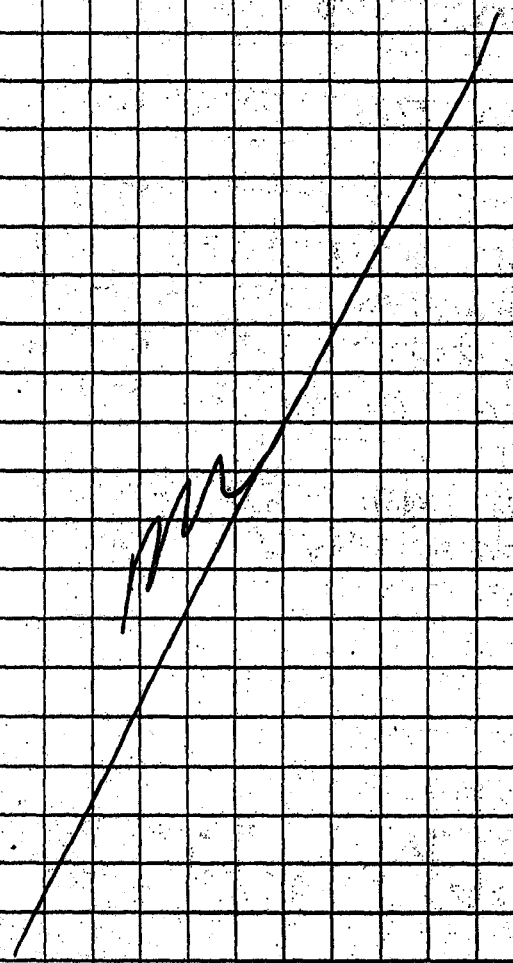
START POURING PADS

1800 DONE FOR DAY

1830 LEAVE SITE



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0700 ON SITE, SET UP EQUIPMENT

0800 MGC & S. GRIER GO TO WELL 13MWT46 TO AWAIT DRILLERS TO SET CASING

0900 MGC & ATU DRILLERS GO TO WELL 110 MWT14 TO ABANDON (WELL DRY TO DATE)

1000 110 MWT14 ABANDONED, PRODUCTION STAFF AT BEESON SWMU 14 INSTRUCTED TO STAY AWAY FROM BUILDING PERIMETER. WE ARE ALLOWED TO WORK ON WELLS ALONG BOUNDARY WE NEED TO LET THEM KNOW HOW MANY STAFF ARE WORKING IN THE AREA AT A TIME.

1130 - 1200 LUNCH.

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1200 RETURN FROM LUNCH. ASSIST T. ROSATO IN WELL DEVELOPMENT

1340 START DEVELOPMENT WELLS 16MWT13 + 16MWT15

1800 LEAVE SITE FOR DAY

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0700 ON SITE, PREPARE EQUIPMENT FOR SLUG TESTING

1000 START SLUG TESTING @ SUMW 16

1100 - 1130 LUNCH

1130 RETURN TO SUMW 16, CONTINUE SLUG TESTING (16MWT10)

1230 MOB TO SUMW 13 TO PERFORM SLUG TESTING (13MWT37 + 12MWT38)

1800 QUIT FOR DAY

1830 LEAVE SITE FOR DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-22-03

DATE

TITLE 11-23-03 PROJECT NO.

BOOK

Work continued from Page

0700 ON SITE, DOWNLOAD ~~GT~~ DATA FROM SLUG TESTING 20 PAY ITEMS FOR DRILLING.

0900 MOB TO SWMU 16 FOR SLUG TESTING, TESTED 16MW08, 17&15

1330 RETURN TO OFFICE, DRILLERS PICK UP EQUIPMENT & LEAVE SITE

1345 DRIVE TO SWMU 13 TO SLUG TEST WELLS WITH F.W.L. IN ~~THE~~ WELL AT SWMU 16 RETURNS TO EQUILIBRIUM (16MW18)

1400 MOC CLEARS UP ACCESS ROAD + CLEARS DITCHES OF H2O AT SWMU 13

1530 RETURN TO SWMU 16 TO CHECK WELL, STILL ~~PARTIAL~~ RECOVERING (16MW15)

SCIENTIFIC SINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-23-03

DATE

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TITLE 11-23-03 PROJECT NO.

BOOK

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1600 SWMU 13. TESTED WELL 13MWT42

1800 RETURN TO SWMU 16. PULL EQUIP FROM WELL 16MWT15 (NOTE: HAD TO CLEAR AREA BEFORE A.M MONDAY)

1830 LEAVE SITE TO SHOP FOR EQUIP

SCIENTIFIC SINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-23-03

DATE

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TITLE 11-24-03 PROJECT NO. BOOK

Work continued from Page

0700 ON SITE, PREP EQUIP FOR SLUG TESTING

0830 AT WELL @ 13MWT33 TO SLUG TEST

1030 SETUP ON 13MWT30 WHILE 13MWT37 RECOVERS

1315 ~~PUCTED~~ STOP TEST @ 13MWT33

1330 STOPPED TEST @ 13MWT30

1345 MOB TO 13MWT32 TO TEST

1500 13MWT32 TESTED.

1600 RETURN TO OFFICE, HELP PACK SAMPLES

1800 LEAVE SITE FOR DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-24-03

DATE

TITLE 11-25-03 PROJECT NO. BOOK

Work continued from Page

0700 ON SITE, PREP EQUIPMENT FOR SLUG TESTING

0830 WENT TO SWMU 13, CHECKED WELL 13MWT45 & 13MWT28 FOR RECOVERY BACK TO STATIC COULD NOT TEST YET.

0900 AT WELL 13MWT34 TO TEST

1000 13MWT34 TESTED, MOVE TO 13MWT47 TO TEST

1345 MOB GOES TO MEET WITH JACOBY (SEEDING CONTRACTOR) TO DISCUSS LOCATIONS TO RESTORE

~~1520~~ 1530 RETURN TO 13MWT47, PULL TRANSDUCER FROM WELL

1600 RETURN TO OFFICE TO DUMP DATA + PACK EQ + SAMPLES.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 11-25-03

DATE

NSWC CAN

N9060

CO 0279

SWMU 13 + 16

2555

DRILLING

START: 3/14/03

END:

2555

TITLE PM: CLEARY05 PROJECT NO. 4060

10-20-03 BOOK

Work continued from Page

0700 THRU 1300	FMR FW TR	TRAVELS PERSONNEL ENROUTE FROM PGH PA TO CRANE
1315		ARR AT CRANE NSWC TRAVELS - UNPACKED SUPPLIES - DRILLERS ARRIVED UNLOADED SUPPLIES AT LAY DOWN
		- GO TO UTILITIES
1600		DISCUSS DRILLING PRIORITIES - START DRILLING @ BHWT 37, T38, T39, T40 T41, T42
		+ DO SITE VISIT W/ DRILLER FOR ACCESS PROBLEMS - DRILL SITES IN THE SOUTH, T38, T37, T39, T40 THO T41, T42. CAN BE ACCESSED FROM MAIN ROAD TO THE SOUTH OF THE SITE - DRILL SITES IN THE NORTH WILL HAVE TO BE ACCESSED

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Grant M Ramsey DATE 10-20-03

WITNESS DATE

TITLE PM CLEARY PROJECT NO. 4060

10-20-03 BOOK

Work continued from Page 8

1700	THROUGH THE COMPOUND
1800	FMR FW TR LV CRANE NSWC FOR HOTEL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Grant M Ramsey DATE 10-20-03

WITNESS DATE

10-21-03 PM: CLEARING BOOK 2555

Work continued from Page

0700 FWR - FRED W. RAMSEY } TENN
TR - TERRY R. } ONSITE
MCC - MATT COCHRAN } TENN
FW - FRANK WD. }

0715 DRILLERS ON SITE
- NO DRILLING ACTIVITIES TODAY DUE TO UTILITIES NOT CLEARED FOR TRUCK RIG. MAY MAKE ROADS FOR ACCESS TO ATV PTS W/ TRUCK RIG. SEE TR PROJECT NOTE BOOK FOR DEVELOPMENTS.

- WILL CLEAR ROAD/PATH FOR ACCESS

1745 FWR+TR LV CHAVENSVC

Work continued to Page

SIGNATURE Fred W Ramsey DATE 10-21-03

WITNESS DATE

10-22-03 WEDNESDAY BOOK 2555

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0700 FWR - TENN> ARR AT FIELD OFFICE
DRILLERS ON SITE
TIM FIELD MANAGER
~~JOHN~~ JONKEFER LEAD DRILLER
TODD WOLLENHAUPT
DENNIS SINK

0930 SET RIG (TRUCK) ON 13MWT42
ROTOSONIC RIG

BEGIN USING 4" CORE CASING
- DRILLERS WERE GOING TO ATTEMPT INSTALLING 2" PVC WELL USING ONLY 4" CORRING
1100 CASING? W/O H_2O + W/O AIR
HOWEVER BECAUSE BED ROCK IS @ ~ 5'-8' TO OF WELL PROJECTED TO BE 25-35' DRILLERS SAY MIR OR WATER WILL BE NEEDED. ALONG W/ 6" CASING (TEMP) 0-10' BG
1130 BREAK FOR LUNCH
1200 - DRILLERS GOTO LAYDOWN TO GET
1300 H/O. DRILLERS ARR @ RIG ON 13MWT42
1320 BEGIN TO ADVANCE 6" TEMP CASING

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SIGNATURE Fred W Ramsey DATE 10-22-03

WITNESS DATE

TITLE PM: 60s WINDY PROJECT NO.

10-22-03 WEDNESDAY BOOK

Work continued from Page

1430 BEGIN ADVANCING 4" DRILL RODS BEYOND 10' USING WATER

1508 TD HOLE @ 13MWT42 TU 25' BGS USED WATER TO CORE CANNOT DETECT WATER PRODUCING ZONE. AIR PURGED HOLE. MADE ABOUT 0.5' OF H_2O IN 16 MINS INSTALLED WELL SCREEN TO 11-21 SAND 9-25 BENT 6-9'

13MWT42 WELL MATERIALS

+ GLOBAL FILTER PACK NSF 800356 6400 QUARTZ SAND 10-30 SEP/18B 450 BAGS

+ PVC SCH 40 RISER

+ PVC 20 SLOT SCREEN

+ PURE GOLD MED CHIPS BENTONITE CETCO POLYMER-FREE NSF HYDRATED W/ 15 GALS H_2O

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Fred M Ransen WITNESS

DATE 10-22-03 DATE

TITLE PM: 60-50s PROJECT NO.

10-22-03 WEDNESDAY BOOK 2555

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1630 SET RIG ON 13MWT40 (SHALLOW WELL)

1640 BEGIN DRILLING DRY USING 4" PIPE.

1700 SWITCH RIG UP TO USING H_2O AND WILL SET TEMP 6" CASING TO 5' BGS. WILL STOP HERE. DRILLERS NEED TO MAKE BIT FOR 5' LENTH.

TO DAYS TOTALS:

WELL	4" DRILL	6" DR	2" WELL
13MWT42	25'	15'	21'
13MWT40	5'		

NICK POST DRILLER WILL FILL IN FOR JON K. ON SATURDAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ransen WITNESS

DATE 10-22-03 DATE

TITLE 10-23-03 THURSDAY

PROJECT NO. 9060

BOOK 2555

Work continued from Page

0700 PWR TKNS

0730 DRILLERS ON-SITE JON K, TODD W. DENNIS S.

0800 WL @ 17.5' BGS @ 13 MWT42

080[illegible] BEGIN TO INSTALL 6" TEMP CASING TO 5' @ 13 MWT40

085[illegible] PROCEED TO DRILL W/ 4" CORE PIPE BEYOND 6" TEMP CASING.

- NOTE STREAM NEXT TO 13MWT40 IS DRY

08[illegible] @ 25' @ 13MWT40 BLOW OUT H_2O

08[illegible] MEASURED H_2O @ 25' BELOW DRILL PLATFORM

0906 WL ROSED TO 23' DECIDED TO INSTALL WELL @ 15'-25' 13MWT40

SAND 12-25.5

BENT 10-13 9-12

0930 GO TO DECON RIG + RODS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred W Ramsey

WITNESS

DATE 10-23-03

DATE

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PM: CLEAR CO's

TITLE 10-23-03 THURSDAY

PROJECT NO. 9060

BOOK 2555

Work continued from Page

1035 BAILED DRY WELL 13MWT42

1100 WL @ 13MWT40 @ 15.5 bgs

DRILLERS BREAK FOR LUNCH

1105 BAILED 13MWT40 ~~DRY~~ DOWN TO 18.5 ft bgs w/ 8 bails SEEM TO MAKE PLENTY OF WATER

1110 WELL RECOVERED TO 17.5' BGS

1215 WL @ WELL 13MWT42 @ 18' BGS

1230 DRILLERS RETURN FROM LUNCH - LOAD UP MORE WATER NEED TO GROUT ISOLATION CASING CONT. TO DRILL @ 13MWT41

1345 SHOW DRILLER WHERE TO DUMP H_2O WASTE

1445 ENCOUNTERED A VERY SOFT MUDSTONE @ ~30' DOWN TO 40' BGS @ 13MWT41 WILL INSTALL THE 6" ISOLATION CASING FROM 0'-38' BG

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred W Ramsey

WITNESS

DATE 10-23-03

DATE

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TITLE PM: CLEAR 60's PROJECT NO. 9060

10-23-03 THURSDAY BOOK 2558

Work continued from Page

1660	DRILLED DOWN TO 38' WITH 8" DRILL PIPE WORKED TO INSTALL THE 6" CASING, ~11" NOMINAL OUTSIDE DIA. LOWERED 30' OF 6" BEGIN TO MIX GROUT/SURFACE CEMENT/BENTONITE MIX
1700	BEGIN TO TREMIE THE CEMENT BENTONITE SLURY
1730	COMPLETED GROUTING IN 6" CASING BEGIN TO CLEAN UP
1860	SET R16 ON 13MWT37/38
1830	DRILLERS + FWR LV DRILL SITE

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SIGNATURE Fred McKamey DATE 10-23-03

WITNESS DATE

TITLE PROJECT NO. 9060

10-24-03 FRIDAY BOOK 2555

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0700	FWR ON SITE, JON KEIFER ON SITE - DISCUSS DAILYS - DISCUSS IDW WATER HANDLING. TOM BRENT GAVE US THE PERMISSION TO DISCARD WATER (DRILLING FLUIDS) ONTO THE GROUND SURFACE NOTE: THIS IS ONLY IN THE WOODS IN SWMU 13
0825	DRILLERS EMPTY IDW H_2O + FILL UP W/ POTABLE H_2O
0830	MEASURE H_2O LEVEL IN 13MWT42 @ 18' BGS TD OF WELL = 21' BGS THREE FEET OF H_2O
0840	SETUP DRILLERS ~~BEGIN~~ TO ADVANCE PIPE 4" @ 13MWT37
0905	BEGIN TO ADVANCE 4" DRILL PIPE
1015	DRILLERS ON STANDBY
1020	MEASURE 22.5' BELOW SURFACE CASING THEN
1027	BAILED H_2O DOWN TO 23.3' BSC
1038	H_2O @ 22.3' BSC, 1050 WL = 21.3

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SIGNATURE 10-24-03 Fred McKamey DATE

WITNESS DATE

TITLE 10-24-03 FRIDAY PM: 50-60's SUNNY PROJECT NO. 9068 BOOK

Work continued from Page

13MWT37

1100 WL = 20' 4" @BSC. BREAK FOR LUNCH DRILLERS ARE EXPECTING AIRCOMP NEW FUNCTION.

1205 WL = 17' 3" @BSC (45 MIN STANDBY)

NOTE: CASING @ 1.5' ABOVE GROUND SURFACE

WL = 17' BSC WL BGS = 15.5

PROPOSE TO DRILLERS TO PLACE SCREEN 14.5 - 24.5

1300 DRILLERS RETURN TO DRILL SITE 13MWT37

CLEAN OUT HOLE TO 25' TO INSTALL WELL 14.5-24.5 SAND

1340 INSTALLED PVC WELL 13MWT37:

WELL SCREEN	14.5 - 24.5
SAND	11.5 - 25
BENTONITE	8.5 - 11.5

1400 NICK POST DRILLER, JON K REPLACEMENT FOR CAT + SUN

1500 ADMINISTERED SSH+S TRAINING TO NICK POST

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Sred W Ramer WITNESS

DATE 10-24-03 DATE

TITLE 10-24-03 FRIDAY PROJECT NO. 9060 BOOK

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1505 MOVE/SET UP RIG ON 13MWT38 (DEEP)

APPROACH

- START BY ADVANCING 8" PIPE TO ACCOMADATE THE ISOLATION CASING

1520 BEGIN TO ADVANCE THE 8" PIPE

1535 SWITCH OVER TO 4" PIPE TO DRILL DOWN TO 25' NO SAMPLING

1650 DRILLED TO 40' SAMPLED 25'-40' W/ 4" PIPE @ 13MWT38

TODAY TOTALS

	WELL	BORE w/ SPL	OB w/ SPL	BORE w/o SPL	OB w/o SPL
13MWT37	24.5	20'	5'	20	
13MWT38	-	15'	-	20	5

CLEAN UP WATER TANK (TIMS), PREP TO INSTALL 6" ISOLATION CASING @ 13MWT38

1830 PUL + DRILLERS LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Sred W Ramer WITNESS

DATE 10-24-03 DATE

TITLE RANGERS FRAME CLOUDY@10AM PROJECT NO. 9060

10-25-03 SATURDAY BOOK

Work continued from Page

0700 | FOR PERSONS ONSITE CALIBRATED PID @ FIELD OFFICE
DENNIS SINK - DRILLER
TODD W. HELPER } BOWSER MORNER
NICK POST HELPER
- LOAD H2O BOTH SUPPORT TRUCKS
- DRILLS

0800 | GOTO SUMP 13, SITE 13MWT38

0830 | BEGIN TO ADVANCE 8 1/2" PIPE

0910 | TD 8 1/2 PIPE, BEGIN TO INSTALL 6" ISOLATION CASING
+ LOWERED 30' OF 6" CASING TREMIE SOME BENTONITE/CEMENT SLURRY

1000 | + PULLED 8" DRILL PIPE CONTINUE TO TREMIE THE BENTONITE/CEMENT

1010 | COMPLETED ISOLATION CASING 6" @ 13MWT38, MOVE RIG + TOOLS TO DECON INSTALLED 39.0' BGS.

1115 | BREAK FOR LUNCH

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Ullamer DATE 10-25-03

WITNESS DATE

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TITLE PM: CLOUDY: 50s-60s PROJECT NO. 9060

10-25-03 SATURDAY RAIN BOOK

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1244 | WL @ 13MWT40 = 15.5' BGS

1300 | DENNIS S. DOES NOT WANT TO TAKE THE RIG INTO THE WOODS DARK SKY RAIN THREATENING

1330 | DRILLERS WILL WORK ON BUILDING PADS ON THE THREE INSTALLED WELLS
- GO OFF SITE TO GET SAKCRETE FOR PADS AND OTHER SUPPLIES,
STARTED TO RAIN @ 1430

1500 | LIGHTING + THUNDER.

1525 | DRILLER RETURNED TO SUMP 13

1530 | THEY HAVE PAD + BOX SUPPLIES BUT DUE TO THE LIGHTING + THUNDER WE DECIDED TO CALL IT A DAY. SENT DRILLERS HOME. TO DATE TOTAL : 40' OF ISOLATION CASING INSTALLED

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Ullamer DATE 10-25-03

WITNESS DATE

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TITLE

PROJECT NO. 9060

BOOK

10-26-03 SUNDAY

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0700 FUR - FIELD GEOLOGIST TtNUS
- CAL PID
- DAILY ACT. SUMMARY

0720 DRILLERS ARR AT FIELD OFFICE
TOO WET TO DRILL, CONCERN THAT RIG WILL SLIDE OFF OR TIP OFF ROADS.
- DECIDED TO INSTALL PROTECTIVE CASING + 4'X4' PADS.

FUR - SWEEP FIELD OFFICE MISC CLEAN UP

HELP TR DO ~~NT~~ MNA FIELD TEST KITS

1500 DRILLERS INSTALLED ONE PAD/PROT. @ 13MWT37, TOP OFF GROUT @ DEEP WELLS T38 + T41, SHALLOW WELLS T42+T40.

- WORK W/ TERRY R
NO DRILLING ACTIVITIES FOR REMAINDER OF DAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Greg McKenzie

DATE 10-26-03

WITNESS

DATE

TITLE COLD 30S CLOUDY

PROJECT NO. 7060

BOOK

10-27-03 MONDAY

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0700 FUR ARR @ FIELD OFFICE

0720 DRILLERS ARR @ FIELD OFFICE
- WILL COMPLETE TWO PADS at WELLS T42+T40
- STILL UNCERTAIN ABOUT UTILITY CLEARANCE INSIDE SWMU 13 COMPOUND.

1000 DRILLER COMPLETED PADS AT WELLS T42+T40 @ SWMU 13
- STILL UNCERTAIN ABOUT UTILITYS INSIDE SWMU 13. TERRY R IS DISCUSSING ISSUE W/ TOM BRENT FACILITY POC.

1300 UTILITY CLEARANCE IS GOOD/SIGNED
WERE OFF STANDBY.
- GLOBAL DELIVERY OFF 6" CASING AND OTHER WELL SUPPLIES.

1430 UNLOADED GLOBAL SUPPLIES

1451 SET UP RIG ON 13MWT45 DEEP WELL MEASURED W/ T21. - WILL ADVANCE TO 20' BGS W/O SAMPLING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Greg McKenzie

DATE 10-27-03

WITNESS

DATE

TITLE PM: PARTLY CLOUDY 50's **PROJECT NO.** 9060

10-27-03 MONDAY **BOOK** 2555

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1504	BEGIN TO ADVANCE 8" DRILL PIPE @ 13MWT45 (CARROLLY) - SWITCH TO HW @ 15'
1700	DRILLER LV. SITE (OFF BASE) FUR CONTINUES TO LOG THE CORES.
1800	FUR LVS BASE

TODAYS TOTALS

OB DRILLING w/o SPL = 10'

BDRK DRILLING w/o SPL = 9'

BDRK DRILLING w SPL = 20'

STANDBY: 700 AM THRU 1300 HR ~5 HRS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred McKamey DATE 10-27-03

WITNESS DATE

TITLE RAINY 40's **PROJECT NO.** 9060

10-28-03 TUESDAY **BOOK**

Work continued from Page

0700	FUR ARR @ FIELD OFFICE
0710	DRILLERS ARR @ FIELD OFFICE JON K TODD DENNIS SONIC NICK P. - LOAD WATER TRUCK
0800	CHECK IN @ NORTHERN GATE @ SUMM - DRILLERS GO TO DECON PAD. -
0815	AT DRILL SITE 13MWT45 - PREP TO GROUT IN THE 6" ISOLATION CASING.
0845	COMPLETED ISOLATION CASING @ 39' BGS. @ 13MWT45 + GO TO DECON PAD - 8" CASING - 4" CA DRILL PIPE - RIG MOVE TO 13MWT35
1040	BEGIN TO CORE 4/4" DRILL PIPE 20 - 30' @ 13MWT35
1116	SPL TO 39 AT 13MWT35 BREAK FOR LUNCH
1200	DRILLERS GO TO GET MORE WATER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred McKamey DATE 10-28-03

WITNESS DATE

RAINY 50's - 60's

TITLE 10-28-03 TUESDAY PROJECT NO. 9060 BOOK

Work continued from Page

LITHOLOGIC DESCRIPTION
WELL 13MWT35
19-39 FT BGS

19-20 GREY MED HARD SANDSTONE POORLY BEDDED (BIOTURBIDATION) CHARCOAL PLANT FOSSILS

20-21.5 DK GREY VERT SOFT SILT + CLAY W/ ROCK FRAGMENT (SHALE)

21.5-22.5 SILTSTONE ALT GREY + BLK THINLY LAMINATED ~~MED~~ SOFT VBR

22.5-25 GREY MED HARD/HARD BR POORLY BEDDED SANDSTONE BIOTURBIDATION RARE CHARCOAL/PLANT FOSSILS

27.5-29 -SILT STONE ALT GREY & BLK THINLY LAMINATION VBR

29-33 INTERLAYER SILT + SAND STONE PLANT FOSSILS/ CHARCOAL @ 31-32 V. BR

34-39 FINE TO MED LAMINATION - NO ~~STONE~~ MED-FINE BRK TO LAMINATED BRK

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Ramer WITNESS

DATE 10-28-03 DATE

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RAIN 50's F

TITLE 10-28-TUESDAY PROJECT NO. 9060 BOOK

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SILT STONE + CLAY STONE GRADING TO ~~FET~~ VERY SOFT CLAY + SILT W/ ROCK FRAG MED BEDDED

1420 COMPLETED INSTALLATION OF 39' ISOLATION CASING 6" @ 13MWT35 + MOVE TO DECON EQUIPMENT - DRILL PIPE + RIG

1900 DRILLER W/LL MOVE TO 13MWT32 20'
-WILL ATTEMPT TO INSTALL WITHOUT USING H_2O

1515 BEGIN ADVANCE ~ 4" DRILL PIPE ~ 5" HOLE. 13MWT32

1520 HIT BDRK @ ~2.5' WILL CONVERT TO USING H_2O TO DRILL.
- GO GET H_2O EQUIP
-

1600 ADVANCE 6" TEMP CASING (SURFACE) 5'
-NO RECOVER TO 10' SUSPECT IT TO BE WEATHER BDRK.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Ramer WITNESS

DATE 10-28-03 DATE

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TITLE RAIN 60s PROJECT NO. 9060

10-28-03 TUESDAY BOOK

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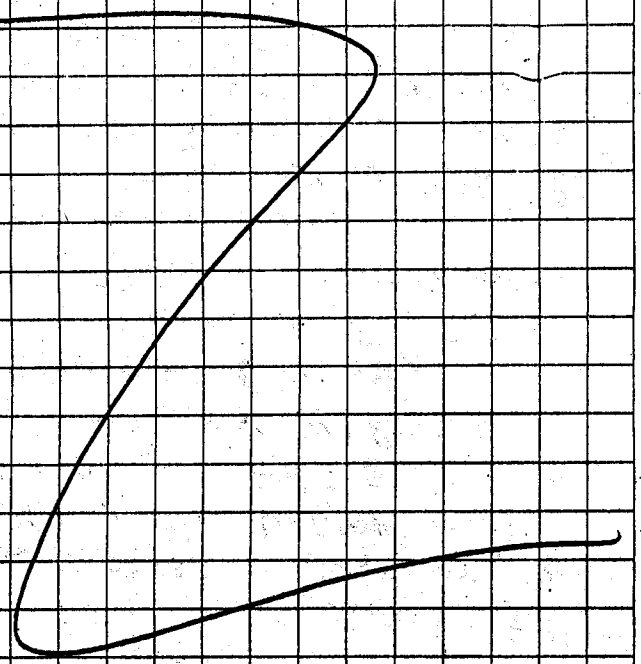
1700 TD @ 25' @ 13MWT32 WILL ALLOW TO SIT OVER NIGHT TO STATIC H2O LEVEL
DRILLERS LV SITE.
-LOG CORE
-BOX CORE ETC

1730 PUR GO TO TENNS FIELD OFFICE
1800 PUR LVS NSWC



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE [signature] DATE 102803

WITNESS DATE

TITLE CLEAR 30's PROJECT NO. 9060

10-29-03 WEDNESDAY BOOK

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0700 PUR @ FIELD OFFICE
- CLEAN UP
- PAPER WORK FOR DAILY ACT
- DRILLERS ON SITE

0745 BID TO 13MWT32 DRILL SITE

0800 WL IN 13MWT32 @ 9' BGS
DECIDED TO PLACE SCREEN @ 8-18' BGS, THEREFORE USE HOLE PLUG TO BACK FILL 20-25
SAND 20-5
BENTONITE SEAL 5-2

0820 INSTALLED WELL 13MWT32

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE DATE

WITNESS DATE

TITLE NOV 3, 03 PM: SUNNY 70's PROJECT NO. 906 BOOK

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0700 FWK - ENROUTE FROM PGH TO CRANE
-1430

+DRILLERS ONSITE (TRUCK RIG CREW)
- JON KEIFER
- DENNIS SINIC
- TODD WOLLENHAUPT
- NICK POST
} BOWSER MORNER

- DECON READY TO GO

1600 MOVE RIG OVER TO 13MWT28 (DEEP WELL
- DRILLED TO 17.5 w/o SPL
- DRILLED TO 37.5 w SPL
PLAN TO INSTALL 6" ISOLATION CASING TO 38.5

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Wanner DATE 11-3-03

WITNESS DATE

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TITLE 11-4-03 AM: CLEAR 60's PROJECT NO. 4060 BOOK

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0700 FWK - ARR AT TENNIS FIELD OFFICE
- CALIBRATE PID
- DAILY DET SUMMARY

DRILLERS ARR:
- JON KEIFER
- TODD W.
- DENNIS SINIC
- NICK POST

0800 FWK + DRILLERS GOTO 13MWT28
- 15 MIN DELAY DUE TO GATES AT NORTH GATE

0815 REAM HOLE (13MWT28) TO 38.5 w/ 11" DRILLPIPE.

0930 COMPLETED INSTALLATION OF ISOLA CASING (6") TO ~~38.5~~ 39' BGS
- MARKING L OF BOWSER/MORN SUGGEST USING ROTO SONIC RIG IN WOODS
- BEGINS TO SMOOTH/CLEAR AREA FOR ACCESS
- PLAN TO SET UP ON 13MWT3 3

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Wanner DATE 11-4-03

WITNESS DATE

11

PM: SUNNY ZOE

TITLE 11-4-03

PROJECT NO. 9060

BOOK

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1250 SET UP ON WELL 13MWT39
- TEMP CASING TO 5'
- CORE BEGIN @ 5-15'

1320 BLOW OUT HOLE
WL = 20.5

1338 WL = 19.5 13MWT39

1345 WL - 19.0

1352 18.8

1425 DECIDED TO WATCH WELL @ 14-24 13MWT39

1450 NOTE - CORE STEM COLLAPSED IN HOLE TO CLEAN OUT HOLE BEFORE WELL INSTALLATION
13MWT39 - SCREEN 14-24'
SAND 1-25
BENT 8-11

-

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Joe McManus

WITNESS

DATE 11-4-03

DATE

TITLE 11-4-03

PM: SUNNY ZOE

PROJECT NO. 9060

BOOK

Work continued from Page

1520 DRILLERS DECON EQUIP.
- MOVE TO 13MWT38
- CASING INSTALLED 10-25-03

1535 BEGIN TO LOWER 4.5 DRILL PIPE

1800 CORED TO 80' @ 13MWT38

TODAYS TOTALS:

13MWT39: 24' PVC WELL
2.5' OB DRILL W/O SPL
22.5 BORE DRILL W SPL

13MWT38 40' BORE DRILL W/SPL

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Joe McManus

WITNESS

DATE 11-4-03

DATE

TITLE 11-5-03 PROJECT NO. 9060 BOOK 2555

Work continued from Page

0700 FOR ARR AT FIELD OFFICE
DRILLERS JON K
TODD
DENNIS S.
NICK

+DISCUSS SCREEN INTERVAL w/ MATT COCHRAN. FOR DEEP WELL T38
+ SUGGEST PLACE IN SCREEN @ 55-65
(WL in 13MWT38 @ 44' BGS)
BACK FILL 80→68
SAND PACK 68-52

0945 INSTALLED WELL 13MWT38
· SCREEN 55-65
SAND 68-52
BENTONITE CHIPS
PURE GOLD
WILL COMPLETE THE WELL WITH VOL CLAY TO 5' FROM SURFACE

BELOW SAND PACK
BENTONITE 80-68

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Hamer
WITNESS

DATE 11-5-03
DATE

TITLE 11-5-03 PM. CLOUDY COLD 40s PROJECT NO. 9060 BOOK 2555

Work continued from Page

1000 CORING BIT LOST IN HOLE AT ATV DRILL SITE 13MWT4,
- TRUCK RIG WILL ATTEMPT TO RETRIEVE THE BIT (2") USING 4" CORE/DRILL PIPE.
- RIG STARTED, DECIDED TO MOVE TRUCK RIG TO SHALLOW WELLS INSIDE COMPOUND

1030 - RIG GETS STUCK MOVING TO 13MWT34.

1200 GET RIG UN-STUCK. DECIDED TO LET THE ATV RIG DO 13MWT34
BREAK FOR LUNCH, PLAN TO MOVE TO 13MWT27,
CLEAN OFF RIG

1320 SET UP RIG ON 13MWT27

1330 BEGIN TO DRILL W/ 4½ DRILL PIPE

500 INSTALLED 13MWT27
- SCREEN 10-20
SAND 7-21
BENT. 2-7'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Hamer
WITNESS

DATE 11-5-03
DATE

TITLE 11-5-03 PM- CLOUDY 40° PROJECT NO. 9060 BOOK

Work continued from Page

1530 DISCUSS W/ TERRY R. TENUS FOR WE HAVE ACCESS TO T44 + T43

1600 DISCUSS W/ DRILLERS DECIDED TO GO INTO T44/T43 AREA AND NOT TO GO TO T41 W/ 2" CORE BIT IS IN THE HOLE @ ~55' BGS - DRILLERS LOAD UP TO INSTALL CASING

1700 @ T44, MOVE TO T44 C.

1715 GO BACK TO LOC DOWN TO GET GROUT MIXER AND

730 LV DRILL SITE:

TO PAYS TOTALS

+ 13MWT 38: INSTALLED 65' PVC WELL

+ 13MWT 27: 10' OB DRILLED W/SPL
2" BORE DRILLED W/SPL
1" BORE DRILLED W/SPL
20' PVC WELL

1800 FOR RETURN TO TBUS FIELD OFFICE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramsey WITNESS

DATE 11-5-03 DATE

TITLE 11-6-03 AM: 40° RAIN PROJECT NO. 9060 BOOK

Work continued from Page

0700 FOR TENUS ARR @ FIELD OFFICE
DRILLERS B/M: JON KEIFER
TODD W.
DENNIS S.
NICK P.
+ CALIBRATED PID
+ DAILY ACT. PAPER WORK
+ CALLED MARVIN KLUESNER
- OK TO GAIN ACCESS THROUGH NORTH GATE TO WELL DRILL SITE 13MWT44.

0815 GOTO 13MWT44, CONTINUES TO RAIN.

0845 RAIN STOPPED BEGIN TO DRILL @ 13MWT44

1115 INSTALLED ISOLATION CASING TO 40' BGS @ 13MWT44.
BREAK FOR LUNCH

1300 TRUCK RIG STUCK ON WAY TO WELL 13MWT43.

1340 UNSTUCK TRUCK, CONT. TO MOVE OTHER MISC. EQUIP TO 13MWT43 TRAILERS ETC.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramsey WITNESS

DATE 11-6-03 DATE

TITLE 11-6-03 PROJECT NO.

BOOK

Work continued from Page

WELL CONSTRUCTION SUMMARY

DATE INSTALLED	WELL ID	SCREEN TOP	SCREEN BOTTOM	INTERVAL TD	BGS TO CASING
11-5-03	13MWT27	10'	20'	21'	NA
10-28-03	13MWT32	8'	18'	25'	NA
10-24-03	13MWT37	14.5'	24.5'	25'	NA
11-4-03	13MWT38	55	65'	80'	39'
11-4-03	13MWT39	14	24'	25	NA
10-23-03	13MWT40	15'	25'	25.5	NA
10-22-03	13MWT42	11'	21'	25	NA
11-6-03	13MWT43	10'	20'	24	NA
	13MWT28				38.5
	13MWT35				39'
11-10-03	13MWT41	55	65	66	38'
	13MWT44				40'
11-10-03	13MWT45	70	80	84	39'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred McConnee

WITNESS

DATE 11-6-03

DATE

110

TITLE 11-6-03 PM: OVERCAST 40's PROJECT NO.

BOOK

Work continued from Page

1400 TRUCK RIG ON 13MWT43
- ADVANCE 6" TEMP DRILL PIPE/CASING TO 10'

1520 COMPLETED 13MWT43 WELL
- SCREEN 10-20
- SAND 7-21
- BENTONITE 2-7

TOTALS 13MWT43:
- 10' OB DRILL W/SPL
- 11' BORK DRILL W/SPL
- 21' 2" WELL INSTLD

1540 DECON EQUIP.
- MATT COCHRAN HAS INFORMED US THAT SWMU 16 IS CLEARED.
- DRILLERS TO LOAD ALL EQUIP TO MOVE TO THAT SWMU 16

1700 DRILLERS MOVE EQUIPMENT TO TETRA FIELD OFFICE AREA READY TO MOVE INTO SWMU 16.

TOTALS 13MWT44:
- 10' OB DRL W/SPL
- 30' BORK DRL W/SPL
- 40' ISO CASING INSTLD

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred McConnee

WITNESS

DATE 11-6-03

DATE

111

TITLE 11-7-03 AM: CLEAR 30 PROJECT NO. 9060 BOOK

Work continued from Page

0700 PUR AMR ON SITE
— START @ 16MWT15

0750 GO TO 16MWT15
— TAG OUT IS NOT IDENTIFIED
MOVE TO 16MWT08

0900 BEGIN TO ADVANCE 4" DRILL PIPE @ 16MWT08

1100 FINISH SPL TO 38', BEGIN TO INSTALL 6" CASING USING 11" (8" ID) DRILL PIPE @ 16MWT08.
BREAK FOR LUNCH

1130 DECON RIG + EQUIP
— WELD HARD CAP

1330 SET UP RIG ON 16MWT15

1600 COMPLETED DRILLING TO 38' 4" w/SPL CORE
BEGIN TO REAM w/ 8" ID PIPE = 11" HOLE TO INSTALL 6" ISOLATION CASING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred McCraven DATE 11-7-03

WITNESS DATE

TITLE 11-7-03 PM: CLOUDY 30's PROJECT NO. 9060 BOOK

Work continued from Page

1700 INSTALLED 6" CASING TO 38.5
GROUTED IN, IS COMPLETE.

TOTALS:

16MWT15: 7.5' OB w/SPL
31' BDRK w/SPL
38.5 ISO. CASING

16MWT08: 7' OB w/SPL
31.5 BDRK w/SPL
38.5 ISO. CASING

1800 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred McCraven DATE 11-7-03

WITNESS DATE

TITLE 11-8-03 SAT. PROJECT NO. [illegible] BOOK 2555

Work continued from Page

0700 | FOR ARR AT FIELD OFFICE
- CALIBRATED PID
- DO DAILY DRILL SUMMARY

DRILLERS ON SITE:
DON KEIFER
DENNIS SINKS } BOWSER MORNER
TODD W.
NICK P.
- LOAD SUPPLIES, FILL WATER TANKS

0830 | SET UP ON 16MWT11

0900 | 4" CORE BIT AS BECOME WORN, DRILLER GO TO LAY DOWN TO GET NEWER PART.

0930 | CONTINUE TO DRILL 16MWT11

1045 | COMPLETE SPL TO 385' BGS @ 16MWT11.
BEGIN TO ADVANCE 8" ID DRILL PIPE.

1350 | COMPLETED INSTALLING 6" ISO CASING BLACK STEEL USING 8" ID (11" OD)
GO TO DECON.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Romer DATE 11-8-03

WITNESS DATE

TITLE 11-8-03 SAT PROJECT NO. [illegible] BOOK 2555

Work continued from Page

1500 | DRILLERS SET UP ON 16MWT08
- CLEAN OUT GROUT

1525 | BEGIN TO DRILL w/ 4" ID DRILL PIPE TO CORE (5" OD)

1700 | REACHED 79' BGS HIT SOME HARD SAND STONE @ 79', IN SHALE FROM 39' TO 79'. DRILLERS LV SITE

TOTALS: 16MWT11
-39' 9' OB DRILL w/ SPL
30' BORE w/ SPL
39' ISO CASING

16MWT08
BORE DRILL w/ SPL = 40'
w/o SPL = 1'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Romer DATE 11-8-03

WITNESS DATE

TITLE 11-9-03 AM: CLEAR 50's -40's PROJECT NO. 7060 BOOK

Work continued from Page

0700 PWR ARR AT FIELD OFFICE
- CALIBRATE PID
- PAPER WORK
DRILLERS ARR
- LOAD RIG, SUPPLIES
- FILL WATER TANK

0730 GO TO SWMU 16, DRILLERS WARM UP RIG.

0815 BEGIN TO DRILL W/ 4" ID

0945 DRILLED TO 99' @ 16MWT08
MOSTLY SHALE TO TD SAND STONE BDS @ 85-89, SANDY SILTSTONE 89-93 GRADING TO SILTSTONE THEN TO CLAYEY SILTSTONE TO 97, 97-99 SANDY SILTSTONE

DRILLER GO TO DECON
- GET H2O
- BOXES

1040 SET UP ON 16MWT15

1055 BEGIN TO DRILL OUT GROUT FROM 150, CASING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramsey WITNESS

DATE 11-9-03 DATE

TITLE 11-9-03 PM: CLEAR 40's PROJECT NO. 7060 BOOK

Work continued from Page

1200 BREAK FOR LUNCH DRILLED FROM 39 THRU 87. PLAN TO DRILL TO THE SAND STONE
~

1300

1330 DRILLED TO 92 DISTINCT SAND STONE INSTALL SCREEN
SCREEN • 81-91 } 16MWT15
SAND • 78-92 }
BENTONITE TO TOP OF WELL (5' BGS)

1500 COMPLETED INSTALLATION OF 16MWT15. MOVE TO 16MWT08 TO INSTALL WELL ON A SIMILAR SAND STONE @ 85' SCREEN 85-95' SAND 82-99 BENT. TO GROUND SURFACE

1630 DRILLER LV SITE

1700 - CLEAN UP SWMU 16
• COLLECT CORE BOXES

17

TOTALS	BDRK W/SPL	BDRK W/O SPL	WELL
16MWT08	20		95
16MWT15	53	1	91
	73	1	186

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramsey WITNESS

DATE 11-9-03 DATE

TITLE DRILLING AM: 30's CLOUDY PROJECT NO. 9060

11-10-03 MONDAY BOOK

Work continued from Page

0700 FOR ARR AT TETRA FIELD TRAILER OFFICE
- CALIBRATED
- DRILLERS ONSITE, DECON RIG + TOOLS

0800 DRILLERS SET UP ON 13MWT41 IN ATTEMPT TO RECOVER A 2" CORE BIT LOST IN HOLE BY THE ATV RIG

0930 RETRIEVED THE LOST BIT. WILL PROCEED TO 66' BGS TO INSTALL WELL TO ~~50-60~~ 55-65' BGS

1015 TD @ 66' (13MWT41) BEGIN TO INSTALL WELL @ 55'-65' SCREEN
SAND 66'-52'
BENT 52'-5'
SUBTOTAL: 13MWT41: DRILLED 6"
BORE w/SPL
WELL INSTALL 65'

1050 COMPLETED WELL (13MWT41) INSTALLATION
+ DRILLERS HAVE MANY CHORES BEFORE THEY CAN MOVE ON TO 13MWT45
• UNLOADING NEW SHIPMENT OF SAND + BENT
• DECON • LOAD MORE WATER

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred McCauser DATE 11-10-03

WITNESS DATE

TITLE PM: PARTLY SUNNY 50's PROJECT NO. 9060

11-10-03 MONDAY BOOK

Work continued from Page

1310 MOVE RIG INTO BWMD COMPOUND (SIGNED IN AT THE NORTH GATE.

1325 SET UP RIG ONTO 13MWT45
• DECIDED TO DRILL DOWN 20' BELOW I50 CASING BEFORE COMING WILL LOG CUTTING

1345 BEGIN TO DRILL USING 4½" ID ~~DRILL~~ DRILLPIPE
DECIDED TO DRILL DOWN 20' BEYOND THE CASING W/O SPL WILL LOG THE CUTTINGS.

1400 LOGGED 39' TO 57' CUTTING. NO SPL.

1430 BEGAN SPL START @ 57' BGS CORE

1615 FINISH DRILLING CORED TO 84'
BASE ON DISCUSSIONS W/MATT C. FINDINGS @ WELL 13MWT44 CORES, RECOMMEND INSTALLING WELL IN V. BR SILT STONE ABOVE A BLOCKY GREY SANDSTONE WHICH IS DRY @ T44. THE VBr SILTSTONE HAS SOME H2O.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Fred McCauser DATE 11-10-03

WITNESS DATE

TITLE 11-10-03 MONDAY PM: CLOUDY 40's-50's PROJECT NO. 9060 BOOK 2555

Work continued from Page

1615 DECIDED TO INSTALL SCREEN @ T45 AT 70' TO 80' BGS ACCROSS THE SECTION THE DRILLERS COULD NOT RETRIEVE FROM HOLE AFTER MANY ATTEMPS.

1630 DRILLER BEGIN TO INSTALL WELL 13MW T45

SUB TOTAL:

- DRILL W/O SPL: 39' TO 57' = 18' (BORE)
- DRILL BORE W/SPL: 57 TO 84 = 27'
- 80' WELL INSTALLATION @ T45

1705 COMPLETED WELL INSTALLATION

- SCREEN 70'-80'
- SAND 67'-84'
- BENTONITE 5'-67'

1715 DRILLER GOTO DECON CLEAN RIG + TOOL PREP TO GOTO SWMU 16.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred Monser WITNESS

DATE 11-10-03 DATE

TITLE CRUZ NSWC AM RAINY PROJECT NO. 9060

11-11-03 TUESDAY BOOK 2555

Work continued from Page

0700 FUK ARR AT FIELD OFFICE
- CALIBRATE PID
- DO DAILY ACTIVITIES SHEETS

DRILLERS ARR ON SITE
- LOAD SUPPLIES
- FILL WATER TANKS

0750 MOVE TO SWMU 16 MW T11

1130 LOG FOR 16MW T11

38-48: 38-40: SILT STONE LAM. DK GREY TO LT GREY FOSSILS PI OCC
REC = 70%
RQD = 20%

40-42: MUD STONE

42-48: LT. GREY f-g SAND BLOCK X BEDDED OCC PLAN FOSSILS LAM TO F. BBED LO Δ FRAC OCC VUGS

48-58: MED DK CLAYEY SILT STONE FT FISS V. BR
RQD = 0%
REC = 100%

58-68
RQD = 0% MED DK CLAYEY SILT STONE
REC = 100% FISS V. BR

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Monser WITNESS

DATE 11-11-03 DATE

TITLE 11-11-03 PROJECT NO. BOOK 2555

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68-78 DK GRY VF MUC SOFT CLAYEY SILT STONE 68-72
REC = 75% -FISSILE
RQD = 20% -VBR
68-72 SAND STONE LT GRY
MED 72-75 BLK BLOCK
HARD POOR BEDDING
SMALL? BED.
74-78? LOTS OF FRAC. BIOTURB?

78-88 SILT STONE
REC = 75% CLAYEY (SHALE)
RQD = 0% SOFT LAM.
V. BR. V.F BRDS
85-88 SILTY SAND STONE
MED LAM. WITH THIN BEDDED
SOFT ALT GRY + DK GRY
LAM BR

88-98 REC = 100%
RQD = 30%

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramer WITNESS

DATE 11-11-03 DATE

122

TITLE 11-11-03 PROJECT NO. BOOK 2555

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88-96 SAND STONE
LAM. TO THIN BEDS
ALT. GRY + BLK LAM.
OCC. IRREGULAR LAM
LAM & FRAC BECOMING SILTY @ 95'
96-98 COAL BED

1200 DRILLERS INSTALLED 16MWT11
SCREEN 86-96
SAND 83-98
BENT 5'-83'

1215 BREAK FOR LUNCH

1400 DECIDED TO LET THE ATV RIG DO THE SHALLOW WELL 16MWT07. JON K AND CREW WILL GO TO SUMM16

SUBTOOLS 16MWT11

BORE DRILL W/SPL 40 TO 98 58'
96' WELL INSTALLATION

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred M Ramer WITNESS

DATE 11-11-03 DATE

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11-11-03 BOOK 2555

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1700 JON K. CREW
- CLEAN UP AT SWMU 16 + SWMU 13
- TOP OFF BENTONITE AT DRRP WELLS @ SWMU 16
- MOVE CORE BOXES TO STORAGE NEAR FIELD OFFICE

PWR CLEAN UP PREP TO DEPART AM TO-MORROW.

1830 PWR LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott M Ramsey

WITNESS

DATE 11-11-03

DATE

11/17/03 BOOK

Work continued from Page

(TENTS)
1100 S. GRIER ARRIVES ON SITE.
(TENTS)
1530 S. GRIER + MATT COCHRAN GO TO SWMU 13 + DRIVE TO SET A ROTOSONIC ON 3 MW 28 IF TO CONTINUE FROM 40'
JOHN KEIFER + NICK POST SET UP ON (BOWSER MORNER)
1630 13 MW 28 + clean it out.
TODD WOLLENHAUPT + DENNIS SINK (BOWSER MORNER) SUPPORT JON KEIFER.

1700 JON KEIFER SETS RIG TO 40' + WE FINISH FOR THAT DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier

WITNESS

DATE 11/17/03

DATE

NSWC CRANE

N9060

GB 0279

SWMU: 13 + 16

2555

DRILLING

START: 3/14/03

END:

SWMU 16 CRANE SWMU

TITLE PM: RAIN 50's PROJECT NO. 9060

11-11-03 BOOK 2555

Work continued from Page

1700 JON K. CREW
- CLEAN UP AT SWMU 16 + SWMU 13
- TOP OFF BENTONITE AT DEEP WELLS @ SWMU 16
- MOVE CORE BOXES TO STORAGE UNDER FIELD OFFICE

FUR CLEAN UP PREP TO DEPART AM TO-MORROW.

1830 FUR LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott McRenzie DATE 11/11/03

WITNESS DATE

CRANE SWMU

TITLE PM. SUNNY ≈ 60°F PROJECT NO. 9060

11/17/03 BOOK

Work continued from Page

1400 S. GRIER (TENNIS) ARRIVES ON SITE

1530 S. GRIER + MR. COCHRAN (FINNS) GO TO SWMU 13 + DECIDE TO SET A PIEZOMETER ON BORING 38 IF TO CONTINUE FROM 40'

JOHN KEIFER + NICK POST SET UP ON (BOWSER MORNER)

1630 BORING 38 + clean it out.

TODD WILLENBRINK + DENNIS SINK (BOWSER MORNER) SUPPORT JON KEIFER.

1700 JON KEIFER SETS BOTTOM TO 40' + WE FINISH FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Keifer DATE 11/17/03

WITNESS DATE

NSWC CRANE 7060

TITLE PROJECT NO.

TUE. 11/18/03 RAINY, ≈65°F BOOK

Work continued from Page

0700 S. GRIER (TENS) IS ON SITE @ 0700.

S. GRIER CALIBRATES PID.

BOWSER MORNER CREW ARRIVES.

0815 S. GRIER, (TENS) J. KEIFER, RAIN WASHES OUT THE DRILLING.

1345 S. GRIER SETS UP ON 13 MWT 25. USING THE PARASTOLTIC PUMP. produced total = 24

Initial H2O Level = 15.68'

H2O was slightly turbid ≈ 25-40 ntu.

1355 S. GRIER FINISHED slowing H2O.

1530 S. GRIER SETS UP ON 13 MWT 34. FOR

1730 S. GRIER + TERRI ROTHAN FINISH DEVELOPMENT ING 13 MW 34.

1830 All personnel leave site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/18/03

WITNESS DATE

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NSWC CRANE 7060

TITLE PROJECT NO.

WED. 11/19/03 Cloudy, 50°F BOOK

Work continued from Page

0655 Scott GRIER (S.G), Terri ROTHAN (TR) MATT COCHRAN (MC), JIM Goeret (JG) arrive onsite. Personel calibrate eq. + prepare for the days drilling activites.

0810 S. GRIER (SG TENS), J. KEIFER, D. SINK, N POST (BOWSER MORNER) SET UP ON 13 MW 34

0830 13' Coring - 10

30' of coringing completed blew out well checking recovery for H2O

1000 Water Level 77.0" ft 40' cored

1100 WATER LEVEL 76.95' S. GRIER (SG TENS) + J. KEIFER DECIDE TO TAKE 1 MORE 10' CORING RUN + REMEASURE H2O level

1130 H2O level = 86' waiting for recovery

1230 H2O Level = 85.5' S. GRIER + M. COCHRAN DECIDE TO INSTALL THE WELL AT TOTAL DEPTH 88' SCREENED INTERVAL 88'-78' with 3' of sand pack.

38.68' (SG) BR

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO

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SIGNATURE Scott Grier DATE 11/19/03

WITNESS DATE

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NDWC CRANE 1060

TITLE 11/19/03 PROJECT NO. BOOK

Work continued from Page

8

1300 S.GRIER (TEMS) J.KEIFER + D.SINK. INSTALL WELL 13 MWT 28. (BOWSER MORNER)

1400 J. KEIFER, D. SINK + TODD WOLLENHORT COMPLETE WELL 13 MWT 28.

1430 RIG IS STUCK -

1530 RIG IS OUT. J.GRIER BOARDS CRUISE 13 MWT 27.

1800 S.GRIER + MATT COCHRAN LEAVE THE SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 11/19/03

WITNESS DATE

NDWC CRANE 1060

TITLE 11/20/03 PROJECT NO. BOOK

Work continued from Page

0700 Scott GRIER (SG), Terri Rojahn (TR), MATT COCHRAN (MC) and JIM GORET (JG) ARRIVE ONSITE.

0900 S.GRIER sets up on 13 MWT 45 for development

0920 SG. BEGINS PURGING 13 MWT 45 with the

hose valve in well.

1020 Get other valve + dry well

1209 S.GRIER FINISHES DEVELOPING 13 MWT 45.

TOTAL Vol. PURGED = 7.25 g
RECHARGE RATE = 0.08' per 10 min OR
" Δ = 0.48' per 60 min
see well devop. sheet for parameters & other details

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE DATE

WITNESS DATE

NSWC CRANE

TITLE 11/20/03 CRANE PROJECT NO.

BOOK

Work continued from Page

1330 S. GRIER SETS UP ON 13 MWT 30.
The well dries in 3 minutes.
approx. 5.25 gal.
The well is allowed to recharge
recharge is aprox 0.5 - 1.0 foot / 10 min
see monitoring well develop. sheet
for details

1430 S. GRIER SURGES THE WELL
WITH THE BLOCK

1455 S. GRIER PUMPS DRY AGAIN
13 MWT 31

1500 S. GRIER FINISHES DEVELOPMENT.

1544 S. GRIER SETS UP AGAIN
13-MWT-30.

1550 SG BEGINS PUMPING
13 MWT 30.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 11/20/03

NSWC CRANE

TITLE 11/20/03 PROJECT NO.

BOOK

Work continued from Page

S.G. surges the well 2x (1606 + 1642)
total vol. purged = 7.5 g
see M.W. dev sheet for details.

1655 S. GRIER ENDS
PURGING 13 MWT 30.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 11/20/03

TITLE

PROJECT NO.

11/21/03 Clear, 58°F BOOK 9060

Work continued from Page

WELL DRILLING

→0700 S.GRIER, MATT COCHRAN, TERRI ROSMANN + JIM GOERDT ARRIVE ONSITE.

→0900 13 MWT 46 = casing set.

S.GRIER (THURS) J.KEIFER, D.SINK + TODD WOLLENHOPT set up on 13 MWT 46. (BOWER WORKER)

→0930 S.G + BOWER WORKER PERSONEL BEGIN DRILLING 13 MWT 46.

* SEE BORING LOG FOR DETAILS *

INSERTING CASING TO 39' BGS.

DRILLED TO 38', 2.40

1110 DRILLERS WENT TO LUNCH.

1230 DRILLERS RETURNED.

DRILLING ENDS TO GROUT CASING.

1400 GROUTING COMPLETE 13 MWT 46.

1530 S.GRIER HELPS T.ROSMANN + M.COCHRAN develop 16 MWT 13 + 16 MWT 15.

1830 All personal leave the site for the night.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier

DATE 11/21/03

WITNESS

DATE

TITLE

PROJECT NO.

11/22/03 SUNNY, 68°F BOOK

Work continued from Page

0700 S.GRIER, T.ROSMANN, M.COCHRAN, + J.GOERDT ARRIVE ONSITE.

Personel calibrate eq. make activities report w/ drillers and plan the days activities

1000 S.GRIER SETS UP ON 13 MWT 28 FOR DEVELOPMENT.

1000 S.GRIER DRIES THE WELL.

*See well development sheet for 13 MWT 28 for details.

1130 S.GRIER COMPLETES DEVELOPING 13 MWT 28. TOTAL PURGED = 3.25 g

1500 S.GRIER (THURS), J.KEIFER + TODD WOLLENHOPT

set on 13 MWT 46 for drilling.

screen = 65 → 55'

sand = 52'

bentonite chip = surface

1730 FINISHED INSTALLATION OF

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page MWT 46

SIGNATURE Scott Grier

DATE 11/22/03

WITNESS

DATE

11/20/03 NSWC CRANE , WV

TITLE Cloudy, Windy. PROJECT NO. BOOK

Work continued from Page

0650 S.GRIER ARRIVES ONSITE. T.ROJAHN, J.GOERDT + M.COCHRAN ARRIVE. ALL PERSONEL PREPAIR FOR THE DAY ACTIVITIES (CAL. EQ, GO OVER LOGS, ETC.)

0910 S.GRIER + T.ROJAHN SET UP ON 16 MWT 16. development

1000 S.GRIER + T.ROJAHN set up on 13 MWT 34.

1330. S.GRIER SETS UP ON 13 MWT 08 FOR SAMPLING.

PID=Not ? Sample 13GWT08 taken @ 1515. *See sampling log for details*

1900 S.GRIER leaves the site to pick up 2 *(100' x 3/4") Rolls OF POLY TUBING.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 11/23/03

WITNESS DATE

NSWC CRANE

TITLE 11/24/03 COLD, WINDY, 30°F PROJECT NO. BOOK

Work continued from Page

0700 S.GRIER, T.ROJAHN, M.COCHRAN, + J.GOERDT ARRIVE ON SITE.

All Personel prepair for the days activities.

0900. S.GRIER SETS UP ON 13 MWT 14.

1115 S.GRIER SAMPLES 13 GWT 14.

See low flow data + g.w. sample sheets for details

1400. S.GRIER SETS UP ON 13 MWT 30.

1615. S.GRIER SAMPLES 13 GWT 30.

1800 S.GRIER GOES TO FIND J.GOERDT AND HELPS HIM FINISH 13 MWT .

1900 S.GRIER + J.GOERDT leave the site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier DATE 11/24/03

WITNESS DATE

TITLE 11/25/03

PROJECT NO.

BOOK

Work continued from Page

0700 S.GRIER, T.ROJAHN, M.COCHRAN + J.GOERDT ARRIVE ONSITE.

ALL PERSONEL MAKE PREPARATIONS FOR THE DAYS ACTIVITIES.

0930 S.GRIER SETS UP ON 13 MWT 27.

1005 S.GRIER BEGINS PURGING 13 MWT 27.

1425 S.GRIER SAMPLES 13 MWT 27.

1600 Personel clean up office + decon pad.

2100 S.GRIER leaves the site for the day.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier

WITNESS

DATE 11/25/03

DATE

TITLE 12/03/03

PROJECT NO.

BOOK

Work continued from Page

1400 S.GRIER ARRIVES AT THE MAIN GATE AND GETS HIS PASS.

S.GRIER SAMPLES RINSATE BLANKS.

1815 S.GRIER LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Scott Grier

WITNESS

DATE 12/03/03

DATE

TITLE NSWC CKRIVE PROJECT NO. 9060

12/04/03 Rainy, Cold 38°F

Work continued from Page

0650 S.GRIER (SG) T.ROJAHN (TR) + J.GOERTO (JG) ARRIVE ONSITE.

Personal prepar for the day's activities.

0900 S.GRIER SETS UP ON 13 MWT 43.

1050 S.GRIER SAMPLES 13 MWT 43.

1200 S.GRIER SETS UP ON 13 MWT 44.
PROBLEM WITH LIFT - HAVE H2O IN TUBING.

1430 S.GRIER BEGINS PURGING 13 MWT 44.

1700 S.GRIER SAMPLES 13 MWT 44.

1745 S.GRIER LEAVES THE SITE.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60645

SIGNATURE Scott Grier

WITNESS

DATE 12/4/03

DATE

TITLE Rain, 36 F PROJECT NO.

12/05/03 BOOK 9060

Work continued from Page

0650 S.GRIER ARRIVES ONSITE.

0915 S.GRIER + T.ROJAHN BEGIN HAND AUGERING 16 SB 47

0940 S.G + T.R SAMPLE (SOIL) 16 SB 47

1000 SG + TR AUGER 16 SB 48.

1015 SG + TR SAMPLE 16 SB 48 0203.

1030 S.G + T.R. AUGER 16 SB 49.

1050 SG + TR SAMPLE 16 SB 49 0405.

1130 SG + TR AUGER 16 SS 42

1155 SG + TR SAMPLE 16 SS 42 0002.

1205 SG + TR AUGER 16 SS 43

1210 SG + TR SAMPLE 16 SS 43 0002.

1225 SG + TR AUGER 16 SS 44.

1225 SG + TR SAMPLE 16 SS 44 0002

1237 SG + TR SAMPLE 16 SS 45 0002.

1255 SG + TR SAMPLE 16 SS 46 0002.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60645

SIGNATURE Scott Grier

WITNESS

DATE 12/5/03

DATE

TITLE 9060 SNOW 3 BOOK PROJECT NO.

Work continued from Page

1450 S-GRIER SETS UP ON 16 MWT 11.

1540 WATER LEVEL IN 16MWT 11 drops below pump intake.

1630 S-GRIER BAILS 16 MWT 11 dry.

1720 S-GRIER CHECKS H2O level in 16 MWT 15.
H2O level = 53.36'

1800 S-GRIER LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Scott Grier DATE 12/5/03

WITNESS DATE

TITLE 12/6/03 PROJECT NO. BOOK

Clear, Lt. Breeze 40°F

Work continued from Page

0655 S.GRIER ARRIVES ONSITE.
S.G + TR SAMPLE THE SUMPS AND 16 MWT 08.

1200 S-GRIER SETS UP ON 13 MWT 02.
S.G pumps the well @ 50-100 mL/min
S.G calculates the H2O level drop to be ready for enough water to purge + sample

1345 S.G. pumps the well dry. (13 MWT 02)

1500 S.G set up on 13 MWT 06.

1628 S.G purges 13 MWT 06 dry.
Total Volume purged = 2.0g.

1715 S.G. LEAVES THE SITE FOR THE DAY.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE Scott Grier DATE 12/6/03

WITNESS DATE

TITLE 12/7/03 PROJECT NO. Clear BRISK BREEZE, 25°F

Work continued from Page

0655 S. GRIER ARRIVES ONSITE.

0900 S. GRIER SETS UP ON 13 MW-28.

1500 WATER LEVEL DROPS BELOW PUMP INTAKE.

1530 SG FTR SET UP ON 13 MW-45.

WELL 13 MW-45 WATER LEVEL 175 DROPS BELOW INTAKE ON PUMP.

1830 SG LEAVES THE SITE.

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott Grier DATE 12/7/03

WITNESS DATE

142

TITLE 12/8/03 PROJECT NO. Clear, Brisk, 25°F

Work continued from Page

0700 S. GRIER ARRIVES ONSITE.

S.G., T. ROTANN & T. GOERTZ MAKE PREPARATIONS FOR THE DAYS ACTIVITIES. (SOIL & GW SAMPLING).

0830 SG & TR BEGIN HAND AUGERING @ SWMU 13.

13 SB 16 H2O in hole @ 2'

0-1.5' Loam (DK-BR)

1.5-4.0' Silty Clay BR/LT BR/GR WET & COHESIVE

0002 INTERVAL SAMPLED @ 0848

0204 INT. SAMPLED @ 0900

13 SB 17

0002 sampled @ 0900

0-1.5 DK BR LOAM

0204 sampled @ 0930

1.5-4.0 FT BR/GR SILTY CLAY

10-1.5 INC. CLAY & GR COLOR known/3.0-4.0' ORANGE

3.0-4.0 INC. FINE SAND WATER

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE Scott Grier DATE 12/8/03

WITNESS DATE

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TITLE

PROJECT NO.

BOOK

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HNU 0.3 ppm

13 SB 18 → 0002 sampled @

0-.5' DK BR LOAM 0902

.5'-2.0'-3.0' BR SILTY CLAY 0204 sampled @ 0930

3.0'-4.0' OR/YELLOW FINE SANDY CLAYEY SAND 70%

13 SB 19 → 0002 sampled @ 0920

0-.5' DK BR LOAM 0203 sampled @

.5'-1.0' LT BR SILTY CLAY 0930

1.0'-2.0' BR LOAM W/ FINE GRAVEL

2.0'-3.0' DK BR SILTY CLAY

3.0'- DK CLAY, DK BR

REFUSAL @ 3.0'

0002

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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Work continued from Page

13 SB 20 0001 sampled @ 1005

0'-.5' DK BR LOAM W/ ORGANICS FINE

.5'-1.0' LT BR/OR CLAYEY SAND W/ ROCKS + GRAVEL

REFUSAL @ 1.0'

13 SB 21 0002 sampled @ 1004

0204 " " 1019

0'-.5' DK BR LOAM

.5'-2.0' LT BR/OR SILTY CLAY, 50/50 W SAND FINE

2.0'-3.0' FINE SAND + OR. COLOR

3.0'-4.0' SANDY, SILTY CLAY 30%, 30%, 40%

13 SB 22 0002 sampled @ 1030

0204 " " 1045

0'-.5' DK BR/BLK LOAM W/ GRAVEL FILL

.5'-1.0' DK BR SILTY CLAY

1.0'-3.0' LT BR/OR CLAYEY SAND (FINE)

GRAVEL @ 2.0'

3.0'-3.5' SANDY CLAY (FINE) OR/OR/WHITE

REFUSAL @ 3.5'

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE

WITNESS

DATE 12/8/03

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13SB23 0-.6 DK GR. SILTY LOAM w/ GRAVEL

0002 sampled @ 1030 1-2' OR/BLK SANDY CLAY w/ BLK PATCHES OF ORGANIC MATTER

0204 sampled @ 1045 2-4' CLAYEY SAND (FINE) OR SOME COHESIVE

13 SB 24 0-.5 BRN/BLK SANDY LOAM w/GRAVEL

0002-1110 .5-1.0 OR. CLAYEY SAND (FINE) 70% SAND

0203-1120 1.0-2.0 OR/GR SANDY CLAY 70% clay

2.0-3.0 OR. SILTY SAND w/GRAVEL 70% SAND

REFUSAL @ 3.0

13 SB 25

0002-1104 0-.5' GR/BL SANDY LOAM w/GRAVEL

0204-1115 .5-4.0 OR. ~~CLAYEY~~ SILTY SAND (FINE) w/clay 70%

3.0-4.0 INCREASING CLAY 25-30%

Scott Grier 11/8/03

NSWC CRANE 9060

TITLE 11/8/03

PROJECT NO.

BOOK

Work continued from Page

1500

~~0630~~ S. GRIER ~~ARRIVE~~ SETS UP ON 13 MWT 28.

1530 S. GRIER GETS THE REMAINDER OF THE SAMPLES FOR 13GWT2901.

1540 S. GRIER SETS UP ON 13 MWT 45.

1558 S. GRIER SAMPLES 1½ AMBER BOTTLES BEFORE WATER LEVEL DROPS BELOW INTAKE OF PUMP.

1700 S. GRIER DOES BORING LOGS FOR ALL HAND AUGERING.

1820 S. GRIER LEAVES THE SITE.

SIGN

Scott Grier 11/8/03

TITLE 12/9/03

PROJECT NO. Cloudy, Brisk Breeze, 51°F

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.

0930 S. GRIER SETS UP ON 13 MW-47.

1110 S. GRIER SAMPLES 13 MW-47

* see GW sample sheet for details.

1400 S. GRIER CONSTRUCTS ~~WELL~~ SOIL BORING ~~LOGS~~ 13SB16 → 13SB25.

1500 S. GRIER LEAVES TO CLEAN RENTAL.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier DATE 12/9/03

WITNESS DATE

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TITLE

PROJECT NO.

BOOK

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE DATE

WITNESS DATE

149

TITLE 12/9/03 PROJECT NO. 9060 BOOK

Cloudy, Breeze, 51°F

Work continued from Page

0650 S. GRIER ARRIVES ONSITE.

0930 S-GRIER SETS UP ON 13MWT47.

1110 S-GRIER SAMPLES 13MWT47

* see GW sample sheet for details.

1400 S. GRIER CONSTRUCTS ~~WELL~~ SOIL BORING LOGS

13SB16 → 13SB25.

1500 S. GRIER LEAVES TO CLEAN RENTAL.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Scott Grier

WITNESS

DATE 12/9/03

DATE

148

TITLE 16 OVERCAST PROJECT NO. 9060 BOOK

1-15-04 FRIDAY

Work continued from Page

1200	DRILLERS LOAD SUPPLIES +GO TO SWMU 16 SET RIG ON HOLE WELL 16MWT18 -BREAK FOR LUNCH
1300	FUR SHOWS DRILLERS WHERE TO DISCHARGE DRILLING FLUIDS INTO IWD LINE!
1330	DRILLERS CONTINUE TO SET UP ON 16MWT18. +PREP TO DO SLUG TESTS AT DEEP WELLS ON SWMU 16 - WELLS THAT NEED TO BE TESTED 16MWT08 DTW = 97.05 TD= 16MWT11 DTW ~ 99 BAILER IN WELL CAN NOT MEASURE WL. THE BAILER SEEMS TO BE ON THE BOTTOM SUGGESTING THAT THE WATER LEVEL IS ~ 3' OFF BOTTOM INSUFFICIENT AMOUNT OF H2O TO DO SLUG TEST. NOTE: ~4' OF WATER IN 16MWT08
1400	BEGIN DRILLING w/ 1" DRILL PIPE - SET MUD PAN.
1700	LOWERED 6" CASING
1715	BEGIN TO GROUT IN CASING CEMENT/BEN

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Greg M Ramsey

WITNESS

DATE 1-15-04

DATE

149

TITLE FUR 16
1-15-04

PROJECT NO. 9060

BOOK

Work continued from Page

1730	COMPLETED INSTALLATION OF 6" CASING 0-40' @ 16 MWTB USING CEMENT/BENTONITE GROUT
1800	CLEAN UP LW SITE - LEFT RIG ON HOLE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Kamer

WITNESS

DATE 1-15-04

DATE

TITLE 17
1-16-04 SAT.

PROJECT NO. 9060

BOOK

Work continued from Page

0700	FUR AT FIELD OFFICE DRILLER AT FIELD OFFICE - PAPER WORK (DAILYS - DISCUSS PROJECT + FUR CALIBRATE EQ. - PLAN TO MOVE OUT TO MGBG TO INSTALL OLTO7 WELL SEE NOTE BOOK 1347 FOR THESE ACT. AT MGBG.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Kamer

WITNESS

DATE 17
1-16-04

DATE

TITLE 1-17-04 SAT — PM: RAIN — PROJECT NO. 9060 — BOOK

Work continued from Page

1430 SET UP TO DO RECON FOR LOC OF Add. CWELLS AT SWMU 13 TO DEFINE DOWNGRADIENT EXTENT OF CONTAMINANT.
- GET WATER LEVELS @ DEEP WELLS TO DO SLUG TEST.

T46 SWL=57.63, TD=67.65
T41 SWL=66.02 TD=67.81
T44: 64.36 SWL, TD=85.9

1ST SWL=57.63, TD=67.65

+ LOCATE WELLS/PROPOSED WELL ALONG ROAD IN AREAS TO AVOID OVERHEAD UTILITIES + UNDER GROUND LOC. ALONG ROAD ARE TRUCK ACCESSIBLE

1730 PUR RETURNS TO FIELD ~~OUT~~ OFFICE

1800 LV SITE W/ TR.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred W Ramsey — DATE 1-17-04

WITNESS — DATE

152

TITLE 1-18-04 SUNDAY — AM: CLOUDY 20's — PROJECT 9060 — BOOK

Work continued from Page

0700 PUR ARR AT FIELD OFFICE,
- CALIBRATE PIDS
- MISC HOUSEKEEPING

0730 DRILLERS ARR
- DO PAPER WORK
- LOAD WATER + OTHER SUPPLIES FOR

0820 MOVE TO 16MWT18 LOC
- MAY CONSIDER USING 15' SCREEN

NOTE SWL = 96.4 @ 16MWT11
TD = 98.7

0830 BEGIN TO ADVANCE 4.5" DRILL PIPE
- 5" HOLE. AT 16MWT19
40'-50'

1115 HAVING TROUBLE EXTRACTING CORES
60'-70' SHALE/MUDSTONE

1330 AGAIN HAVING TROUBLE EXTRACTING CORES
70-80 SHALE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE — DATE

WITNESS — DATE

153

TITLE 20's PROJECT NO. 9060

1-18-04 SUNDAY BOOK

Work continued from Page

1430	CLOGGED DRILLING BIT SHORT RUN 80-88.
1700	TD AT 105' BGS ⇒ 16MWT18 ENCOUNTERED COAL SEAM @~
	BEGIN TO INSTALL WELL 16MWT18 SCREEN 94-104 SAND 91-105 BENTONITE 3' - 91' CHIPS HYDRATED
1800	DRILLERS CLEAN UP SITE
	TOTALS:
	16MWT18
	40-105 BORE w/SPL 65'
	104' 2" WELL INSTALL.
850	DRILLERS+PJR LV SITE 16 + PJR GO TO FIELD OFFICE
1900	- CLEAN OUT BLUE POLY TANK LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Wagner DATE 1-18-04

WITNESS DATE

154

TITLE PROJECT NO. 9060

1-19-04 MONDAY BOOK

Work continued from Page

0700	PJR ARR AT TERRA FIELD OFFICE - UNLOAD SUPPLIES USED FOR WELL INSTALL - PAPER WORK
0730	DRILLERS ARR. - LOAD WATER, MAIN VALVE FROZEN USE GARDEN HOSE FROM INSIDE SPIGOT. -
0815	SURVEYORS ON SITE DISCUSS PROJECT W/T.R. - JOE McCLOUD GOES TO SWMU 1 TO DECON DOZER + TO PULL CASTOR UP HILL + SCOTT+DON (DRILLERS) GO TO SWMU 16 TO INSTALL FLUSH MT. + CUT 6" ISOLATION CASING HAVING PROBLEMS + DELAY
0900	PJR ESCORTS SURVEYORS TO SWMU 16
0915	PJR GO TO FIELD OFFICE, SCOTT+DON WENT TO MG06 TO DISCUSS PLAN C" TO CUT 6" CASING USING CENTRATOR + SAWS ARR? - CATCH UP ON PAPER WORK

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred Wagner DATE 1-19-04

WITNESS DATE

155

TITLE 1-19-04 MONDAY, TEEN'S PROJECT NO. 9060 BOOK

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1200 DRILLER CONTINUE TO CUT THE 6" SURVEYOR CONTINUE TO DO SITE 1

1530 FINNISH FLUSH MT @ 16MWT18 GOTO FIELD OFFICE, DO PAPER WORK ETC.

1630 - PREP TO DEVELOPE/PURGE 16MW18

1825 BUILED 16MWT18 DOWN TO 104.1 TD = 104.5

PURGED 22 GAL (DRY)

1700 DRILL DEMOB, LV SITE.

1900 FUR LV. SITE.

- NOTE: WATER LEVELS IN WELLS TO BE SLUG TESTED:

13MWT35 : SWL = 63.96 TD ~ 69.5 70

13MWT45 = SWL = 72.75 TD ~ 82

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Greg McKeever DATE 1-19-04

WITNESS DATE

TITLE 1-20-04 TUESDAY 15°F SUNNY PROJECT NO. 9060 BOOK

Work continued from Page

0700 FUR ARR AT FIELD OFFICE.
- DISCUSS W/TR FIELD ACTIVITIES
- ESCORT SURVEYORS AT SWMU 13
- COMPLETE SYNOPTIC WL AT SWMU 13 (OUTSIDE WELLS)
- PREFORM SLUG TESTS @ TWO WELLS INSIDE SWMU 13 ALONG RAILROAD.

0815 SURVEYORS ON SITE

0830 FUR + SURVEYORS GO TO SWMU SURVEYORS GOTO SWMU 1 TO COMPLETE. WILL MT @ SWMU 16 @ NOON.

0900 FUR BEGIN SYNOPTIC WLS @ SWMU 13.

1130 COMPLETED WL's,

1200 MTG WILL SURVEYORS,
- WILL CONTINUE WORK @ SWMU 1 THEN MOVE TO "OUTSIDE GATE" @ SWMU 13. EXPECT WORK TILL END OF DAY WILL MEET UP W/ THEM TO-MORROW @ 0800 HRS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE DATE

WITNESS DATE

TITLE PM: SUNNY & CLOUDS 16°F PROJECT NO. 9060

1-20-04 BOOK

Work continued from Page

1240 SET UP EQUIPMENT FOR SLUG TESTS.

EQUIPMENT:

- MINITROLLS:

US ENV. RENTAL { S/N 008670 100 PSI
S/N 012487 100 PSI

BOTH MODEL "PROFESSIONAL"

- COMPUTER

DELL S/N 222 FROM US ENV. RENTAL W/ SOFTWARE

PROGRAM TROLLS

+ SET UP 8670 FOR T35

- RUN TEST ON X-DUCER USING CALIBRATED CYLINDER OF "THIS IS NOT CALIBRATION JUST CHECK"

+ SET UP 12487 FOR T45

- RUN CHECK OK

- TOC, Ref -00.00, LOG 10 min.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Fred H Ramsey DATE 1-2004

WITNESS DATE

158

TITLE PROJECT NO. 9060

1-20-04 BOOK

Work continued from Page

1400 SET UP AT T45,

1445 - READING WATER COL. ABOVE XD @ 9.554 PRIOR TO INSTALLING BAILERS (TWO) Ø TO 9.553

1450 INSERT BAILERS

1457 XD = 9.892

1500 XD = 9.886

1510 MOVE TO T35, BEGIN TO SET UP TEST

1520 INSERT XD TO BOTTOM (JUST OFF) OF WELL T35 (XD 8670)

1525 XD WL @ 6.166 (PRIOR TO BAILER INSERTION)

1535 INSERTED BAILER H_2O XD = 6.251

1540

1550 $XD_{H_2O\,WL}$ = 9.844

1637 $XD_{H_2O\,WL}$ = 9.824

1655 STARTED SLUG TESTS @ ~~16~~ 13 WNT 35

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred H Ramsey DATE 1-2004

WITNESS DATE

159

TITLE NSWC CRANE PM: CLEAR 16°-20° 1-20-04 PROJECT NO. 9060 BOOK

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1700 STARTED TEST @ T45

1800 LV SWMU 13

1830 LV FIELD OFFICE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer WITNESS

DATE 1-20-04 DATE

TITLE NSWC CRANE AM: 20's 1-21-04 PROJECT NO. 9060 BOOK

Work continued from Page

0700 FLUR ON SITE AT FIELD OFFICE
- PREP TO SLUG TEST
- PREP TO T46 SLUG TEST T46

0830 GO TO SWMU 16, CHECK IN WITH SECURITY.

0850 ARR @ T35

SET UP TEST FOR T46 ON 8670 XD/TROLL

0925 @ T35 H_2O @ XD = 5.871
NOTE SWL H_2O @ XD = 6.166
5.871
.295
h_o = 1.3 · $\frac{.295}{1.3}$ = 0.227 · .295
= 22%

DECIDED TO STOP TEST

0930 STOPPING TEST.
SET UP TEST FOR T46 TROLL 8670

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Fred M Ramer WITNESS

DATE 1-21-04 DATE

TITLE 1-21-04 PROJECT NO. 4060 BOOK

Work continued from Page

0945	PWC LV FOR T 46
0955	MEET SURVEYORS, TAKE TO NORTH GATE TO CHECK IN.
1000	PWC GOES TO T46 - SURVEYORS INSIDE GATE AREA.
1010	PWC @ T46 SET UP FOR SLUG TEST.
1015	INSERTED TROLL 8620 H_2O @ XD = 9.475 PRIOR TO BAILER INSERTION.
1030	CAN NOT INSERT BAILER, MIGHT BE DUE TO BEND IN RISER WILL GO GET LONG + SMALL DIA SOLID SLUG.
1130	MET SURVEYORS AT GATE, LET THEM OUT OF GATE
1145	ARR @ T46 SET UP SOLID SLUG.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE Greg McKenzie DATE 1-21-04

WITNESS DATE

TITLE 1-21-04 CLOUDY 30's PROJECT NO. 4060 BOOK

Work continued from Page

1156	XD_{H_2O} = 9.512 BEFORE SLUG INSERTED WILL DO FALLING HEAD TEST NOTE: SWL = 57.93 TD = 67.66 67.66 57.93 9.73
	RECORD TO DO FALLING HEAD DUE TO TIME CONSTRAINTS.
	XD_{H_2O} = 9.544 AT END OF FALLING HEAD
1	TEST
1245	COMPLETE SLUG TEST & CLEAN UP LV. T46 ARR FOR INSIDE T45
1300	AT 13MWT45. CHECK DRAWDOWN DIST Δh @ 0.992 WILL ALLOW TO RUN LONGER
1403	AT FIELD OFFICE LOAD EQUIPMENT FOR MGBG SEE NOTE BOOK 1347 FOR MINUTES.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Greg McKenzie DATE 1-21-04

WITNESS DATE

APPENDIX D.2.3
SWMU 13
FIELD NOTEBOOK
ROUND 3

2577

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Subject	Page

TITLE NSWC CRANE
MON JULY 26 2004

PROJECT NO. N7448
BOOK 2577

Work continued from Page

AT SITE: SJC JW, CM, JD } B/M

AM: CLOUDY, RAIN, COOL
PM: " " "

0700 - AT SITE CALLED PID - DRILLERS GET WATER - GO OVER QUANTITIES.

0800 - STILL RAINING - B/M WILL WAIT TO SEE IF IT SUBSIDES.

0930 STILL RAINING - DRILLERS GO GET SUPPLIES, GAS ETC.

1100 - DRILLERS - BACK ON SITE - B/M DECIDES (DUE TO RAIN) NOT TO WORK TODAY.

1230 B/M OFF SITE - SJC WORKS W/ TR - GETS SUPPLIES ETC.

NO ITEMS FOR B/M TODAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 7/26/04

WITNESS DATE

TITLE SWC CRANE PROJECT NO. N7448

TUES JULY 27 2004 BOOK 2577

Work continued from Page AT SITE: SJC JW CM B/M JD

AM: SUNNY, WARM

PM: " "

0640 AT SITE - CALIB PID - UNLOAD SUPPLIES, THAT I PICKED UP ON MON.

0730 MOVE TO DECON PAD THEN TO 13MWT51

0800 SET UP AT 13MWT51.

0812 START TO SAMPLE T51 (T51)

0845 @ 15.5 REF (SHALE) WILL AUGER TO 16. SET WELL @ 15-5, SAND 16-4 THEN PELLETS

0920 TALKED TO JEFF SCHUBERT - HE AGREED WITH THE ABOVE WELL - FOR NEXT 3 WELLS - WILL TARGET THE O.B. UNLESS THERE IS NOT ENOUGH SATURATION. HE WOULD LIKE TO CORE 5 TO 8' OF NEXT HOLE TO SEE HOW THICK IS THE SHALE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conti DATE 7-27-04

WITNESS DATE

TITLE NSWC CRANE

CONT. (TUES) 2004 BOOK 2577

Work continued from Page

SAND USED: GLOBAL FILTER PACK
50lb Bags
GLOBAL DRILLING SUPPLIERS INC.
1-800-356-6400
#5 QUARTZ SAND PACK

BENTONITE USED: Pure Gold Medium Chips by CETCO
50lb. Bags
CO 1010 ENVIRONMENTAL TECHNOLOGIES CO.
1-800-527-9948

SWMU 2

QUANT - (TUES)

	OB W/SAMPLES	2" WELL	CORE REAM	TEMP CASIN	
13MWT51	16'	15	—	—	← OB WELL
13MWT50	9.5	25	16.5	9.5	
13MWT49	10	9	—	—	← OB WELL
13MWT48	10				
	(45.5)	(49)	(16.5)	(9.5)	

Core T50 25'0 - 9.5 = 15.5
Ream T0 26 16.5 + 9.5 = 26.0

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conti DATE 7-27-2004

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

TUES (CONT) 2004 BOOK 2577

Work continued from Page

1000 START @ 13MWT50.

1015 HIT SHALE ≈ 8'-9.5 - HOLE DRY

1020 WAIT TO SEE IF HOLE MAKES WATER

1045 NO WATER - DECIDE TO CORE SET 6" TEMP CASING TO 9.5'±

1105 SET UP FOR CORING W/ AIR.

1110 START TO CORE @ 13MW T51

1125 RUN (1) 9.5 → 15

1130 START RUN (2)

1155 RUN (2) 15 → 20 -- POOR REC VERY "CRUMBLY" SILTSTONE.

1205 DECIDE TO LET SIT (LUNCH)

1245 AT FIELD OFF - TR SAYS THAT MEETING AT 1300 WAS POSTPONED TO THURS.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S J Conte. DATE 7/27/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

(TUES) 2004 BOOK 2577

Work continued from Page

1330 SJC AT 13MWT50 - CHIP SAYS THAT HOLE HAS ≈ 3' WATER IN HOLE IN FROM 20-17 - DECIDE TO CORE 5 MORE FEET - PLAN TO SET WELL AT ≈ 25' → 15 SCREEN (T50)

12 → 26 SAND

1430 4 → 12 CHIPS

1500 GO DECON TOOLS ETC. MOVED TO 13MWT49.

1545 BACK FROM DECON. START @ T49 (T49)

1605 AT 10' - SHALE ≈ 8.5 - WATER AT 4' BGS AT 1625 - CALL J SCHUBERT SAYS OK TO SET WELL IF WE HAVE ≈ 3' OF WATER FROM 8.5' - WHICH WE DO. WILL SET WELL 9-4 (5' SCREEN) SAND FROM 3 TO 9.5 - CHIPS TO 1'

1635 START TO SET WELL. CHIPS TAKES WL OF T50 WAS ≈ DRY BGS.

1700 WELL SET @ T49 TO 9'.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE S J Conte DATE 7/27/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

(TUES) 2004 BOOK 2577

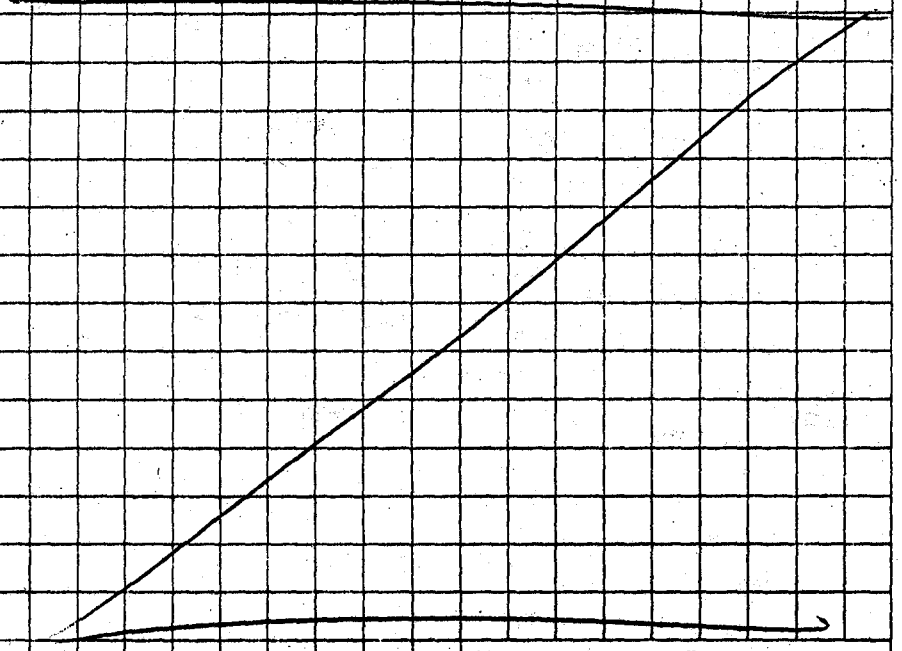
Work continued from Page

1710 MOVE TO/START 13 MW T48 - HSA RIG (ATV).

1723 DOWN TO 10 W/ SPOONS - LAST 1.5 WAS WET, BUT DOESN'T SEEM TO BE RISING.

1750 JIM WILL AUGER TO 10' CLEAN OUT AND LIFT AUGERS - WILL CHECK HOLE IN THE MORNING.

1830 LV SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 7-27-04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

WED JULY 28 2004 BOOK 2577

Work continued from Page

AT SITE SJC JW, CM, JD } BM

AM: SUNNY COOL - WARM

PM: " " V WARM.

0650 AT SITE - CALIB PID - 60 OVER QUANT

0750 WL @ T48 (13MW13) WAS ≈ 5' BGS DECIDE TO SET WELL AT 10' ± JD

WL T49 - ≈ 4' BGS

WL T50 - ~~24.8 BGS~~ 25.5 BGS

0800 SETTING WELL AT 13MWT48 - SCREEN FROM 5 - 10, SAND 3.5 TO 10.5, CHIPS FROM 1.5 TO 3.5. T48

0830 13MWT48 IS INSTALLED AS ABOVE.

0900 MOVE TO DECON

1000 GET SUPPLIES AT FIELD OFFICE GO TO 16MW T20

1010 SET UP AT T20.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 7-28-04

WITNESS DATE

TITLE NSWC CRANE WED (CONT) 2004 **PROJECT NO.** N7448 **BOOK** 2577

Work continued from Page

1055 DOWN TO 16' - HIT SOME H_2O AT 10-12'± - WILL CLEAN OUT HOLE AND WAIT TO SEE IF IT MAKES WATER.

1200 WL ≈ 12' BGS (3%) AT TD 16'± AUGERS ARE AT ≈ 12'± BASED ON 2'± OF H_2O ABOVE ROCK IN HOLE NOW AND WATER HIT AT 10-12. DECIDE TO PUT IN WELL FROM 5-15. SAND 4 TO 15.5, CHIPS TO 2'.

1238 PLACING SAND PACK (15.5 TO 4) AT WL 11'±

1310 MOVE TO 16MWT19 - SET UP ATV.

1348 ~~DONE~~ DOWN TO 16' AT T19 @ 16' WILL WAIT TO SEE IF IT MAKES WATER

1430 HOLE HAD ≈ 2.5' WATER AND STILL RISING - DECIDE TO SET WELL AT 15' - 5' SAND 5.5 → 4, CHIPS TO 2'.

1500 - SETING WELL - SAND PACK AND PELLETS AT 16MWT ~~19~~ 19 SF.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 7/28/04

WITNESS DATE

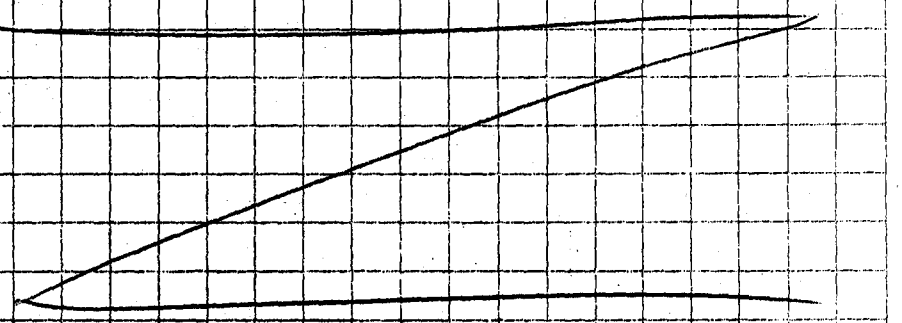
TITLE NSWC CRANE WED (CONT) 2004 **PROJECT NO.** N7440 **BOOK** 2577

Work continued from Page

1680 CLEAN UP - GO TO DECON PAD

1700 FINISH DECON - CLEAN UP AROUND DECON PAD.

1830 LV SITE



	QUANT WED 2' well	CB/ CONT	CORE Ream	Temp Casing
13MWT48	10		NA	NA
16MWT20	15	16	NA	NA
16MWT19	15	16		
	(40)	(32)		

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte DATE 7/28/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

THORS JULY 29 2004 BOOK 2577

Work continued from Page

AT SITE SJC JW, CM, JD } BM

AM PARTLY CLOUDY WARM, BREEZY

PM

0645 AT SITE - CALIB PID - LOAD VAN - GO OVER DAR W/ JIM W.

0740 PREPARE TO GO TO 600 RR MTG @ 0800

0800 AT MTG FOR RR 600 CORRIDOR WEWS.

6' OFF RAIL TO DRILL

MAY NOT NEED COMM ON SUNDAY

DONT RUN ON SUN, BUT NEED COMM

* 3 TIMES A DAY - TRAIN PASSES

TES

812-225-7013 Mike Lashford RR Insp.

854-1613 Dispatcher RR

854-3300 Security

Inchworm Alpha - Call Sign.

BLDG 7

Call Sed on Sunday

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

SIGNATURE SJ Comte DATE 7/29/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

THURS (CONT) 2004 BOOK 2577

Work continued from Page

0900 MTG OVER - THUS WILL DRAFT UP A WORK PLAN + WORK TO START ON RR AT LEAST 4 WKS AWAY.

0930 OK TO GO TO MFA - WE CAN WORK ON WEWS NEAR THE BLDG 151 ARC. JIM W WENT TO CHECK ON PADS AT SWMU 16

1000 PREPARE TO GO TO SWMU 12 - PLEASE REFER TO NB 2576 FOR DETAILS.

QUANT THURS

PADS

600 RR MTG. CORRIDOR

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Comte DATE 7/29/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

TUE AUG 17 2004 BOOK 2577

Work continued from Page AT SITE SJC JWJ & JDS TO CM

AM: SUNNY, WARM 68° → 80°F

PM: " V WARM. LO TO MID 80°F

0630 AT SITE - CALIB PID - SWEEP OUT OUR AREA OF BLDG 3245 - COMPLETE DAR

0715 DRILLERS ARRIVE - GET WATER - TAILGATE MEETING.

0745 LOAD UP EQUIP - HOOK UP COMPRESSOR MOVE TO SWMU 16

0800 CHECK IN AT SWMU 16 OFFICE - SET UP ON 16MWT21

0830 6¼" HSA TO ≈ 9.5 - TO MAKE HOLE FOR 8" (TEMP) CASING SET

0850 SETTING 8" Ø TEMP CASING

0900 BEGIN AIR ROT (8" BIT)

1045 DOWN TO ≈ 49' - BEGIN PULLING RODS

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SIGNATURE SJ Conti DATE 8/17/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

TUES (CONT) 2004 BOOK 2577

Work continued from Page

1050 RODS OUT (8" BIT) PROCEED TO SET 6' ID STEEL CASING (PERM) FLUSH JOINT THREADED AT 10' LONG SECTIONS.

1130 6" CASING SET - HAD A LITTLE TROUBLE SETTING THE LAST 10' - HAD TO BLOW OUT SOME CUTTINGS TO SET AT ≈ 49'

1140 BEGIN TO MIX CEMENT/BENT GROUT

1200 HOLE GROUTED - CLEAN UP PULL EQUIP OUT OF SWMU 16 - WILL CONTINUE THIS HOLE NEXT SHIFT.

QUANT TUES

	PERM CAS	OB DRILL NO SAMPLES (?)	TEMP CAS	BR DRILL NO SAMPLES OR CORING (?)
16MWT21	SET @ 49' (50)	9.5	9.5	39.5

Work continued to Page

SIGNATURE SJ Conti DATE 8/17/04

WITNESS DATE

TITLE NSWC CRANE
~~WED~~ THURS SEPT 9 2004

PROJECT NO. N7448
BOOK 2577

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AT SITE SJC — JW, JD, TW } B/M

AM CLOUDY, COOL
PM PARTLY CLDY WARMER

0630 AT SITE - CALIB PID, LOAD VAN, TAILGATE MTG.

0730 GO TO SWMU 16 TO COMPLETE WELL 16MWT21

0810 SET UP OVER T21 - WILL REAM W/ ROLLER BIT FIRST TO CLEAN OUT CASING

0840 CORE RUN (1) 50-57

0950 DONE RUN (2) 57-67

1030 " " (3) 67-77

1120 " " (4) 77-87

1345 " " (5) 87-97 HOLE IS MAKING "SUBSTANTIAL" AMOUNT OF WATER FROM ± 78 TO 95 - DECIDE TO REAM TO 96 AND SET A

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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SIGNATURE SJ Conte

DATE 9/9/04

WITNESS

DATE

TITLE NSWC CRANE
THURS (CONT) 2004

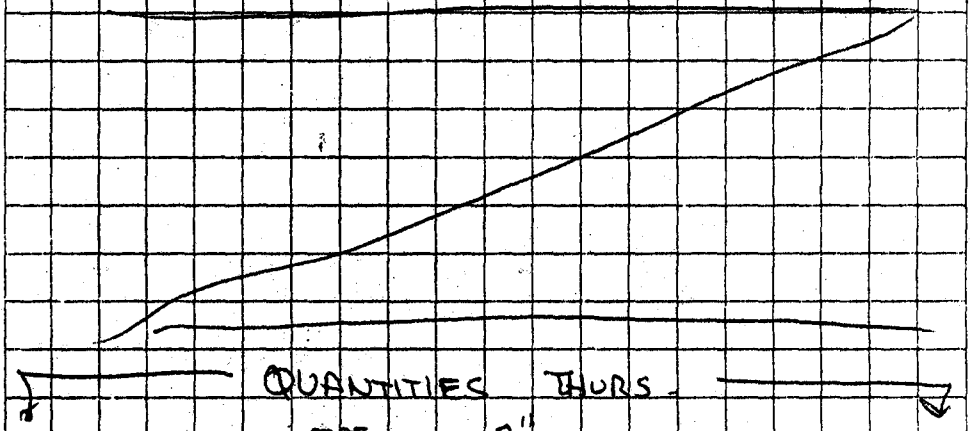
PROJECT NO. N7448
BOOK 2577

Work continued from Page

WELL FROM ± 80-95, SAND 77 TO 96, CHIPS TO

1500 PULLING RODS (REAMING) NOW

1515 START SETTING WELL SCREEN & RISER AT DEPTHS MENTIONED ABOVE. WILL LET PELLETS SET UP AND GROUT LATER.



QUANTITIES THURS.

	CORE ~~REAM~~	2" WELL
16MWT21	47' ✓	95' ✓
50 → 97 47		

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte

DATE 9/9/04

WITNESS

DATE

TITLE NSWC CRANE **PROJECT NO.** N7448

WED OCT 6 2004 **BOOK** 2577

Work continued from Page

AT SITE SJC / JG.

AM: SUNNY, COOL
PM: " WARM

0630 AT SITE - NOTE 10/5/04 - TRAVEL AND PREP DAY. TODAY GET VANS LOADED AND CALIB YSI & LAMOTTE START PAPER WORK.

0830 GO TO SWMU 13 - START SWSD SAMPLING AT LOCATION 33

0900 SAMPLE TIME FOR [redacted]13SD3301 (NO SW)

0930 " " " [redacted]13SD3002 (NO SW)

1010 " " " [redacted]13SD2802 (NO SW)

1045 " " " [redacted]13SW3401

1100 " " " [redacted]13SD3401

1245 13SW/SD (IC) WAS DRY - NO SED REQ HERE.

1305 13SW/SD (15) WAS DRY NO SED REQ

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte. DATE 10/6/04

WITNESS DATE

16

TITLE NSWC CRANE **PROJECT NO.** N7448

WED (CONT) 2004 **BOOK** 2577

Work continued from Page

1315 13SW/SD14 WAS DRY NO SED REQ

1345 Sample Time [redacted]13SW3501 ← (MS/MSD + DUP)

1410 " " " [redacted]13SD3501

1445 CANT FIND 13SW/SD 31 - CANNOT FIND STAKE OR RIBBON - PACED OFF FROM 13SW/SD 29 AND FOUND POOL OF WATER TO SAMPLE.

1515 Sample Time [redacted]13SW3102

1520 " " " [redacted]13SD3102 ← MS/MSD + DUP

Summary - Went to 9 Location / 11

Sampled 6 of 8 Sediments
" 3 of 9 Surface Waters

[redacted] Sed @ 28, 30, 31, 33, 34, 35 = (6)
" SW @ 31 34, 35 = (3)

1730 PROCEED TO LABEL, PREPARE SAMPLES

1900 LV SITE

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte. DATE 10/6/04

WITNESS DATE

17

TITLE [redacted]SWC CRANE PROJECT NO. N7448

THUR OCT 7 2004 BOOK 2577

Work continued from Page AT SITE SJC/JG

AM: SUNNY COOL
PM: " WARM

0630 AT SITE - GET SUPPLIES READY FOR SW/SD - CALIB YSI AND LAMOTTE LEFT MSSG FOR R.B.

0830 AT SWMU 13 - 13SW/SD 01

0855 Sample [redacted] 13SW0102
0900 " [redacted] 13SD0102

0930 Sample [redacted] 13SD2202 (NO SW)

THIS COMPLETES SWMU 13 SW/SD.

1050 Sample [redacted] 16SD1302 (NO SW)

1100 " [redacted] 16SD2701 (NO SW) ENCORES (6)

1115 " [redacted] 16SD0902 (NO SW)

1145 PACK UP SAMPLES FROM YESTERDAY AND TODAY

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/7/04

WITNESS DATE

TITLE [redacted]NSWC CRANE PROJECT N[redacted]N7448

THURS (CONT) 2004 BOOK 2577

Work continued from Page

1300 CALL FED EX FOR PICKUP (PU# 42)

1330 3 COOLERS READY FOR PICKUP

1400 Sample [redacted] 16SD1902 (NO SW)

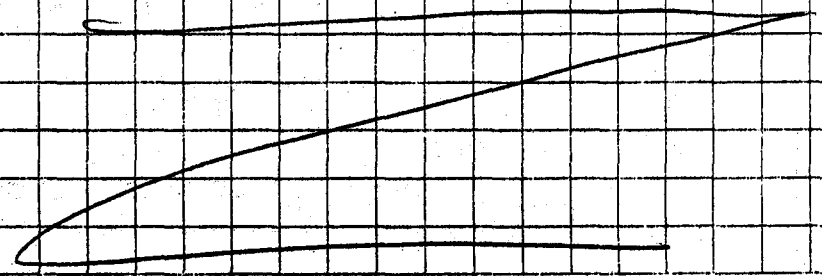
1440 " [redacted] 16SD2601 (NO SW)

1500 TRY TO FIND 16SD16 CANT FIND TO HEAVILY VEGETATED

1600 LAYOUT 13SW/SD24, 25 & 30 BOTH 24 & 25 HAVE POOLED WATER 30 IS DRY, BUT REQUIRES ENCORES

1730 RETURN TO FIELD OFFICE - PREPARE FOR FRIDAY

1830 LU SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Work continued to Page

SIGNATURE SJ Conte DATE 10/7/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

FRI OCT 8 2004 BOOK 2577

Work continued from Page

AT SITE: SJC/JG

WINDY &

AM: SUNNY COOL → WARM TO CLOUDY

PM: CLOUDY, BREEZY WARM -

0630 AT SITE -- PREPARE FOR SW/SD SAMPLING FAX COPIES OF COC TO LAUCKS AND TO SEDLMYER.

0800 PREPARE TRIP BLANK FOR TODAY.

0840 Sample [redacted] 16 SW2501 MS/MSD (Metals) +DUP 01

0845 " [redacted] 16 SD2501

0900 Sample [redacted] 16 SW2401 MS/MSD (VOAS) +DUP 02 (VOAS)

0910 " [redacted] 16 SD2401

1035 Sample [redacted] 16 SD3001 MS/MSD +DUP 03

1100 TOOK SAMPLES TO FIELD OFFICE WRITE OUT LABELS.

1230 RETURN TO SWMU 16 - WILL GO TO LOCATIONS 28, 29 TO PICK UP THE LAST 2 SED THAT REQ VOAS

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 10/8/04

WITNESS DATE

20

TITLE NSWC CRANE PROJECT NO. N7448

FRI OCT 8 2004 BOOK 2577

Work continued from Page

1300 Sample [redacted] 16 SD2901 (NO SW)

1315 Sample [redacted] 16 SD2801 (NO SW)

1430 Finish Labeling - return to field office

1500 PREPARE SAMPLES FOR SHIPPING. LABELS, COC, ETC WILL SHIP FOR SATURDAY PICKUP

1700 SHIP SAMPLES

1800 PREPARE FOR GW SAMPLING ON SAT

1830 LV SITE

Fri Summary:

Sampled 2 SW

" 5 SD

Will go to SWMU 12 for GW samples on Saturday.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJ Conte DATE 10/8/04

WITNESS DATE

21

TITLE NSWC CRANE PROJECT NO. N7448

SUN OCT 10 2004 BOOK 2577

Work continued from Page

AM: CLEAR, COOL
PM: SUNNY, WARMER

AT SITE: SJC/JG (TT NUS)

RESUMED SW/SD @ 1030 HRS - SAMPLED AT SWMU (GW) EARLIER - SEE NB 2576 FOR DETAILS.

1030 UNLOAD GW SAMPLING EQUIP FROM VANS - PREPARE FOR SW/SD SAMPLES.

1115 Sample [redacted] 16SD0802 (NO SW)

1130 " [redacted] ~~16SD08~~ sjc 10/10 16SD1202 (NO SW)

1255 " [redacted] 16SD0502 (NO SW)

1305 " [redacted] 16SD0402 (NO SW)

1310 " [redacted] 16SD1002 (NO SW)

1330 " [redacted] 16SD2302 (NO SW)

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 10/10/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

SUN (CONT) 2004 BOOK 2577

Work continued from Page

1340 Sample [redacted] 16SD1102 (NO SW)

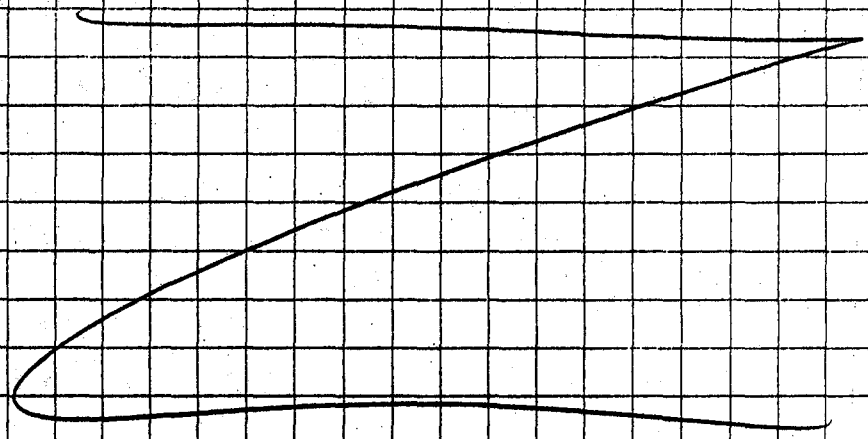
1425 " [redacted] 16SD0602 (NO SW)

1445 " [redacted] 16SD0302 (NO SW)

1530 BACK AT FIELD OFFICE - WORK ON SAMPLE PREP PAPER WORK ETC.

1700 GO TO SWMU 12 - TRY TO LOCATE A FEW SW/SD LOCATIONS

1830 LU SITE



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 10/10/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. ~~N6878~~ N7448

MON ~~OCT 4~~ DEC 15 2004 BOOK 2577

Work continued from Page

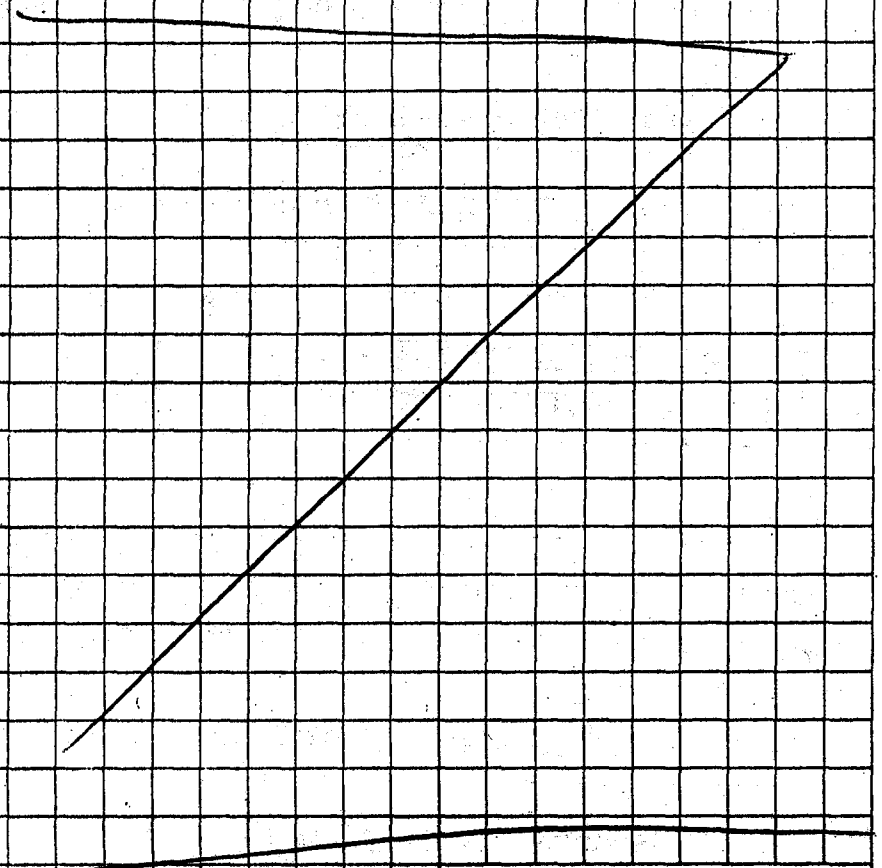
AT SITE: STC, JG

AM: CLOUDY COLD

PM: 11 11

0830 16MWT19 3.24

0832 16MWT20 3.63



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 12/15/04

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

FRI JAN 7 2005 BOOK 2577

Work continued from Page AT SITE STC

AM: CLOUDY COLD

PM: 11 11

0630 AT SITE - CHECK OUT RENTAL COMPUTER - LOAD VAN.

0730 FINISH UP NOTES

0800 GO TO SWMU 16 - HAD TROUBLE W/ LOCKS FROZEN.

0855 START SWG TESTS:

HAD TO BAIL H_2O @ T6 →

16MWT03 - R, F

16MWT05 - R, F

16MWT16 - NOT ENOUGH H_2O

VERY SLOW REC

16MWT18 - WILL START W/ PDA AND RUN ALL NITE

16MWT19 - R, F

1600 DUMP DATA ONTO HYD COND SHEETS

1800 LV SITE.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE SJConte DATE 1/7/05

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

SAT JAN 8 2005 BOOK 2577

Work continued from Page AT SITE: SJC, CD TENUS

AM: CLOUDY COLD

PM:

0630 AT SITE - PREPARE FOR SLUG TESTS

0700 TR - SAYS THAT COLIN WILL WORK W/ ME TODAY ON SLUG TESTS. WILL HEAD OVER TO SWMU 16 AND SHUT DOWN TEST @ 16MW18. THEN GO DOWN TO 16MW20.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE DJ Conn DATE 1/8/05

WITNESS DATE

TITLE NSWC CRANE PROJECT NO. N7448

BOOK 2577

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SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

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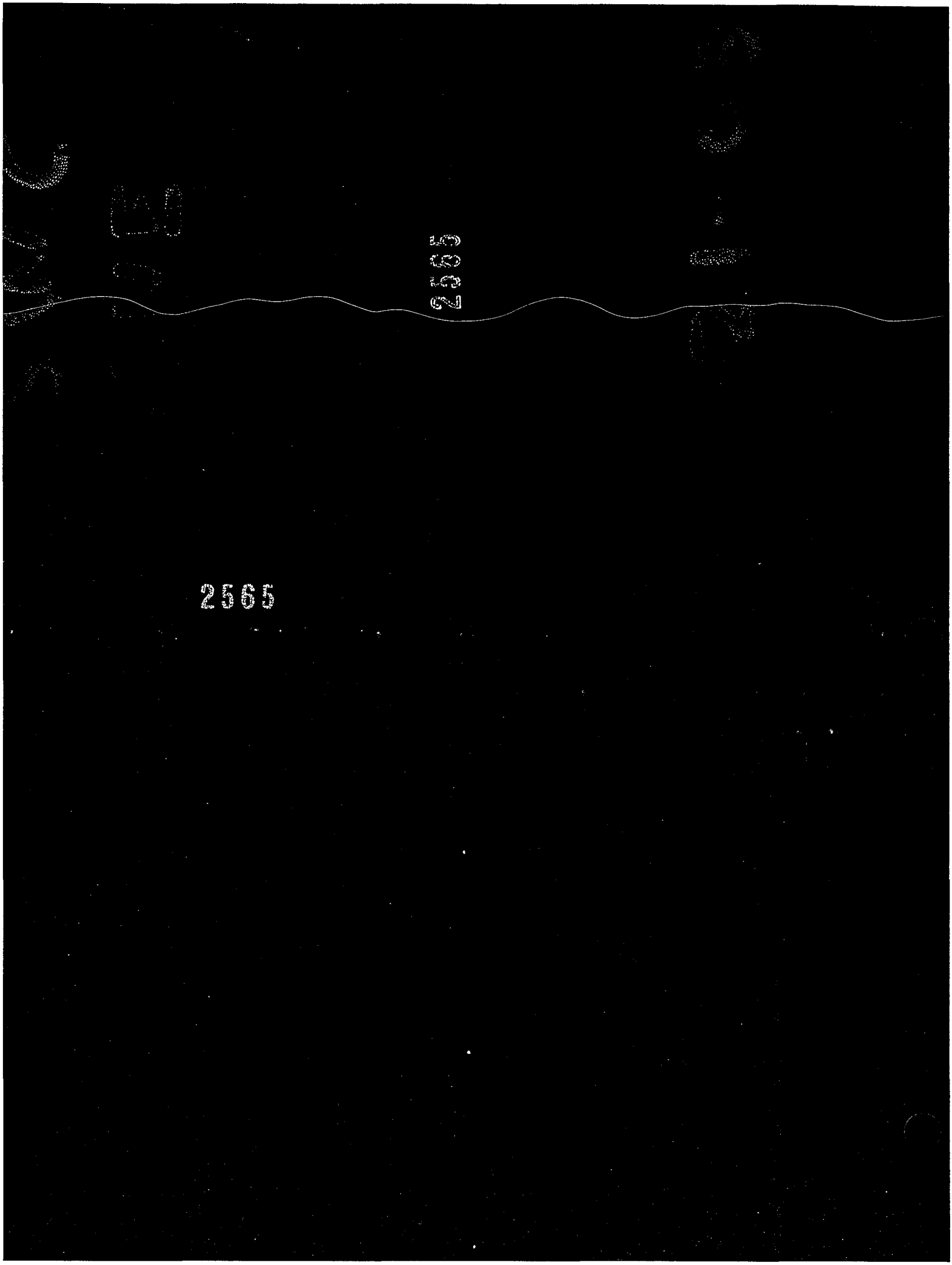
SIGNATURE DATE

WITNESS DATE


2565

TITLE

PROJECT NO.

8/11/04 Partly Cloudy, 65°F BOOK

Work continued from Page

0700	Arrive @ Office Bldg on site. Calibrate PID & Load supplies for the day. Plan is to mob back to site 13 & then, if we get digging permit, to go to site 16.
0815	Mob to Site 13 w/ DPT Rig.
0830	Set up on 13 SB 30.
0840	Collect Sample 13SS 30 0002 along w/ MS/MSD (2 Jars TOTAL)
0846	Collect Sample 13SB30 0204 along w/ Duplicate: 13FD0811 04-01.
0900	Set up on 13 SB 47.
0904	Collect sample 13 SB 47 0406. Only able to get 4' sample here.
0910	Set up on 13SB45 again & attempt to get rods out that were stuck there yesterday. Success in getting the rods out
0928	Collect sample 13 SB45 0406.
0940	Mobilize back to Office Building. Await Terry R. with digging permits for SWMU 16
1024	Terry R. returns and says that we still cannot drill @ SWMU 16 because they have not signed off on the Digging Permits yet. They are concerned w/ Fiber Optic & the Fire Alarm System on-base.

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Thomas C. Fry III DATE 8/11/04

WITNESS DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1318	Terry returns w/ dig permit for Site 16. We all mob over to start DPT Work.	
1348	Collect 16 SS 65 0102	16SB65
1356	Collect 16 SB 65 0206 from middle.	
1405	Collect 16 SB 65 0608 from middle.	
1423	Collect 16 SS 64 0102	16SB64
1435	Collect 16 SB 64 0206 from middle.	
1441	Collect 16 SB 64 0608 from middle.	
1456	Collect 16 SS 63 0102	16SB63
1508	Collect 16 SB 63 0206 from middle	
1517	Collect 16 SB 63 0608 from middle	
1537	Collect 16 SS 61 0102	16 SB 61
1545	Collect 16 SB 61 0206 from middle	
1550	Collect 16 SB 61 0607 from middle	
1605	Collect 16 SS 60 0102	16SB60
1616	Collect 16 SB 60 0206 from middle	
1622	Collect 16 SB 60 0609 from middle	
1645	Return to Office & pack samples for shipment.	
1730	All leave site for day.	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Thomas C. Fry III DATE 8/11/04

WITNESS DATE

TITLE

PROJECT NO.

8/12/04 SUNNY, 60°F BOOK

Work continued from Page

0700	Arrive @ Office Bldg. on-site. Calibrate PID & Load supplies for the day		
0745	Mob over to site 16 for DPT Work.		
0815	Collect	16SS66010 2	16SB66
0823	Collect	16SB66020 6	
0828	Collect	16SB66060 8	
0842	Collect	16SS68010 2	16SB68
0854	Collect	16SB68020 6 Along with Duplicate Sample 16FD0812040-01	
0859	Collect	16SB68060 9	
0912	Collect	16SS67010 2	16SB67
0917	Collect	16SB67020 6 *	* MS/MSD
0936	Collect	16SB67060 9	
0946	Collect	16SS69010 2	16SB69
0954	Collect	16SB69020 6	
1002	Collect	16SB69060 7	
1022	Collect	16SS72010 2	16SB72
1033	Collect	16SB72020 6	
1037	Collect	16SB72060 7	
1046	Collect	16SS73010 2	16SB73
1050	Collect	16SB73020 4	
1102	Collect	16SS75010 2	16SB75
1106	Collect	16SB75020 3	

Work continued to Page

SIGNATURE Chelsea C. Ivy III

DATE 8/12/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1240	Collect	16SS77010 2	16SB77 + DUP: 16FD0812040-02
1249	Collect	16SB77020 6	
1304	Collect	16SB77060	
1317	Collect	16SS78010 2	16SB78
1323	Collect	16SB78020 6 *	* MS/MSD
1338	Collect	16SB78060 9	
1348	Collect	16SS76010 2	16SB76
1357	Collect	16SB76020 6	
1402	Collect	16SB76060 7	
1413	Collect	16SS71010 2	16SB71
1418	Collect	16SB71020 6	
1515	Collect	16SS52010 2	16SB52
1520	Collect	16SB52020 5	
1528	Collect	16SS53010 2	16SB53
1531	Collect	16SB53020 5	
1427	Collect	16SS70010 2	16SB70
1435	Collect	16SB70020 6	
1440	Collect	16SB70060 7	
1545	Collect	16SS55010 2	16SB55
1548	Collect	16SB55020 6	
1555	Collect	16SB55060 7	

Work continued to Page

SIGNATURE Chelsea C. Ivy III

DATE 8/12/04

WITNESS

DATE

TITLE

PROJECT NO.

BOOK

Work continued from Page

1600	Collect	16SS56Φ1Φ2	16SB56
1603	Collect	16SB56Φ2Φ6	
1615	Collect	16SB56Φ6Φ8	
1630	Return to Main Office. Pack samples for Fed Ex.		
1730	All leave site for day.		

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chuck C. Fry III

DATE 8/12/04

WITNESS

DATE

TITLE

PROJECT N

8/13/04 Partly Cloudy +60°F BOOK

Work continued from Page

Φ700	Arrive @ Office Bldg. on-site. Calibrate PID. Load supplies for the day. Help Terry & Jim take a Rinse Blank on the DPT Liner & on the DPT Metal Shoe. Driller is making repairs to the DPT which was cutting off a lot while it was idling yesterday.		
Φ830	Mob over to site 16.		
Φ846	Collect	16SS59Φ1Φ2	16SB59
Φ851	Collect	16SB59Φ2Φ6	
Φ900	Collect	16SB59Φ6Φ8	
Φ912	Collect	16SS62Φ1Φ2	16SB62
Φ917	Collect	16SB62Φ2Φ6	
Φ923	Collect	16SB62Φ6Φ7	
Φ938	Collect	16SS58Φ1Φ2	16SB58
Φ941	Collect	16SB58Φ2Φ6 along w/ Duplicate: 16FDΦ813Φ4-Φ1	
1001	Collect	16SB58Φ6Φ7	
1010	Collect	16SS57Φ1Φ2	16SB57
1013	Collect	16SB57Φ2Φ6	
1030	Collect	16SS51Φ1Φ2	16SB51
1033	Collect	16SB51Φ2Φ4	
1050	Collect	16SS54Φ1Φ2	16SB54
1059	Collect	16SB54Φ2Φ5 + MS/MSD	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Chuck C. Fry III

DATE 8/13/04

WITNESS

DATE

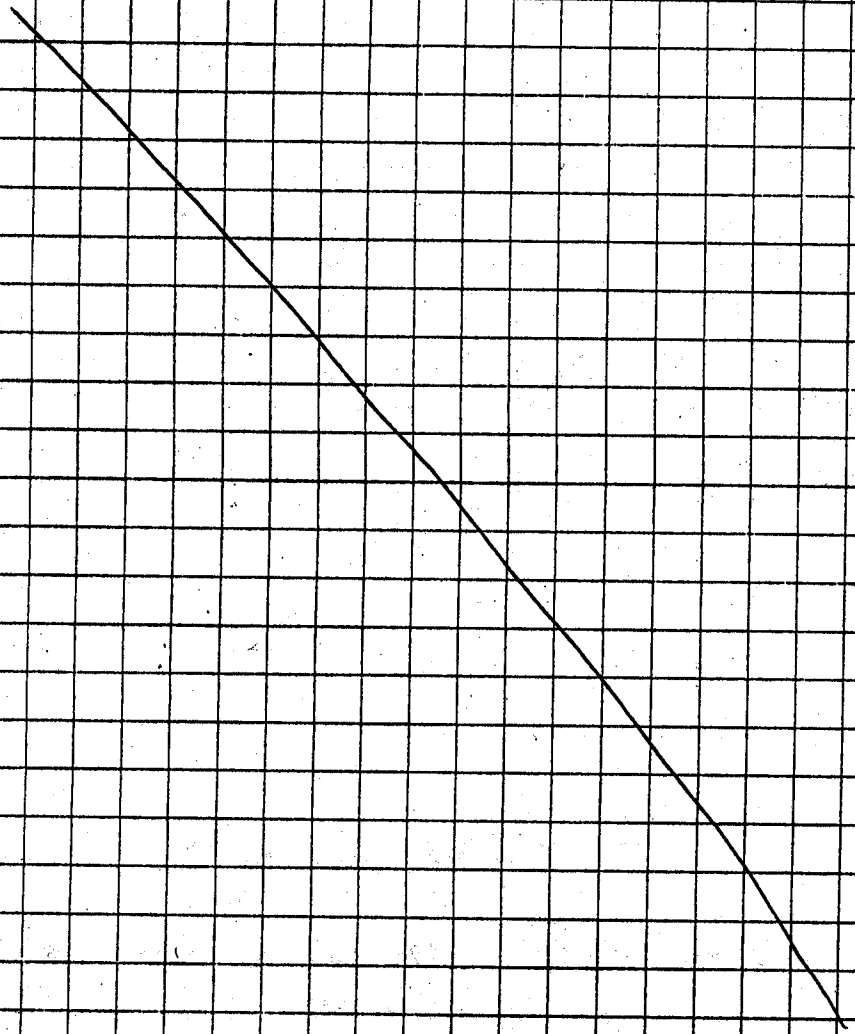
TITLE

PROJECT NO.

BOOK

Work continued from Page

1130 Return to office. Prepare to mob to Site 12.



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Jack C. Lyon III

DATE 8/13/04

WITNESS

DATE

TITLE

PROJECT NO.

8/14/04 Partly Cloudy, 70°F BOOK

Work continued from Page

0745 Arrive @ Office Bldg ON-SITE. Prepare for ~~today~~ activities: Hand Augering @ Site 16.

0850

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

TITLE 8/16/04

PROJECT NO.

BOOK

Work continued from Page

	0700	Arrive @ Office, Load up supplies for Today. Going to Core inside Bldg @ SWMU 16 & then use the DPT Rig.
	0830	Corig contractor arrives. Jwin and I and the driller arrive @ the site to determine how to get the geoprobe up & inside the Bldg.
	0915	Corig contractor & Terry R. arrive @ the site. DPT Rig is on load dock. Concrete Coring Subcontractor is: CAPITOL DRILLING & SAWING (317)-875-7601 (800)-648-0702
	1000	Corig Begins on Boring 12SB98
		Concrete w/Rebar @ Surface 0-8"
		Large Gravels & SAND from 8"-12"
	1034	Collect 16SS98 0102
	1042	Collect 16SB98 0206
	1050	Collect 16SB98 0607
		Refusal in hole @ ± 6'6".
	1059	Collect 16SB99 0102
	1113	Collect 16SB99 0608
	1116	Collect 16SB99 0206
		Refusal in hole @ ± 7'6"

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Mark C. Griffith

DATE 8/16/04

WITNESS

DATE

44

TITLE

PROJECT NO.

BOOK

Work continued from Page

1137	Collect	16SB92 0406	16SB92
1158	Collect	16SB92 0608	
1211	Collect	16SB90 0406	16SB90
1219	Collect	16SB90 0608	Refusal @ 8'
1335	Collect	16SB91 0406 along w/ DUP	16SB91
		16FD08 1604 01	
1342	Collect	16SB91 0609	
		Refusal in hole @ 9'	
1410	Collect	16SB94 0708	16SB94
		Refusal in hole @ 7'6"	
		NO SS collected in SB's 92, 90, 91 & 94 due to lack of recovery in sleeves.	
1435	Collect	16SB95 0406 along w/MS/MSD	16SB95
1445	Collect	16SB95 0607	
		Refusal in hole @ 7'	
		NO SS collected due to No Recovery	
		ONLY 1-40z Jar collected on % Moisture	
		(NOT 3 as usually Done on MS/MSD	
1458	Collect	16SB93 0406	16SB93
1505	Collect	16SB93 0608	
		NO SS collected due to No Recovery	
		Refusal in hole @ 7'6"	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Mark C. Griffith

DATE 8/16/04

WITNESS

DATE

45

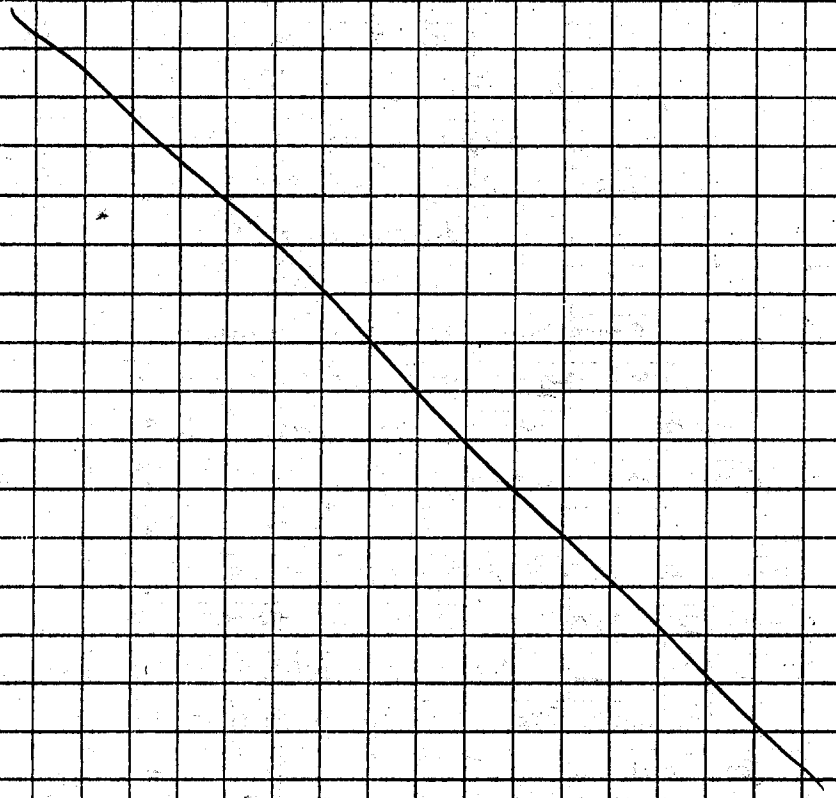
TITLE

PROJECT NO.

BOOK

Work continued from Page

1520	Collect	16SB9604Ø6	} 16SB96
1525	Collect	16SB9606Ø8	
1545	Collect	16SB9704Ø6 along w/MS/MSD	} 16SB97
1555	Collect	16SB9706Ø7 along w/DUP	
		16FDØ816Ø4Ø2	
17ØØ	Return to Office & begin to pack samples		
183Ø	Leave all for the day.		



SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE Charles C. Ng III

DATE 8/16/Ø4

WITNESS

DATE

TITLE

8/17/Ø4 Sunny +60°F

PROJECT NO.

BOOK

Work continued from Page

Ø7ØØ	Arrive @ Office. Load up supplies for today. Going to Hand Auger 16SB74 w/ Tom Dickson,	
Ø816	Collect	16SS74Ø1Ø2 along w/DUP 16FDØ817Ø4Ø1 } 16SB74
Ø842	Collect	16SB74Ø2Ø6 along w/MS/MSD Refusal @ 6'.
Ø93Ø	Return to Office & begin finishing paperwork.	

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605

Work continued to Page

SIGNATURE

DATE

WITNESS

DATE

APPENDIX D.3.1
SWMU 13
LAND SURVEY DATA
ROUND 1

SURVEY DATA FOR MINE FILL B (SWMU13)
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	TOP OF PVC ELEVATION
MONITORING WELLS					
13MWT01	490305.15300	572268.53800	713.10	715.91	715.34
13MWT02	490540.13400	571996.14500	702.10	705.28	704.72
13MWT03	490004.52900	572144.25400	718.34	721.60	721.10
13MWT04	490146.98000	571798.70700	704.37	707.32	706.84
13MWT05	490522.50900	571632.62300	693.61	697.12	696.44
13MWT06	489679.76400	571747.86000	715.30	718.47	717.93
13MWT07	490302.90700	571346.72500	684.38	687.70	687.22
13MWT08	490011.44600	571590.15400	698.42	701.11	700.56
13MWT09	489425.65800	571301.61900	703.29	706.37	705.90
13MWT10	489743.28300	571253.85400	697.77	700.64	700.15
13MWT11	489997.31100	571002.68200	679.76	682.82	682.29
13MWT12	489843.79900	570827.53900	679.96	682.66	682.12
13MWT13	489204.86300	571416.19200	699.28	702.40	701.98
13MWT14	488905.82800	571362.75200	703.15	705.98	705.50
13MWT15	489329.11300	570970.39200	694.27	697.16	696.65
13MWT16	489617.87100	570594.50800	682.13	684.83	684.35
13MWT17	489368.87000	570376.55700	690.68	693.68	693.01
13MWT18	489090.57900	570546.00400	700.05	703.43	702.92
13MWT19	488657.57000	571087.14800	703.10	706.32	705.82
13MWT20	488830.35700	570779.81800	699.33	702.65	702.07
13MWT21	489154.61000	570168.80700	688.37	691.26	690.74
13MWT22	488699.94300	570038.25800	669.53	672.38	671.96
13MWT23	488471.62000	570497.70000	696.66	699.69	699.14
13MWT24	488160.83900	570169.06500	691.33	694.39	693.93
13MWT25	488389.22600	569930.02700	678.87	682.00	681.57
13MWT26	487996.29700	569942.72200	684.86	687.92	687.49
SOIL BORINGS					
13SB01	489421.85300	571329.32300	701.65	NA	NA
13SB02	489396.70100	571297.96400	700.20	NA	NA
13SB03	489375.03300	571273.03400	700.58	NA	NA
13SB04	489385.84300	571330.45100	701.26	NA	NA
13SB05	489376.78300	571304.92500	699.79	NA	NA
13SB06	489352.52400	571292.62900	699.09	NA	NA
13SB07	488743.91300	570447.02600	689.03	NA	NA
13SB08	490012.98800	571588.35200	697.80	NA	NA
13SB09/15	488815.46300	570768.05300	697.30	NA	NA
13SB10	488836.34400	570767.42100	698.32	NA	NA
13SB11	488838.53000	570804.33700	700.14	NA	NA
13SB12	488864.33600	570835.20900	701.19	NA	NA
13SB13	488870.59400	570857.80800	702.11	NA	NA
13SB14	488731.63000	570710.62400	694.90	NA	NA

SURVEY DATA FOR MINE FILL B (SWMU13)
NSWC CRANE
CRANE, INDIANA

LOCATION	NORTHING	EASTING	GROUND SURFACE ELEVATION	TOP OF CASING ELEVATION	TOP OF PVC ELEVATION
SURFACE WATER AND SEDIMENT					
13SW/SD01	490596.61600	572020.84300	696.86	NA	NA
13SW/SD02	490504.19100	572103.57100	697.90	NA	NA
13SW/SD03	489732.34500	572333.87800	715.89	NA	NA
13SW/SD04	489349.74200	571689.14500	694.32	NA	NA
13SW/SD05	489242.08300	571570.04500	686.51	NA	NA
13SW/SD06	489107.59400	571437.21900	691.10	NA	NA
13SW/SD07	488755.84800	571101.89700	702.49	NA	NA
13SW/SD08	488280.24800	570580.34900	684.35	NA	NA
13SW/SD09	487926.41400	569874.59800	678.37	NA	NA
13SW/SD10	488609.31900	570001.82100	661.24	NA	NA
13SW11	489188.95100	570197.88400	687.59	NA	NA
13SD11	489233.71900	570161.02900	679.45	NA	NA
13SW/SD12	489711.54500	570582.67100	661.78	NA	NA
13SW/SD13	490163.75400	571029.10100	690.77	NA	NA
13SD14	489968.57900	569906.49400	575.25	NA	NA
13SD15	489884.66300	569754.91000	583.37	NA	NA
13SD16	489320.66700	569400.94800	575.81	NA	NA
13SD17	487816.46100	569751.53500	669.80	NA	NA
13SD18	487356.24200	569753.78600	633.40	NA	NA
13SD19	487904.93700	571123.18600	619.14	NA	NA
13SD20	487999.72700	571997.68800	578.15	NA	NA
13SD21	490202.93400	573035.24200	689.98	NA	NA
13SD22	490817.19800	571833.43900	666.78	NA	NA
13SD23	490638.06500	571834.51200	692.08	NA	NA
STAFF GAUGES					
13SG01	490600.47300	572024.03400	698.35	NA	NA
13SG02	490510.14500	572106.96400	701.95	NA	NA
13SG03	489349.29000	571689.47900	696.24	NA	NA
13SG04	489241.85000	571570.45100	688.99	NA	NA
13SG05	489105.05200	571437.99000	692.94	NA	NA
13SG06	488755.58000	571102.25900	704.88	NA	NA
13SG07	487927.86000	569874.64400	680.30	NA	NA
13SG08	488610.34100	569997.36300	665.95	NA	NA
13SG09	489632.20200	570664.74200	675.30	NA	NA
13SG10	490130.56400	571073.84300	676.10	NA	NA

APPENDIX D.3.2
SWMU 13
LAND SURVEY DATA
ROUND 2

SURVEY DATA FOR MINE FILL B (SWMU 13)
NSWC CRANE
CRANE, INDIANA

LOCATION	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Top of PVC Elevation
13SB16	1309644.53	3024109.94	704.73	NA	NA
13SB17	1309603.41	3024091.61	703.67	NA	NA
13SB18	1309569.54	3024057.47	700.78	NA	NA
13SB19	1309569.11	3024032.95	699.65	NA	NA
13SB20	1309109.72	3023520.23	698.62	NA	NA
13SB21	1309143.49	3023643.96	705.44	NA	NA
13SB22	1309073.36	3023628.64	701.76	NA	NA
13SB23	1309004.34	3023563.33	700.41	NA	NA
13SB24	1308950.01	3023513.53	699.75	NA	NA
13SB25	1308938.63	3023443.64	697.49	NA	NA
13MWT27	1309786.55	3023829.07	696.09	698.18	698.13
13MWT28	1309678.62	3024066.67	703.54	705.53	705.55
13MWT29	1309538.75	3024290.72	698.10	700.50	700.44
13MWT30	1309174.84	3024237.45	696.57	698.97	698.94
13MWT31	1308631.83	3023583.85	693.56	696.15	696.21
13MWT32	1308214.11	3023162.00	693.62	696.06	696.04
13MWT33	1308749.27	3023868.77	700.14	702.05	701.97
13MWT34	1309304.31	3023084.25	693.35	695.83	695.93
13MWT35	1310254.91	3023773.29	679.51	681.73	681.73
13MWT36	1309053.39	3022677.86	664.91	667.17	667.21
13MWT37	1309402.93	3022617.27	659.96	662.38	662.29
13MWT38	1309376.76	3022619.53	659.03	661.03	661.04
13MWT39	1309804.48	3022589.03	652.42	654.39	654.44
13MWT40	1309622.33	3022833.33	664.93	667.27	667.18
13MWT41	1309645.20	3022819.00	663.65	665.81	665.67
13MWT42	1309862.28	3023113.22	668.05	670.35	670.31
13MWT43	1310558.56	3023939.45	688.88	690.96	690.90
13MWT44	1310621.14	3023530.33	682.11	684.06	683.82
13MWT45	1309373.68	3022901.38	688.76	690.54	690.59
13MWT46	1309812.02	3022565.94	651.64	653.68	653.61
13MWT47	1309389.47	3024437.45	675.41	677.32	677.23
13SP01	1309723.29	3021982.45	558.94	NA	NA
13SP02	1310315.90	3022574.54	567.87	NA	NA
13SP03	1311091.03	3022745.09	574.29	NA	NA
13SP04	1311053.97	3024465.59	660.80	NA	NA
13SW/SD24	1308767.99	3024782.09	612.91	NA	NA
13SW/SD25	1307717.82	3025181.47	550.41	NA	NA
13SW/SD26	1309927.94	3026328.70	588.77	NA	NA
13SW/SD27	1309923.03	3026476.80	583.08	NA	NA
13SW/SD28	1308827.77	3021144.45	555.68	NA	NA
13SW/SD29	1311065.29	3022760.50	572.40	NA	NA
13SW/SD30	1308982.53	3020612.39	528.14	NA	NA
13SW/SD31	1311321.27	3022611.01	569.16	NA	NA
13SW/SD32	1308877.82	3024614.15	623.48	NA	NA
13SG11	1309388.01	3024416.84	675.36	(Top Guage)	NA

SB = Soil Boring SW = Surface Water SG = Staff Gauge
MW = Monitoring Well SD = Sediment SP = Seep

SURVEY DATA FOR CAST HIGH EXPLOSIVES FILL/B146 INCINERATOR (SWMU 16)
NSWC CRANE
CRANE, INDIANA

LOCATION	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Top of PVC Elevation
16SB42	1320695.93	3033088.62	752.50	NA	NA
16SB43	1320625.18	3033128.42	751.92	NA	NA
16SB44	1320573.49	3033158.25	744.26	NA	NA
16SB45	1320496.42	3033085.00	742.47	NA	NA
16SB46	1320451.82	3033020.17	749.06	NA	NA
16SB47	1321100.87	3032594.91	759.83	NA	NA
16SB48	1321081.68	3032601.85	760.26	NA	NA
16SB49	1321117.41	3032618.95	761.32	NA	NA
16SB50	1321088.19	3032626.34	761.50	NA	NA
16MWT07	1321176.93	3033001.57	760.54	762.91	762.87
16MWT08	1321179.45	3033009.24	759.57	761.62	761.56
16MWT09	1321068.49	3033041.44	762.43	764.47	764.28
16MWT10	1320936.05	3033074.74	761.93	764.48	764.43
16MWT11	1320934.64	3033062.79	763.23	765.47	765.24
16MWT12	1320729.14	3033074.92	753.23	755.54	755.45
16MWT13	1321125.78	3032562.41	757.62	759.66	759.57
16MWT14	Abandoned	-	-	-	-
16MWT15	1321120.81	3032563.53	757.73	759.77	759.69
16MWT16	1321059.41	3032814.52	764.98	Flush Mt.	764.74
16MWT17	1321235.88	3032675.07	764.79	766.52	766.53
16MWT18	1321068.96	3032807.84	764.99	Flush Mt.	764.44
16SW/SD12	1320984.27	3032193.49	681.09	NA	NA
16SW/SD13	1320296.86	3032110.65	639.33	NA	NA
16SW/SD14	1321752.05	3034042.95	625.32	NA	NA
16SW/SD15	1320773.46	3034509.17	595.51	NA	NA
16SW/SD16	1320361.12	3034191.41	597.61	NA	NA
16SW/SD17	1319010.15	3033272.07	585.01	NA	NA
16SW/SD18	1320758.36	3034589.83	595.44	NA	NA
16SW/SD19	1318678.18	3033398.54	578.89	NA	NA
16SW/SD20	1320338.90	3032013.81	642.09	NA	NA
16SW/SD21	1321738.16	3034075.17	623.94	NA	NA
16SW/SD22	1321416.93	3032998.48	713.03	NA	NA

SB = Soil Boring
MW = Monitoring Well
SW = Surface Water
SD = Sediment

APPENDIX D.3.3
SWMU 13
LAND SURVEY DATA
ROUND 3

SWMU 13 SURVEY LOCATIONS- OCTOBER, 2004					
DATA COMPILED BY: BLEDSOE, TAPP, & RIGGERT, INC					
Location	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Top of PVC Elevation
MONITORING WELL			Elevation	Elevation	Elevation
13MWT48	1309618.82	3021409.02	546.20	548.75	548.67
13MWT49	1309795.96	3021713.21	551.05	553.92	553.90
13MWT50	1310002.40	3022085.22	557.77	560.49	560.49
13MWT51	1310206.30	3022381.03	569.28	571.24	571.36
SOIL BORING					
13SB26	1308977.87	3023412.07	696.34	N/A	N/A
13SB27	1309019.05	3023506.70	698.46	N/A	N/A
13SB28	1308957.59	3023462.53	697.66	N/A	N/A
13SB29	1309072.31	3023493.85	697.39	N/A	N/A
13SB30	1309125.49	3023478.91	696.65	N/A	N/A
13SB31	1309089.71	3023523.44	699.50	N/A	N/A
13SB32	1309164.94	3023567.00	699.47	N/A	N/A
13SB33	1309214.12	3023604.99	699.90	N/A	N/A
13SB34	1309199.57	3023640.37	704.67	N/A	N/A
13SB35	1309163.30	3023669.49	700.89	N/A	N/A
13SB36	1309091.92	3023689.59	700.85	N/A	N/A
13SB37	1309042.68	3023591.93	700.09	N/A	N/A
13SB38	1309586.06	3023995.86	701.22	N/A	N/A
13SB39	1309554.95	3024003.47	698.33	N/A	N/A
13SB40	1309546.83	3024040.70	700.48	N/A	N/A
13SB41	1309581.91	3024040.83	698.93	N/A	N/A
13SB42	1309621.03	3024065.68	700.65	N/A	N/A
13SB43	1309512.30	3023895.30	696.64	N/A	N/A
13SB44	1309478.27	3023922.51	697.28	N/A	N/A
13SB45	1308991.43	3023350.47	689.29	N/A	N/A
13SB46	1308937.59	3023379.57	694.95	N/A	N/A
13SB47	1308844.66	3023159.60	680.62	N/A	N/A
SURFACE WATER/ SEDIMENT					
13SW01/SD33	1308432.31	3019851.58	519.16	N/A	N/A
13SW02/SD34	1309899.21	3021700.73	544.92	N/A	N/A
13SW03/SD35	1310607.45	3022473.11	558.00	N/A	N/A
STAFF GUAGE					
13SG12	1312371.18	3022662.06	595.28	N/A	N/A
13SG13	1311077.60	3022704.86	572.52	N/A	N/A
13SG14	1310424.91	3022481.79	567.75	N/A	N/A
13SG15	1309660.62	3021524.54	544.18	**TOP OF STAKE=**	546.13
13SG16	1309270.46	3021074.88	537.01	**TOP OF STAKE=**	538.97
13SG17	1309034.25	3020747.93	532.48	**TOP OF STAKE=**	534.56
13SG18	1308276.51	3019633.62	524.23	N/A	N/A
VEGETATION					
13VG01	1309943.71	3022181.04	565.50	N/A	N/A
13VG02	1309912.02	3022053.44	555.46	N/A	N/A
13VG03	1309706.50	3022121.22	590.73	N/A	N/A
13VG04	1309685.02	3022200.09	608.26	N/A	N/A
13VG05	1309834.90	3022337.85	619.95	N/A	N/A

13VG06	1309904.81	3022880.39	644.68	N/A	N/A
13VG07	1309794.13	3022407.12	635.16	N/A	N/A
13VG08	1309655.99	3022427.09	643.92	N/A	N/A
13VG09	1309479.50	3022560.24	653.04	N/A	N/A
SB= Soil Boring SW = Surface Water SG = Staff Guage					
MW = Monitoring Well SD = Sediment SP = Seep VG = Vegetation					

APPENDIX D.3.4
SWMU 13
LAND SURVEY DATA
ADDITIONAL SEDIMENT SAMPLING

SURVEY TABLE
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Location	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Top of PVC Elevation (feet amsl)
The following data was collected in April of 2005, but not previously published.					
Surface Water/Sediment					
13SW/SD036	1308866.44	3019243.68	518.28	NA	NA
13SW/SD037	1308413.20	3019478.35	513.59	NA	NA
13SW/SD038	1308019.19	3019461.05	511.94	NA	NA
13SW/SD039	1307874.49	3019417.83	511.22	NA	NA
13SW/SD040	1306032.96	3019790.03	501.31	NA	NA
13SW/SD041	1305092.91	3019408.94	498.38	NA	NA
13SW/SD042	1303638.67	3019362.37	491.77	NA	NA
13SW/SD043	1301382.91	3025289.56	488.65	NA	NA
13SW/SD044	1302663.81	3026143.05	487.61	NA	NA
13SW/SD045	1304178.26	3026775.79	487.15	NA	NA

MW = Monitoring Well TW = Temporary Well SP = Seep SG = Staff Gauge SW = Surface Water
SD = Sediment SU = Sump SB = Soil Boring

APPENDIX D.3.5
SWMU 13
LAND SURVEY DATA
EXTERNAL SUMP/DRAINAGE INVESTIGATION

location_id	easting	northing	coordinate_system
13SB048	3024189.4	1309813.94	NAD 1983 SPCS Indiana West (Feet)
13SB049	3024094.65	1309806.11	NAD 1983 SPCS Indiana West (Feet)
13SB050	3024077.9	1309815.54	NAD 1983 SPCS Indiana West (Feet)
13SB051	3023988.76	1309812.53	NAD 1983 SPCS Indiana West (Feet)
13SB052	3023485.02	1308991.98	NAD 1983 SPCS Indiana West (Feet)
13SB053	3023458.32	1308967.35	NAD 1983 SPCS Indiana West (Feet)
13SB054	3023492.82	1309071.8	NAD 1983 SPCS Indiana West (Feet)
13SB055	3023387.4	1308999.91	NAD 1983 SPCS Indiana West (Feet)
13SB056	3023355.47	1308989.67	NAD 1983 SPCS Indiana West (Feet)
13SB057	3023356.77	1309051.2	NAD 1983 SPCS Indiana West (Feet)
13SB059	3023402.28	1309094.47	NAD 1983 SPCS Indiana West (Feet)
13SB060	3024174.91	1309713.37	NAD 1983 SPCS Indiana West (Feet)
13SB061	3024137.06	1309677.15	NAD 1983 SPCS Indiana West (Feet)
13SB062	3024013.7	1309791.85	NAD 1983 SPCS Indiana West (Feet)
13SB063	3024009.53	1309817.68	NAD 1983 SPCS Indiana West (Feet)
13SB064	3022920.62	1308586.09	NAD 1983 SPCS Indiana West (Feet)
13SB065	3022935.39	1308588.59	NAD 1983 SPCS Indiana West (Feet)
13SB066	3022941.78	1308580.24	NAD 1983 SPCS Indiana West (Feet)
13SB067	3022927.74	1308578.42	NAD 1983 SPCS Indiana West (Feet)
13SB068	3023854.32	1310130.88	NAD 1983 SPCS Indiana West (Feet)
13SB069	3023841.37	1310127.59	NAD 1983 SPCS Indiana West (Feet)
13SB070	3023111.96	1309355.05	NAD 1983 SPCS Indiana West (Feet)
13SB071	3023103.69	1309344.92	NAD 1983 SPCS Indiana West (Feet)
13SB072	3023397.43	1308968.06	NAD 1983 SPCS Indiana West (Feet)
13SB073	3023497.674	1308987.889	NAD 1983 SPCS Indiana West (Feet)
13SB074	3023473.418	1308975.911	NAD 1983 SPCS Indiana West (Feet)
13SB075	3023483.117	1309070.937	NAD 1983 SPCS Indiana West (Feet)
13SB076	3023490.469	1309082.542	NAD 1983 SPCS Indiana West (Feet)
13SB077	3023485.181	1309096.733	NAD 1983 SPCS Indiana West (Feet)
13SU/SL001	3023767.03	1310156.18	NAD 1983 SPCS Indiana West (Feet)
13SU/SL002	3023884.05	1310307.7	NAD 1983 SPCS Indiana West (Feet)
13SU/SL003	3023888.84	1310252.75	NAD 1983 SPCS Indiana West (Feet)
13SU/SL004	3022970.62	1309298.47	NAD 1983 SPCS Indiana West (Feet)
13SU/SL005	3022980.01	1309329.47	NAD 1983 SPCS Indiana West (Feet)
13SU/SL006	3023075.77	1309433.63	NAD 1983 SPCS Indiana West (Feet)
13SU/SL007	3023116.45	1309466.92	NAD 1983 SPCS Indiana West (Feet)
13SU/SL008	3023120.78	1309434.08	NAD 1983 SPCS Indiana West (Feet)
13SU/SL009	3023406.07	1308963.3	NAD 1983 SPCS Indiana West (Feet)

APPENDIX D.3.6
SWMU 13
LAND SURVEY DATA
PCB DELINEATION INVESTIGATIONS

SURVEY TABLE
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Location	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Top of PVC Elevation (feet amsl)
Surface Water/Sediment					
13SW/SD046	1309554.64	3023866.22	696.87	NA	NA
13SW/SD047	**NOT SAMPLED**				
13SW/SD048	1309602.65	3023735.46	690.45	NA	NA
13SW/SD049	1308965.80	3023405.73	690.94	NA	NA
13SW/SD050	1308961.03	3023394.17	691.23	NA	NA
13SW/SD051	1308986.81	3023362.53	689.92	NA	NA
13SW/SD052	1308934.39	3023250.23	684.55	NA	NA
13SW/SD053	1308857.64	3023172.89	680.50	NA	NA
13SW/SD054	1308888.74	3023110.84	676.55	NA	NA
13SW/SD055	1309846.87	3023453.71	672.96	NA	NA
13SW/SD056	1309855.33	3023445.99	672.37	NA	NA
13SW/SD057	1309056.91	3023361.26	684.25	NA	NA
13SW/SD058	**NOT SAMPLED**				
13SW/SD059	1308966.76	3023298.02	686.31	NA	NA
13SW/SD060	1308899.81	3023211.99	682.21	NA	NA
13SW/SD061	1308905.47	3023050.73	674.47	NA	NA
13SW/SD062	1308852.26	3022910.29	667.29	NA	NA
13SW/SD063	1309601.94	3023706.96	689.77	NA	NA
13SW/SD064	1309602.21	3023686.26	688.88	NA	NA
13SW/SD065	1309615.67	3023664.36	687.12	NA	NA
13SW/SD066	1309604.07	3023682.24	689.08	NA	NA
13SW/SD067	1309608.63	3023677.15	688.85	NA	NA
13SW/SD068	1309611.79	3023671.58	688.35	NA	NA
Soil Borings					
13SB073	1308987.89	3023497.67	695.82	NA	NA
13SB074	1308975.91	3023473.42	698.37	NA	NA
13SB075	1309070.94	3023483.12	696.08	NA	NA
13SB076	1309082.54	3023490.47	695.90	NA	NA
13SB077	1309096.73	3023485.18	695.71	NA	NA
13SB078	1309170.55	3023566.28	699.04	NA	NA
13SB079	1309138.43	3023614.81	704.46	NA	NA
13SB080	1308998.86	3023600.23	699.99	NA	NA
13SB081	1309520.01	3023913.88	697.09	NA	NA
13SB082	1309492.01	3023936.79	697.08	NA	NA
13SB083	1309514.33	3024001.27	697.05	NA	NA
13SB084	1309530.14	3023983.59	697.59	NA	NA
13SB085	1309631.76	3024076.32	700.96	NA	NA
13SB086	1309572.54	3024033.74	699.18	NA	NA
13SB087	1309562.09	3023961.79	700.17	NA	NA
13SB088	1309145.64	3023487.09	698.02	NA	NA
13SB089	1309123.64	3023454.30	696.55	NA	NA
13SB090	1309133.56	3023667.95	700.93	NA	NA
13SB091	1309093.78	3023644.12	701.67	NA	NA

SURVEY TABLE
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Sample Location	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet amsl)	Top of Casing Elevation (feet amsl)	Top of PVC Elevation (feet amsl)
13SB092	NOT SAMPLED				
13SB093	1309104.98	3023520.24	698.79	NA	NA
13SB094	1309073.05	3023499.89	697.06	NA	NA
13SB095	1308967.95	3023456.69	694.91	NA	NA
13SB096	1308994.23	3023335.52	690.49	NA	NA
13SB097	1308978.39	3023341.91	690.05	NA	NA
13SB098	1308950.98	3023255.26	686.84	NA	NA
13SB099	1308932.74	3023264.32	686.88	NA	NA
13SB100	1308865.51	3023173.78	682.01	NA	NA
13SB101	1308858.48	3023181.97	682.54	NA	NA
13SB102	1308996.64	3023337.55	690.59	NA	NA
13SB103	1308996.24	3023332.65	690.54	NA	NA
13SB104	1308959.99	3023452.35	696.88	NA	NA
13SB105	1308970.95	3023450.31	696.34	NA	NA
13SB106	1308971.18	3023448.13	696.39	NA	NA
13SB107	1308972.62	3023451.59	697.00	NA	NA
MW = Monitoring Well TW = Temporary Well SP = Seep SG = Staff Gauge SW = Surface Water					
SD = Sediment SU = Sump SB = Soil Boring					

APPENDIX E
SWMU 13
AQUIFER CHARACTERISTICS, CALCULATIONS, AND RECORDS

APPENDIX E.1
SWMU 13
SLUG TEST DATA, CALCULATIONS, AND RESULTS

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT02
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	435.00 = To

Hydraulic Conductivity (K) :

2.70E-06	ft./min.
4.49E-08	ft./sec.
3.88E-03	ft./day
1.37E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: BMW102

PROJECT NO.: 9060 C20 0879 GEOLOGIST: BOB BARKOVIC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 29.54' T.D. TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 17.10 DATE: 5/10/03

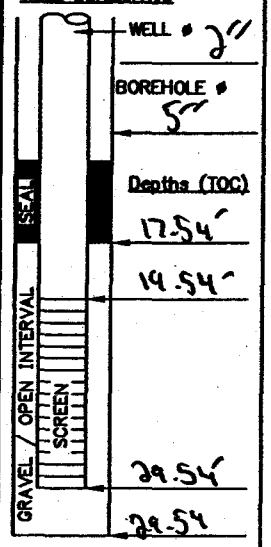
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

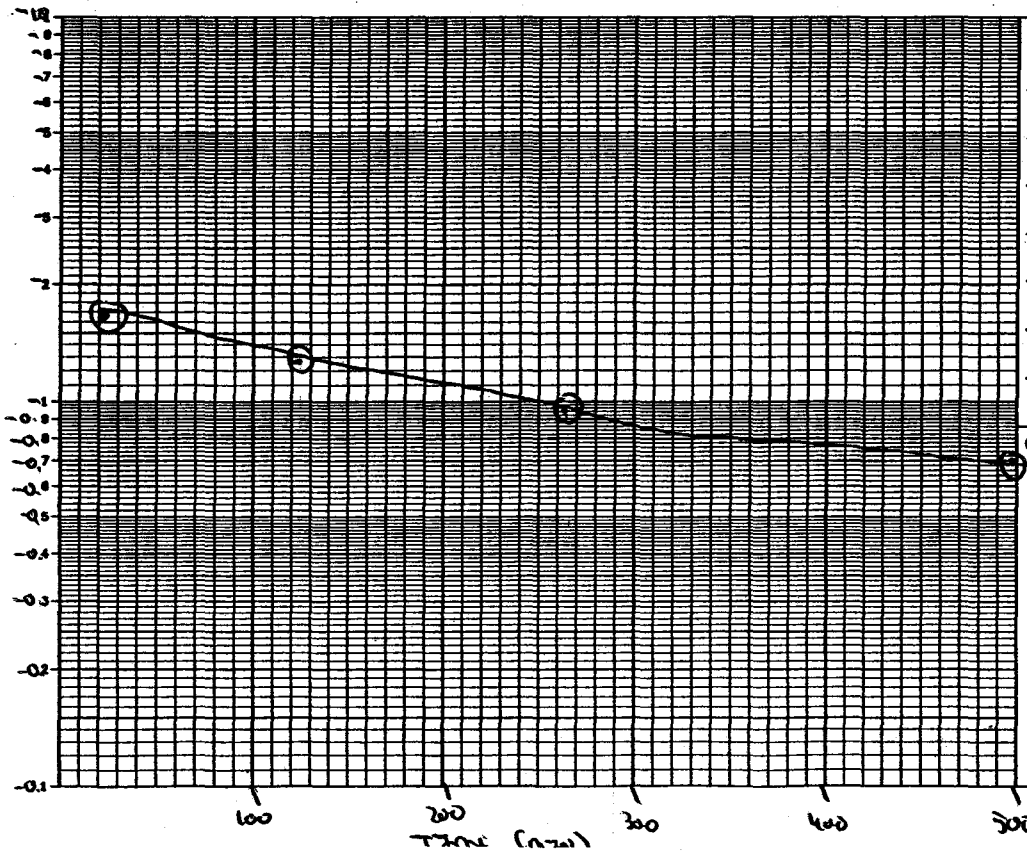
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 61.5" SOLID SLUG PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	10.937	0			
0.1	8.299	-2.638			
0.81	9.065	-1.872			
1.04	9.08	-1.857			
7.035	9.154	-1.783			
25.05	9.277	-1.66			
79.35	9.522	-1.415			
135.81	9.673	-1.264			
265.98	9.977	-0.96			
501.08	10.243	-0.694			
744.21	10.424	-0.513			

WELL SCHEMATIC

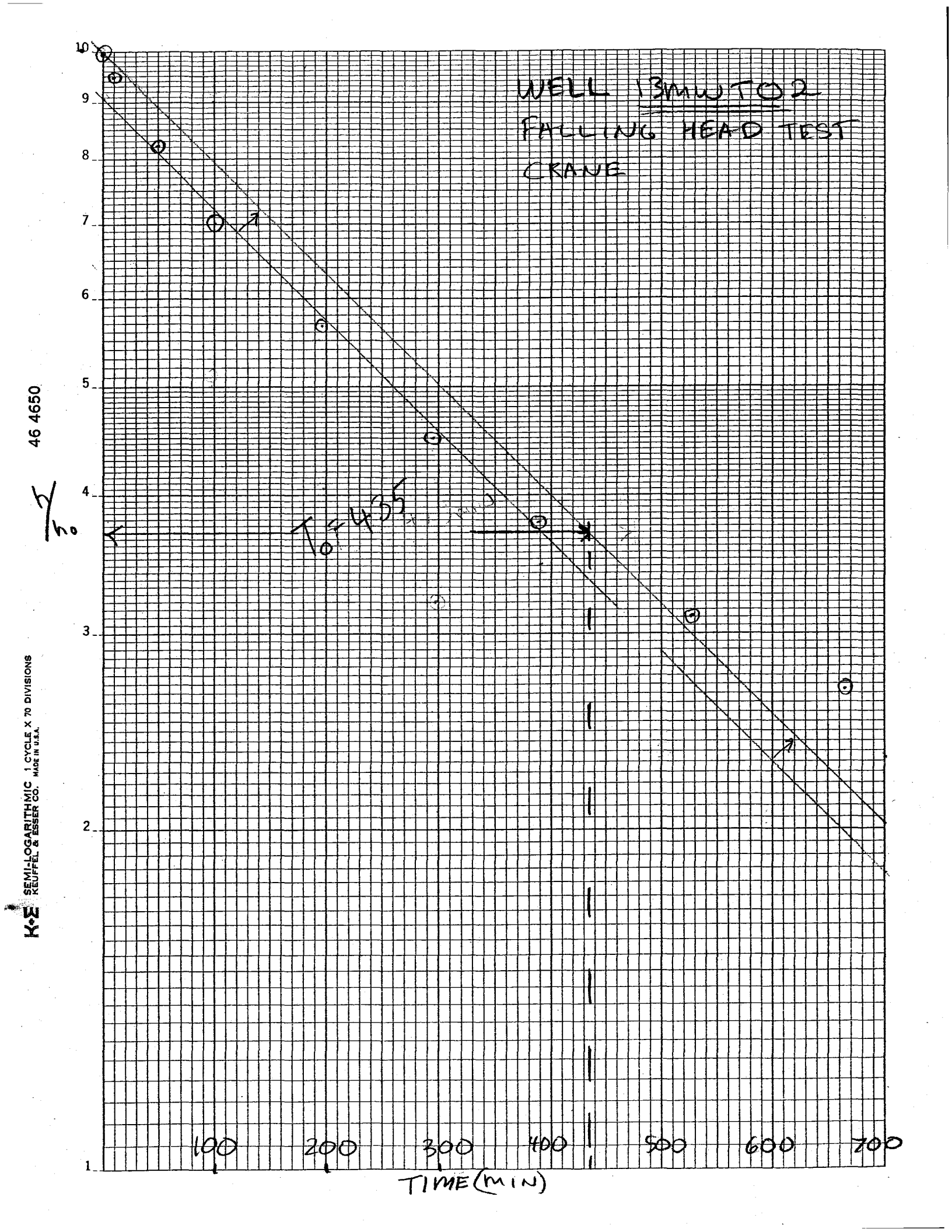




REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 13MW TO2
FALLING HEAD TEST
CRANE
$T_0 = 435$
h/h_0
TIME (MIN)
100
200
300
400
500
600
700
1
2
3
4
5
6
7
8
9
10
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 16:15:41
Report from file: ...\SN09018 2003-05-10 090719 13MWT02 Falling.bin
Win-Situ Version 4.41

Serial number: 9018
Firmware Version 3.06
Unit name:

Test name: 13MWT02 Falling

Test defined on: 5/10/2003 9:06:57
Test started on: 5/10/2003 9:07:19
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betw Seconds.
Number of data san 193

TOTAL DATA SAMPI 193

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	Adjusted time	h/ho	ho= 1.624
5/10/2003	9:07:19	0	0	55.38	10.774	0	0.065		
5/10/2003	9:07:20	0.3	0.005	55.42	10.774	0			
5/10/2003	9:07:20	0.6	0.01	55.45	10.774	0			
5/10/2003	9:07:20	0.9	0.015	55.45	10.774	0			
5/10/2003	9:07:20	1.2	0.02	55.45	10.774	0			
5/10/2003	9:07:21	1.5	0.025	55.47	10.794	0.02			
5/10/2003	9:07:21	1.8	0.03	55.47	10.806	0.032			
5/10/2003	9:07:21	2.1	0.035	55.47	10.935	0.161			
5/10/2003	9:07:22	2.4	0.04	55.47	12.92	2.146			
5/10/2003	9:07:22	2.7	0.045	55.47	13.002	2.228			
5/10/2003	9:07:22	3	0.05	55.47	12.596	1.822			
5/10/2003	9:07:23	3.3	0.055	55.47	13.189	2.415			
5/10/2003	9:07:23	3.6	0.06	55.49	12.471	1.697			
5/10/2003	9:07:23	3.9	0.065	55.49	13.048	2.274			
5/10/2003	9:07:23	4.2	0.07	55.49	12.77	1.996			
5/10/2003	9:07:24	4.5	0.075	55.49	12.925	2.151			
5/10/2003	9:07:24	4.8	0.08	55.49	12.322	1.548			
5/10/2003	9:07:24	5.1	0.085	55.49	12.55	1.776			
5/10/2003	9:07:25	5.4	0.09	55.49	12.65	1.876			
5/10/2003	9:07:25	5.7	0.095	55.49	12.699	1.925			
5/10/2003	9:07:25	6	0.1	55.49	12.368	1.594			
5/10/2003	9:07:26	6.4	0.106667	55.49	12.507	1.733			
5/10/2003	9:07:26	6.7	0.111667	55.49	12.384	1.61			
5/10/2003	9:07:26	7.1	0.118333	55.49	12.504	1.73			
5/10/2003	9:07:27	7.5	0.125	55.49	12.463	1.689			
5/10/2003	9:07:27	8	0.133333	55.49	12.465	1.691			
5/10/2003	9:07:28	8.4	0.14	55.49	12.471	1.697			
5/10/2003	9:07:28	8.9	0.148333	55.49	12.467	1.693			
5/10/2003	9:07:29	9.5	0.158333	55.49	12.467	1.693			
5/10/2003	9:07:29	10	0.166667	55.47	12.465	1.691			
5/10/2003	9:07:30	10.6	0.176667	55.47	12.457	1.683			
5/10/2003	9:07:31	11.3	0.188333	55.47	12.459	1.685			
5/10/2003	9:07:31	11.9	0.198333	55.47	12.457	1.683			
5/10/2003	9:07:32	12.6	0.21	55.47	12.455	1.681			
5/10/2003	9:07:33	13.4	0.223333	55.45	12.455	1.681			
5/10/2003	9:07:33	14.2	0.236667	55.47	12.453	1.679			
5/10/2003	9:07:34	15	0.25	55.45	12.451	1.677			
5/10/2003	9:07:35	15.9	0.265	55.45	12.451	1.677			
5/10/2003	9:07:36	16.8	0.28	55.45	12.451	1.677			

5/10/2003	9:07:37	17.8	0.296667	55.45	12.451	1.677		
5/10/2003	9:07:38	18.9	0.315	55.45	12.447	1.673		
5/10/2003	9:07:39	20	0.333333	55.45	12.447	1.673		
5/10/2003	9:07:40	21.2	0.353333	55.45	12.447	1.673		
5/10/2003	9:07:42	22.4	0.373333	55.45	12.445	1.671		
5/10/2003	9:07:43	23.8	0.396667	55.45	12.445	1.671		
5/10/2003	9:07:44	25.2	0.42	55.45	12.445	1.671		
5/10/2003	9:07:46	26.7	0.445	55.45	12.441	1.667		
5/10/2003	9:07:47	28.2	0.47	55.45	12.441	1.667		
5/10/2003	9:07:49	29.8	0.496667	55.45	12.441	1.667		
5/10/2003	9:07:51	31.5	0.525	55.45	12.439	1.665		
5/10/2003	9:07:53	33.3	0.555	55.45	12.439	1.665		
5/10/2003	9:07:54	35.2	0.586667	55.45	12.437	1.663		
5/10/2003	9:07:57	37.3	0.621667	55.45	12.439	1.665		
5/10/2003	9:07:59	39.5	0.658333	55.45	12.435	1.661		
5/10/2003	9:08:01	41.8	0.696667	55.45	12.435	1.661		
5/10/2003	9:08:04	44.3	0.738333	55.45	12.435	1.661		
5/10/2003	9:08:06	46.9	0.781667	55.45	12.433	1.659		
5/10/2003	9:08:09	49.7	0.828333	55.45	12.433	1.659		
5/10/2003	9:08:12	52.6	0.876667	55.45	12.43	1.656		
5/10/2003	9:08:15	55.7	0.928333	55.45	12.428	1.654		
5/10/2003	9:08:18	59	0.983333	55.45	12.43	1.656		
5/10/2003	9:08:22	62.5	1.041667	55.42	12.429	1.655		
5/10/2003	9:08:25	66.2	1.103333	55.42	12.427	1.653		
5/10/2003	9:08:29	70.1	1.168333	55.42	12.425	1.651		
5/10/2003	9:08:34	74.3	1.238333	55.45	12.424	1.65		
5/10/2003	9:08:38	78.7	1.311667	55.42	12.416	1.642		
5/10/2003	9:08:43	83.4	1.39	55.45	12.428	1.654		
5/10/2003	9:08:48	88.4	1.473333	55.45	12.433	1.659		
5/10/2003	9:08:53	93.7	1.561667	55.47	12.432	1.658		
5/10/2003	9:08:59	99.3	1.655	55.47	12.434	1.66		
5/10/2003	9:09:04	105.2	1.753333	55.47	12.426	1.652		
5/10/2003	9:09:11	111.5	1.858333	55.42	12.414	1.64		
5/10/2003	9:09:17	118.1	1.968333	55.42	12.412	1.638		
5/10/2003	9:09:24	125.1	2.085	55.42	12.41	1.636		
5/10/2003	9:09:32	132.6	2.21	55.42	12.41	1.636		
5/10/2003	9:09:40	140.5	2.341667	55.42	12.408	1.634		
5/10/2003	9:09:48	148.9	2.481667	55.42	12.406	1.632		
5/10/2003	9:09:57	157.8	2.63	55.42	12.406	1.632		
5/10/2003	9:10:06	167.2	2.786667	55.42	12.402	1.628		
5/10/2003	9:10:16	177.2	2.953333	55.42	12.4	1.626	Adjusted time	h/ho
5/10/2003	9:10:27	187.8	3.13	55.42	12.398	1.624	0.000	1.000
5/10/2003	9:10:38	199	3.316667	55.42	12.396	1.622	0.187	0.999
5/10/2003	9:10:50	210.9	3.515	55.42	12.396	1.622	0.385	0.999
5/10/2003	9:11:03	223.5	3.725	55.42	12.393	1.619	0.595	0.997
5/10/2003	9:11:16	236.8	3.946667	55.42	12.389	1.615	0.817	0.994
5/10/2003	9:11:30	250.9	4.181667	55.42	12.387	1.613	1.052	0.993
5/10/2003	9:11:45	265.8	4.43	55.42	12.385	1.611	1.300	0.992
5/10/2003	9:12:01	281.6	4.693333	55.42	12.381	1.607	1.563	0.990
5/10/2003	9:12:18	298.4	4.973333	55.4	12.379	1.605	1.843	0.988
5/10/2003	9:12:35	316.2	5.27	55.4	12.375	1.601	2.140	0.986
5/10/2003	9:12:54	335	5.583333	55.4	12.373	1.599	2.453	0.985
5/10/2003	9:13:14	354.9	5.915	55.4	12.369	1.595	2.785	0.982
5/10/2003	9:13:35	376	6.266667	55.4	12.365	1.591	3.137	0.980
5/10/2003	9:13:58	398.4	6.64	55.4	12.363	1.589	3.510	0.978
5/10/2003	9:14:21	422.1	7.035	55.38	12.361	1.587	3.905	0.977
5/10/2003	9:14:46	447.2	7.453333	55.38	12.355	1.581	4.323	0.974
5/10/2003	9:15:13	473.8	7.896667	55.38	12.353	1.579	4.767	0.972
5/10/2003	9:15:41	502	8.366667	55.38	12.349	1.575	5.237	0.970
5/10/2003	9:16:11	531.9	8.865	55.38	12.344	1.57	5.735	0.967
5/10/2003	9:16:43	563.5	9.391667	55.38	12.34	1.566	6.262	0.964
5/10/2003	9:17:16	597	9.95	55.38	12.336	1.562	6.820	0.962
5/10/2003	9:17:52	632.5	10.54167	55.38	12.332	1.558	7.412	0.959
5/10/2003	9:18:29	670.1	11.16833	55.36	12.326	1.552	8.038	0.956
5/10/2003	9:19:09	709.9	11.83167	55.36	12.322	1.548	8.702	0.953
5/10/2003	9:19:51	752.1	12.535	55.36	12.316	1.542	9.405	0.950
5/10/2003	9:20:36	796.8	13.28	55.36	12.312	1.538	10.150	0.947
5/10/2003	9:21:23	844.2	14.07	55.36	12.305	1.531	10.940	0.943
5/10/2003	9:22:14	894.4	14.90667	55.36	12.301	1.527	11.777	0.940
5/10/2003	9:23:07	947.5	15.79167	55.36	12.295	1.521	12.662	0.937
5/10/2003	9:24:03	1003.8	16.73	55.36	12.289	1.515	13.600	0.933
5/10/2003	9:25:03	1063.4	17.72333	55.36	12.282	1.508	14.593	0.929
5/10/2003	9:26:06	1126.6	18.77667	55.38	12.276	1.502	15.647	0.925
5/10/2003	9:27:13	1193.5	19.89167	55.38	12.27	1.496	16.762	0.921
5/10/2003	9:28:24	1264.4	21.07333	55.38	12.261	1.487	17.943	0.916
5/10/2003	9:29:39	1339.5	22.325	55.4	12.255	1.481	19.195	0.912
5/10/2003	9:30:58	1419	23.65	55.38	12.247	1.473	20.520	0.907

5/10/2003	9:32:23	1503.3	25.055	55.38	12.239	1.465	21.925	0.902
5/10/2003	9:33:52	1592.6	26.54333	55.38	12.23	1.456	23.413	0.897
5/10/2003	9:35:26	1687.1	28.11833	55.38	12.222	1.448	24.988	0.892
5/10/2003	9:37:06	1787.2	29.78667	55.4	12.213	1.439	26.657	0.886
5/10/2003	9:38:53	1893.3	31.555	55.42	12.203	1.429	28.425	0.880
5/10/2003	9:40:45	2005.7	33.42833	55.42	12.194	1.42	30.298	0.874
5/10/2003	9:42:44	2124.7	35.41167	55.42	12.186	1.412	32.282	0.869
5/10/2003	9:44:50	2250.8	37.51333	55.45	12.175	1.401	34.383	0.863
5/10/2003	9:47:04	2384.4	39.74	55.47	12.165	1.391	36.610	0.857
5/10/2003	9:49:25	2525.9	42.09833	55.47	12.154	1.38	38.968	0.850
5/10/2003	9:51:55	2675.8	44.59667	55.49	12.144	1.37	41.467	0.844
5/10/2003	9:54:34	2834.6	47.24333	55.49	12.131	1.357	44.113	0.836
5/10/2003	9:57:22	3002.8	50.04667	55.49	12.119	1.345	46.917	0.828
5/10/2003	10:00:20	3180.9	53.015	55.47	12.107	1.333	49.885	0.821
5/10/2003	10:03:29	3369.6	56.16	55.47	12.092	1.318	53.030	0.812
5/10/2003	10:06:49	3569.5	59.49167	55.45	12.08	1.306	56.362	0.804
5/10/2003	10:10:20	3781.2	63.02	55.45	12.065	1.291	59.890	0.795
5/10/2003	10:14:05	4005.5	66.75833	55.45	12.051	1.277	63.628	0.786
5/10/2003	10:18:02	4243.1	70.71833	55.45	12.034	1.26	67.588	0.776
5/10/2003	10:22:14	4494.7	74.91167	55.49	12.019	1.245	71.782	0.767
5/10/2003	10:26:41	4761.3	79.355	55.49	12.003	1.229	76.225	0.757
5/10/2003	10:31:23	5043.7	84.06167	55.47	11.988	1.214	80.932	0.748
5/10/2003	10:36:22	5342.8	89.04667	55.47	11.97	1.196	85.917	0.736
5/10/2003	10:41:39	5659.6	94.32667	55.45	11.951	1.177	91.197	0.725
5/10/2003	10:47:14	5995.2	99.92	55.42	11.933	1.159	96.790	0.714
5/10/2003	10:53:10	6350.7	105.845	55.4	11.917	1.143	102.715	0.704
5/10/2003	10:59:26	6727.2	112.12	55.38	11.896	1.122	108.990	0.691
5/10/2003	11:06:05	7126.1	118.7683	55.38	11.88	1.106	115.638	0.681
5/10/2003	11:13:08	7548.6	125.81	55.36	11.861	1.087	122.680	0.669
5/10/2003	11:20:35	7996.1	133.2683	55.38	11.842	1.068	130.138	0.658
5/10/2003	11:28:29	8470.1	141.1683	55.38	11.82	1.046	138.038	0.644
5/10/2003	11:36:51	8972.2	149.5367	55.38	11.799	1.025	146.407	0.631
5/10/2003	11:45:43	9504.1	158.4017	55.36	11.778	1.004	155.272	0.618
5/10/2003	11:55:07	10067.5	167.7917	55.4	11.761	0.987	164.662	0.608
5/10/2003	12:05:04	10664.3	177.7383	55.38	11.739	0.965	174.608	0.594
5/10/2003	12:15:36	11296.5	188.275	55.4	11.718	0.944	185.145	0.581
5/10/2003	12:26:45	11966.1	199.435	55.38	11.695	0.921	196.305	0.567
5/10/2003	12:38:35	12675.4	211.2567	55.4	11.674	0.9	208.127	0.554
5/10/2003	12:51:06	13426.7	223.7783	55.36	11.646	0.872	220.648	0.537
5/10/2003	13:04:22	14222.6	237.0433	55.38	11.625	0.851	233.913	0.524
5/10/2003	13:18:25	15065.6	251.0933	55.38	11.591	0.817	247.963	0.503
5/10/2003	13:33:18	15958.6	265.9767	55.36	11.561	0.787	262.847	0.485
5/10/2003	13:49:04	16904.5	281.7417	55.36	11.536	0.762	278.612	0.469
5/10/2003	14:05:46	17906.4	298.44	55.4	11.508	0.734	295.310	0.452
5/10/2003	14:23:27	18967.7	316.1283	55.33	11.484	0.71	312.998	0.437
5/10/2003	14:42:11	20091.9	334.865	55.29	11.46	0.686	331.735	0.422
5/10/2003	15:02:02	21282.7	354.7117	55.31	11.435	0.661	351.582	0.407
5/10/2003	15:23:03	22544.1	375.735	55.29	11.414	0.64	372.605	0.394
5/10/2003	15:45:19	23880.2	398.0033	55.29	11.39	0.616	394.873	0.379
5/10/2003	16:08:55	25295.5	421.5917	55.33	11.37	0.596	418.462	0.367
5/10/2003	16:33:54	26794.7	446.5783	55.29	11.35	0.576	443.448	0.355
5/10/2003	17:00:22	28382.7	473.045	55.31	11.329	0.555	469.915	0.342
5/10/2003	17:28:24	30064.8	501.08	55.33	11.308	0.534	497.950	0.329
5/10/2003	17:58:06	31846.6	530.7767	55.33	11.283	0.509	527.647	0.313
5/10/2003	18:29:33	33734	562.2333	55.36	11.262	0.488	559.103	0.300
5/10/2003	19:02:52	35733.2	595.5533	55.36	11.243	0.469	592.423	0.289
5/10/2003	19:38:10	37850.9	630.8483	55.31	11.227	0.453	627.718	0.279
5/10/2003	20:15:33	40094	668.2333	55.33	11.208	0.434	665.103	0.267
5/10/2003	20:55:09	42470.1	707.835	55.36	11.187	0.413	704.705	0.254
5/10/2003	21:37:06	44987	749.7833	55.31	11.171	0.397	746.653	0.244
5/10/2003	22:21:32	47653	794.2167	55.33	11.157	0.383	791.087	0.236
5/10/2003	23:08:36	50477	841.2833	55.33	11.14	0.366	838.153	0.225
5/10/2003	23:58:28	53468.3	891.1383	55.36	11.144	0.37	888.008	0.228
5/11/2003	0:51:16	56636.8	943.9467	55.33	11.136	0.362	940.817	0.223
5/11/2003	1:47:12	59993.1	999.885	55.36	11.138	0.364	996.755	0.224
5/11/2003	2:46:28	63548.3	1059.138	55.22	11.137	0.363	1056.008	0.224
5/11/2003	3:46:28	67148.3	1119.138	55.29	11.124	0.35	1116.008	0.216
5/11/2003	4:46:28	70748.3	1179.138	55.31	11.115	0.341	1176.008	0.210
5/11/2003	5:46:28	74348.3	1239.138	55.31	11.103	0.329	1236.008	0.203
5/11/2003	6:46:28	77948.3	1299.138	55.33	11.078	0.304	1296.008	0.187
5/11/2003	7:46:28	81548.3	1359.138	55.36	11.053	0.279	1356.008	0.172
5/11/2003	8:46:28	85148.3	1419.138	55.33	11.028	0.254	1416.008	0.156
5/11/2003	9:46:28	88748.3	1479.138	55.33	11.003	0.229	1476.008	0.141
5/11/2003	10:46:28	92348.3	1539.138	55.36	10.98	0.206	1536.008	0.127
5/11/2003	11:46:28	95948.3	1599.138	55.33	10.957	0.183	1596.008	0.113
5/11/2003	12:46:28	99548.3	1659.138	55.33	10.943	0.169	1656.008	0.104
5/11/2003	13:46:28	103148.3	1719.138	55.33	10.926	0.152	1716.008	0.094

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT02
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	560.00 = To

Hydraulic Conductivity (K) :

2.09E-06	ft./min.
3.49E-08	ft./sec.
3.02E-03	ft./day
1.06E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 13MW102

PROJECT NO.: 9060 C00 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 29.54'TOC TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 17.21' DATE: 5/16/03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 61.5" SOLID SLUG PAGE ..... OF .....

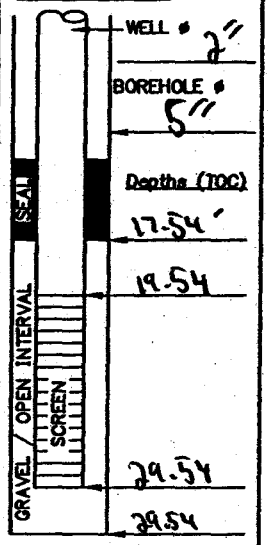
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

07/06/99 INL

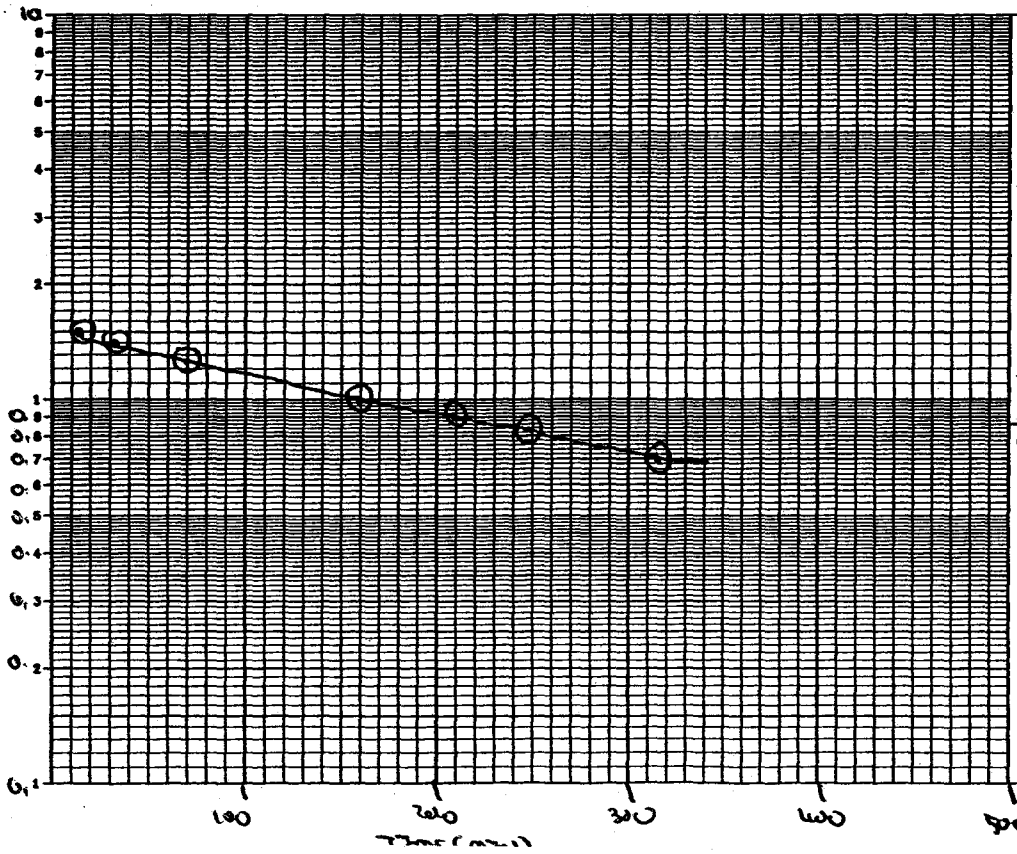
ACAD:FORM_HYDCONTST.dwg

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	10.774	0	530.77	11.283	+0.509
0.04	12.42	+2.146	1714.13	10.926	+0.152
0.055	13.189	+2.415			
0.1	12.368	+1.544			
0.21	12.455	+1.681			
18.77	12.276	+1.502			
33.43	12.144	+1.42			
70.72	12.034	+1.26			
158.4	11.778	+1.004			
211.25	11.674	+0.9			
251.0	11.541	+0.817			
316.12	11.484	+0.71			

WELL SCHEMATIC

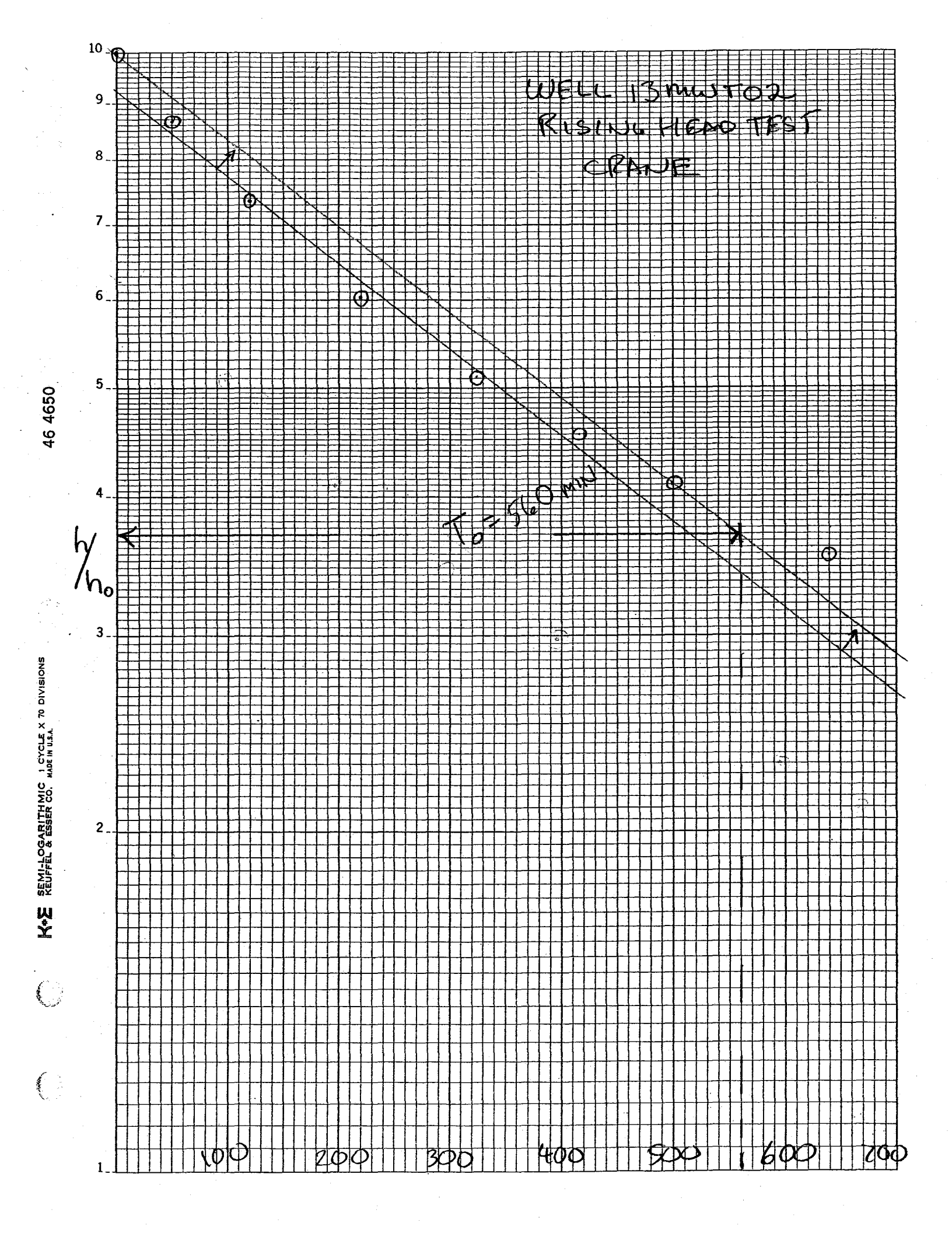


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS,SKETCH MAPS, ETC.:


WELL 13MW102
RISING HEAD TEST
GRAPE
$T_0 = 5.0$ min
h/h_0
10
9
8
7
6
5
4
3
2
1
100
200
300
400
900
1600
700
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/19/2003 11:10:19
Report fror ...\SN09018 2003-05-11 145001 13MWT02 Rising.bin
Win-Situ V 4.41

Serial num 9018
Firmware \ 3.06
Unit name:

Test name: 13MWT02 Riosing

Test define 5/11/2003 14:46:11
Test starte 5/11/2003 14:50:01
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number (191

TOTAL DA 191

Channel number [1]
Measuren Temperature
Channel r Temperature

Channel number [2]
Measuren Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	time (min)	h/ho	ho= -1.632
5/11/2003	14:50:01	0	0	55.33	10.937	0			
5/11/2003	14:50:01	0.3	0.005	55.38	10.937	0			
5/11/2003	14:50:01	0.6	0.01	55.38	10.937	0			
5/11/2003	14:50:02	0.9	0.015	55.4	10.937	0			
5/11/2003	14:50:02	1.2	0.02	55.4	10.937	0			
5/11/2003	14:50:02	1.5	0.025	55.4	10.937	0			
5/11/2003	14:50:02	1.8	0.03	55.42	10.937	0			
5/11/2003	14:50:03	2.1	0.035	55.42	10.937	0			
5/11/2003	14:50:03	2.4	0.04	55.42	10.937	0			
5/11/2003	14:50:03	2.7	0.045	55.42	10.937	0			
5/11/2003	14:50:04	3	0.05	55.42	10.937	0			
5/11/2003	14:50:04	3.3	0.055	55.42	10.937	0			
5/11/2003	14:50:04	3.6	0.06	55.42	10.937	0			
5/11/2003	14:50:05	3.9	0.065	55.42	10.732	-0.205			
5/11/2003	14:50:05	4.2	0.07	55.42	9.506	-1.431			
5/11/2003	14:50:05	4.5	0.075	55.42	10.023	-0.914			
5/11/2003	14:50:05	4.8	0.08	55.42	10.255	-0.682			
5/11/2003	14:50:06	5.1	0.085	55.42	10.498	-0.439			
5/11/2003	14:50:06	5.4	0.09	55.45	8.467	-2.47			
5/11/2003	14:50:06	5.7	0.095	55.42	8.336	-2.601			
5/11/2003	14:50:07	6	0.1	55.45	8.299	-2.638			
5/11/2003	14:50:07	6.4	0.106667	55.42	8.645	-2.292			
5/11/2003	14:50:07	6.7	0.111667	55.45	8.657	-2.28			
5/11/2003	14:50:08	7.1	0.118333	55.45	9.014	-1.923			
5/11/2003	14:50:08	7.5	0.125	55.45	9.011	-1.926			
5/11/2003	14:50:09	8	0.133333	55.45	8.9	-2.037			
5/11/2003	14:50:09	8.4	0.14	55.45	8.871	-2.066			
5/11/2003	14:50:10	8.9	0.148333	55.45	9.041	-1.896			
5/11/2003	14:50:10	9.5	0.158333	55.45	9.118	-1.819			
5/11/2003	14:50:11	10	0.166667	55.42	9.112	-1.825			
5/11/2003	14:50:11	10.6	0.176667	55.42	9.102	-1.835			
5/11/2003	14:50:12	11.3	0.188333	55.4	9.081	-1.856			
5/11/2003	14:50:13	11.9	0.198333	55.4	9.071	-1.866			
5/11/2003	14:50:13	12.6	0.21	55.4	9.065	-1.872			
5/11/2003	14:50:14	13.4	0.223333	55.4	9.048	-1.889			
5/11/2003	14:50:15	14.2	0.236667	55.4	9.058	-1.879			
5/11/2003	14:50:16	15	0.25	55.4	9.034	-1.903			
5/11/2003	14:50:17	15.9	0.265	55.4	9.042	-1.895			
5/11/2003	14:50:17	16.8	0.28	55.4	9.052	-1.885			

5/11/2003	14:50:18	17.8	0.296667	55.4	9.052	-1.885
5/11/2003	14:50:20	18.9	0.315	55.4	9.061	-1.876
5/11/2003	14:50:21	20	0.333333	55.38	9.065	-1.872
5/11/2003	14:50:22	21.2	0.353333	55.4	9.063	-1.874
5/11/2003	14:50:23	22.4	0.373333	55.38	9.071	-1.866
5/11/2003	14:50:24	23.8	0.396667	55.38	9.067	-1.87
5/11/2003	14:50:26	25.2	0.42	55.38	9.069	-1.868
5/11/2003	14:50:27	26.7	0.445	55.38	9.067	-1.87
5/11/2003	14:50:29	28.2	0.47	55.38	9.069	-1.868
5/11/2003	14:50:30	29.8	0.496667	55.38	9.073	-1.864
5/11/2003	14:50:32	31.5	0.525	55.38	9.071	-1.866
5/11/2003	14:50:34	33.3	0.555	55.38	9.073	-1.864
5/11/2003	14:50:36	35.2	0.586667	55.38	9.073	-1.864
5/11/2003	14:50:38	37.3	0.621667	55.38	9.073	-1.864
5/11/2003	14:50:40	39.5	0.658333	55.38	9.075	-1.862
5/11/2003	14:50:42	41.8	0.696667	55.38	9.075	-1.862
5/11/2003	14:50:45	44.3	0.738333	55.38	9.077	-1.86
5/11/2003	14:50:48	46.9	0.781667	55.38	9.077	-1.86
5/11/2003	14:50:50	49.7	0.828333	55.38	9.08	-1.857
5/11/2003	14:50:53	52.6	0.876667	55.38	9.082	-1.855
5/11/2003	14:50:56	55.7	0.928333	55.38	9.082	-1.855
5/11/2003	14:51:00	59	0.983333	55.38	9.086	-1.851
5/11/2003	14:51:03	62.5	1.041667	55.38	9.08	-1.857
5/11/2003	14:51:07	66.2	1.103333	55.38	9.086	-1.851
5/11/2003	14:51:11	70.1	1.168333	55.38	9.082	-1.855
5/11/2003	14:51:15	74.3	1.238333	55.38	9.088	-1.849
5/11/2003	14:51:19	78.7	1.311667	55.38	9.092	-1.845
5/11/2003	14:51:24	83.4	1.39	55.36	9.09	-1.847
5/11/2003	14:51:29	88.4	1.473333	55.36	9.096	-1.841
5/11/2003	14:51:34	93.7	1.561667	55.36	9.096	-1.841
5/11/2003	14:51:40	99.3	1.655	55.4	9.104	-1.833
5/11/2003	14:51:46	105.2	1.753333	55.4	9.106	-1.831
5/11/2003	14:51:52	111.5	1.858333	55.36	9.094	-1.843
5/11/2003	14:51:59	118.1	1.968333	55.36	9.103	-1.834
5/11/2003	14:52:06	125.1	2.085	55.36	9.094	-1.843
5/11/2003	14:52:13	132.6	2.21	55.36	9.099	-1.838
5/11/2003	14:52:21	140.5	2.341667	55.36	9.103	-1.834
5/11/2003	14:52:30	148.9	2.481667	55.36	9.107	-1.83
5/11/2003	14:52:38	157.8	2.63	55.36	9.105	-1.832
5/11/2003	14:52:48	167.2	2.786667	55.36	9.109	-1.828
5/11/2003	14:52:58	177.2	2.953333	55.36	9.105	-1.832
5/11/2003	14:53:08	187.8	3.13	55.36	9.107	-1.83
5/11/2003	14:53:20	199	3.316667	55.36	9.113	-1.824
5/11/2003	14:53:32	210.9	3.515	55.36	9.117	-1.82
5/11/2003	14:53:44	223.5	3.725	55.36	9.121	-1.816
5/11/2003	14:53:57	236.8	3.946667	55.36	9.121	-1.816
5/11/2003	14:54:12	250.9	4.181667	55.36	9.117	-1.82
5/11/2003	14:54:26	265.8	4.43	55.36	9.132	-1.805
5/11/2003	14:54:42	281.6	4.693333	55.36	9.132	-1.805
5/11/2003	14:54:59	298.4	4.973333	55.36	9.132	-1.805
5/11/2003	14:55:17	316.2	5.27	55.38	9.138	-1.799
5/11/2003	14:55:36	335	5.583333	55.38	9.14	-1.797
5/11/2003	14:55:56	354.9	5.915	55.38	9.148	-1.789
5/11/2003	14:56:17	376	6.266667	55.38	9.146	-1.791
5/11/2003	14:56:39	398.4	6.64	55.4	9.148	-1.789
5/11/2003	14:57:03	422.1	7.035	55.4	9.154	-1.783
5/11/2003	14:57:28	447.2	7.453333	55.4	9.156	-1.781
5/11/2003	14:57:54	473.8	7.896667	55.4	9.158	-1.779
5/11/2003	14:58:23	502	8.366667	55.4	9.162	-1.775
5/11/2003	14:58:53	531.9	8.865	55.4	9.168	-1.769
5/11/2003	14:59:24	563.5	9.391667	55.4	9.173	-1.764
5/11/2003	14:59:58	597	9.95	55.42	9.176	-1.761
5/11/2003	15:00:33	632.5	10.54167	55.42	9.183	-1.754
5/11/2003	15:01:11	670.1	11.16833	55.45	9.186	-1.751
5/11/2003	15:01:51	709.9	11.83167	55.45	9.191	-1.746
5/11/2003	15:02:33	752.1	12.535	55.45	9.195	-1.742
5/11/2003	15:03:17	796.8	13.28	55.45	9.201	-1.736
5/11/2003	15:04:05	844.2	14.07	55.45	9.205	-1.732
5/11/2003	15:04:55	894.4	14.90667	55.45	9.211	-1.726
5/11/2003	15:05:48	947.5	15.79167	55.42	9.22	-1.717
5/11/2003	15:06:44	1003.8	16.73	55.4	9.224	-1.713
5/11/2003	15:07:44	1063.4	17.72333	55.4	9.231	-1.706
5/11/2003	15:08:47	1126.6	18.77667	55.4	9.239	-1.698
5/11/2003	15:09:54	1193.5	19.89167	55.38	9.248	-1.689
5/11/2003	15:11:05	1264.4	21.07333	55.38	9.254	-1.683
5/11/2003	15:12:20	1339.5	22.325	55.36	9.262	-1.675
5/11/2003	15:13:40	1419	23.65	55.36	9.269	-1.668

5/11/2003	15:15:04	1503.3	25.055	55.36	9.277	-1.66	Plotted shaded data	
5/11/2003	15:16:33	1592.6	26.54333	55.33	9.286	-1.651		
5/11/2003	15:18:08	1687.1	28.11833	55.31	9.294	-1.643	time (min)	h/ho
5/11/2003	15:19:48	1787.2	29.78667	55.26	9.305	-1.632	0.000	1.000
5/11/2003	15:21:34	1893.3	31.555	55.26	9.314	-1.623	1.768	0.994
5/11/2003	15:23:26	2005.7	33.42833	55.26	9.324	-1.613	3.642	0.988
5/11/2003	15:25:25	2124.7	35.41167	55.26	9.332	-1.605	5.625	0.983
5/11/2003	15:27:31	2250.8	37.51333	55.29	9.344	-1.593	7.727	0.976
5/11/2003	15:29:45	2384.4	39.74	55.26	9.355	-1.582	9.953	0.969
5/11/2003	15:32:07	2525.9	42.09833	55.26	9.365	-1.572	12.312	0.963
5/11/2003	15:34:36	2675.8	44.59667	55.26	9.376	-1.561	14.810	0.956
5/11/2003	15:37:15	2834.6	47.24333	55.24	9.389	-1.548	17.457	0.949
5/11/2003	15:40:03	3002.8	50.04667	55.26	9.405	-1.532	20.260	0.939
5/11/2003	15:43:02	3180.9	53.015	55.24	9.415	-1.522	23.228	0.933
5/11/2003	15:46:10	3369.6	56.16	55.22	9.428	-1.509	26.373	0.925
5/11/2003	15:49:30	3569.5	59.49167	55.24	9.445	-1.492	29.705	0.914
5/11/2003	15:53:02	3781.2	63.02	55.26	9.461	-1.476	33.233	0.904
5/11/2003	15:56:46	4005.5	66.75833	55.26	9.475	-1.462	36.972	0.896
5/11/2003	16:00:44	4243.1	70.71833	55.29	9.489	-1.448	40.932	0.887
5/11/2003	16:04:55	4494.7	74.91167	55.29	9.504	-1.433	45.125	0.878
5/11/2003	16:09:22	4761.3	79.355	55.31	9.522	-1.415	49.568	0.867
5/11/2003	16:14:04	5043.7	84.06167	55.31	9.541	-1.396	54.275	0.855
5/11/2003	16:19:03	5342.8	89.04667	55.26	9.556	-1.381	59.260	0.846
5/11/2003	16:24:20	5659.6	94.32667	55.26	9.575	-1.362	64.540	0.835
5/11/2003	16:29:56	5995.2	99.92	55.29	9.595	-1.342	70.133	0.822
5/11/2003	16:35:51	6350.7	105.845	55.31	9.616	-1.321	76.058	0.809
5/11/2003	16:42:08	6727.2	112.12	55.31	9.634	-1.303	82.333	0.798
5/11/2003	16:48:47	7126.1	118.7683	55.29	9.651	-1.286	88.982	0.788
5/11/2003	16:55:49	7548.6	125.81	55.24	9.673	-1.264	96.023	0.775
5/11/2003	17:03:17	7996.1	133.2683	55.26	9.693	-1.244	103.482	0.762
5/11/2003	17:11:11	8470.1	141.1683	55.26	9.718	-1.219	111.382	0.747
5/11/2003	17:19:33	8972.2	149.5367	55.29	9.738	-1.199	119.750	0.735
5/11/2003	17:28:25	9504.1	158.4017	55.29	9.761	-1.176	128.615	0.721
5/11/2003	17:37:48	10067.5	167.7917	55.29	9.784	-1.153	138.005	0.706
5/11/2003	17:47:45	10664.3	177.7383	55.26	9.809	-1.128	147.952	0.691
5/11/2003	17:58:17	11296.5	188.275	55.29	9.832	-1.105	158.488	0.677
5/11/2003	18:09:27	11966.1	199.435	55.24	9.855	-1.082	169.648	0.663
5/11/2003	18:21:16	12675.4	211.2567	55.24	9.88	-1.057	181.470	0.648
5/11/2003	18:33:47	13426.7	223.7783	55.26	9.903	-1.034	193.992	0.634
5/11/2003	18:47:03	14222.6	237.0433	55.26	9.93	-1.007	207.257	0.617
5/11/2003	19:01:06	15065.6	251.0933	55.29	9.952	-0.985	221.307	0.604
5/11/2003	19:15:59	15958.6	265.9767	55.26	9.977	-0.96	236.190	0.588
5/11/2003	19:31:45	16904.5	281.7417	55.29	10.004	-0.933	251.955	0.572
5/11/2003	19:48:27	17906.4	298.44	55.26	10.029	-0.908	268.653	0.556
5/11/2003	20:06:08	18967.7	316.1283	55.29	10.052	-0.885	286.342	0.542
5/11/2003	20:24:53	20091.9	334.865	55.29	10.077	-0.86	305.078	0.527
5/11/2003	20:44:43	21282.7	354.7117	55.22	10.102	-0.835	324.925	0.512
5/11/2003	21:05:45	22544.1	375.735	55.24	10.125	-0.812	345.948	0.498
5/11/2003	21:28:01	23880.2	398.0033	55.24	10.152	-0.785	368.217	0.481
5/11/2003	21:51:36	25295.5	421.5917	55.24	10.171	-0.766	391.805	0.469
5/11/2003	22:16:35	26794.7	446.5783	55.24	10.195	-0.742	416.792	0.455
5/11/2003	22:43:03	28382.7	473.045	55.24	10.218	-0.719	443.258	0.441
5/11/2003	23:11:05	30064.8	501.08	55.26	10.243	-0.694	471.293	0.425
5/11/2003	23:40:47	31846.6	530.7767	55.22	10.266	-0.671	500.990	0.411
5/12/2003	0:12:15	33734	562.2333	55.22	10.291	-0.646	532.447	0.396
5/12/2003	0:45:34	35733.2	595.5533	55.24	10.316	-0.621	565.767	0.381
5/12/2003	1:20:52	37850.9	630.8483	55.24	10.339	-0.598	601.062	0.366
5/12/2003	1:58:15	40094	668.2333	55.24	10.361	-0.576	638.447	0.353
5/12/2003	2:37:51	42470.1	707.835	55.22	10.382	-0.555	678.048	0.340
5/12/2003	3:19:48	44987	749.7833	55.24	10.405	-0.532	719.997	0.326
5/12/2003	4:04:14	47653	794.2167	55.24	10.424	-0.513	764.430	0.314
5/12/2003	4:51:18	50477	841.2833	55.26	10.44	-0.497	811.497	0.305
5/12/2003	5:41:09	53468.3	891.1383	55.24	10.455	-0.482	861.352	0.295
5/12/2003	6:33:57	56636.8	943.9467	55.24	10.465	-0.472	914.160	0.289
5/12/2003	7:29:54	59993.1	999.885	55.24	10.475	-0.462	970.098	0.283
5/12/2003	8:29:09	63548.3	1059.138	55.26	10.481	-0.456	1029.352	0.279
5/12/2003	9:29:09	67148.3	1119.138	55.22	10.482	-0.455	1089.352	0.279
5/12/2003	10:29:09	70748.3	1179.138	55.24	10.482	-0.455	1149.352	0.279
5/12/2003	11:29:09	74348.3	1239.138	55.22	10.48	-0.457	1209.352	0.280
5/12/2003	12:29:09	77948.3	1299.138	55.24	10.484	-0.453	1269.352	0.278
5/12/2003	13:29:09	81548.3	1359.138	55.29	10.485	-0.452	1329.352	0.277
5/12/2003	14:29:09	85148.3	1419.138	55.24	10.488	-0.449	1389.352	0.275
5/12/2003	15:29:09	88748.3	1479.138	55.24	10.492	-0.445	1449.352	0.273
5/12/2003	16:29:09	92348.3	1539.138	55.22	10.492	-0.445	1509.352	0.273
5/12/2003	17:29:09	95948.3	1599.138	55.24	10.502	-0.435	1569.352	0.267

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT08
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.22 = To

Hydraulic Conductivity (K) :

7.56E-03	ft./min.
1.26E-04	ft./sec.
1.09E+01	ft./day
3.84E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 13MW108

PROJECT NO.: 9060 C10 0279 GEOLOGIST: BOB BANKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 17.50' T.O. TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 2.80' DATE: 5/10/03

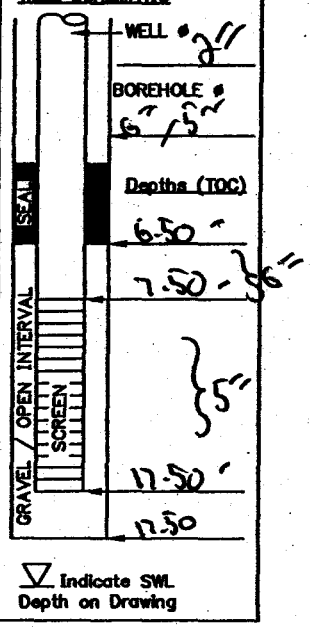
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 39" SOLID SLUG PAGE ..... OF .....

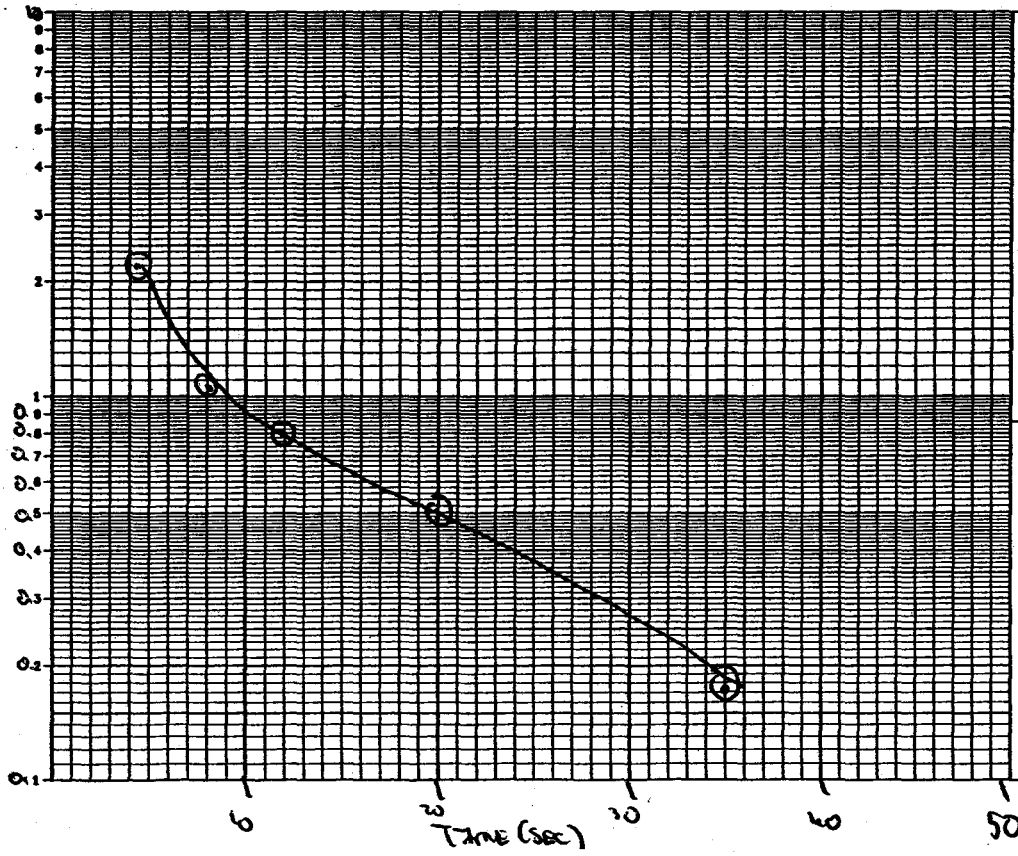
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	14.904	0			
3	14.954	-0.05			
4.5	17.122	-2.218			
6	16.705	-1.801			
8	15.962	-1.058			
11.9	15.705	-0.801			
15.0	15.5	-0.596			
20	15.406	-0.502			
22.8	15.27	-0.366			
35.2	15.074	-0.17			
46.9	14.977	0.073			
59	14.904	0			

WELL SCHEMATIC



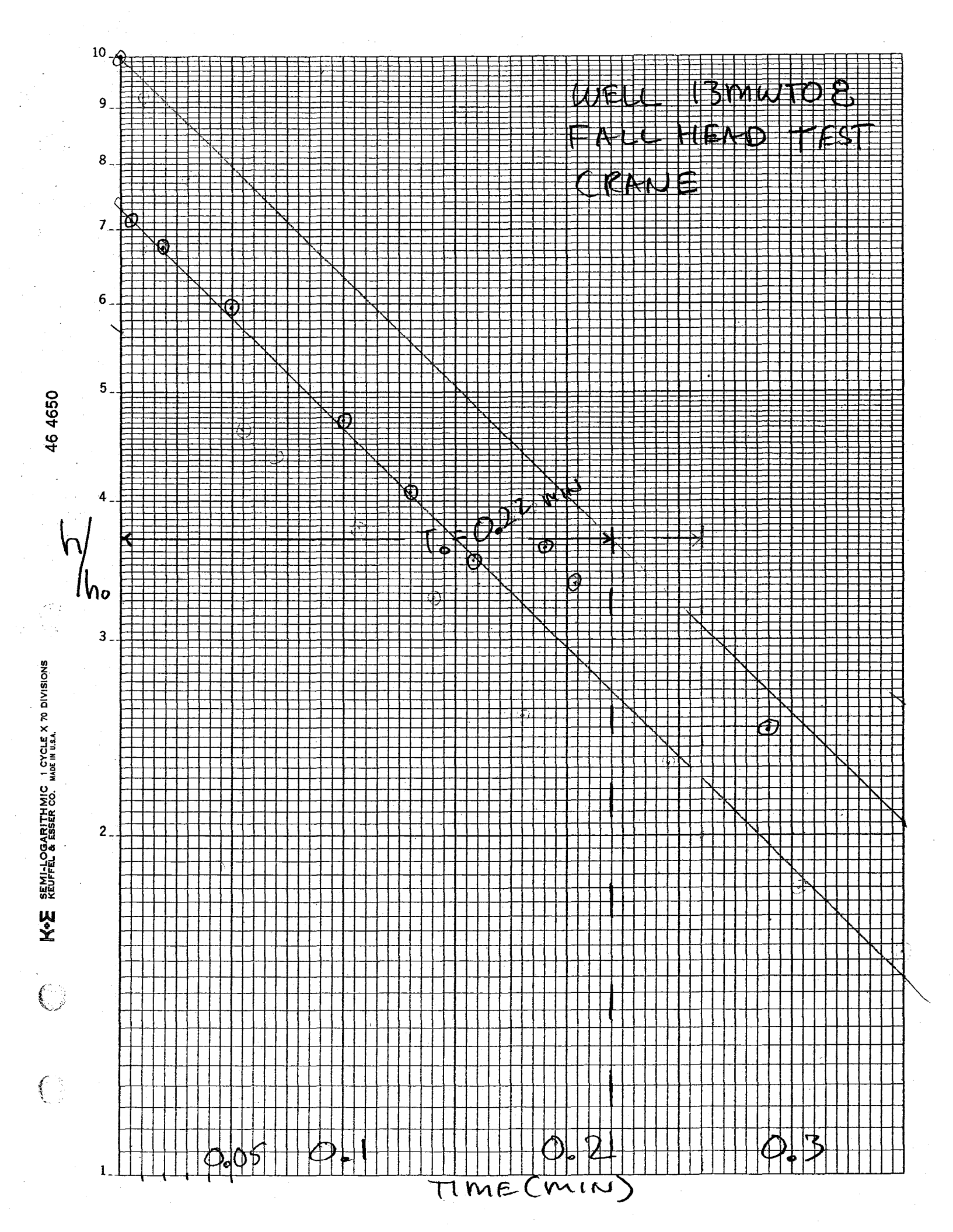
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 13MW108
FALL HEAD TEST
CRANE
h/ho
10
9
8
7
6
5
4
3
2
1
0.05
0.1
0.2
0.3
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 16:17:52
Report from file: ...\SN00824 2003-05-10 092231 13MWT08 Falling.bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 13MWT08 Falling

Test defined on: 5/10/2003 9:21:51
Test started on: 5/10/2003 9:22:31
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betwe Seconds.
Number of data sam 81

TOTAL DATA SAMPLI 81

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet			
								time (min)	h/ho
									Ho= 1.607
5/10/2003	9:22:31	0	0	50.76	14.904	0			
5/10/2003	9:22:31	0.3	0.005	50.81	14.904	0			
5/10/2003	9:22:32	0.6	0.01	50.83	14.904	0			
5/10/2003	9:22:32	0.9	0.015	50.83	14.904	0			
5/10/2003	9:22:32	1.2	0.02	50.83	14.904	0			
5/10/2003	9:22:33	1.5	0.025	50.83	14.904	0			
5/10/2003	9:22:33	1.8	0.03	50.86	14.904	0			
5/10/2003	9:22:33	2.1	0.035	50.86	14.904	0			
5/10/2003	9:22:33	2.4	0.04	50.86	14.904	0			
5/10/2003	9:22:34	2.7	0.045	50.86	14.904	0			
5/10/2003	9:22:34	3	0.05	50.86	14.954	0.05			
5/10/2003	9:22:34	3.3	0.055	50.86	15.021	0.117			
5/10/2003	9:22:35	3.6	0.06	50.86	15.404	0.5			
5/10/2003	9:22:35	3.9	0.065	50.86	16.379	1.475	time (sec)		
5/10/2003	9:22:35	4.2	0.07	50.86	17.232	2.328	0		
5/10/2003	9:22:36	4.5	0.075	50.86	17.122	2.218	0.3		
5/10/2003	9:22:36	4.8	0.08	50.88	17.042	2.138	0.6		
5/10/2003	9:22:36	5.1	0.085	50.88	16.978	2.074	0.9		
5/10/2003	9:22:36	5.4	0.09	50.86	16.951	2.047	1.2		
5/10/2003	9:22:37	5.7	0.095	50.88	16.832	1.928	1.5		
5/10/2003	9:22:37	6	0.1	50.88	16.705	1.801	1.8	time (min)	h/ho
5/10/2003	9:22:37	6.4	0.106667	50.88	16.511	1.607	2.2	0.000	1.000
5/10/2003	9:22:38	6.7	0.111667	50.88	16.048	1.144	2.5	0.005	0.712
5/10/2003	9:22:38	7.1	0.118333	50.88	15.996	1.092	2.9	0.012	0.680
5/10/2003	9:22:39	7.5	0.125	50.88	15.983	1.079	3.3	0.018	0.671
5/10/2003	9:22:39	8	0.133333	50.88	15.962	1.058	3.8	0.027	0.658
5/10/2003	9:22:40	8.4	0.14	50.88	15.927	1.023	4.2	0.033	0.637

5/10/2003	9:22:40	8.9	0.148333	50.88	15.895	0.991	4.7	0.042	0.617
5/10/2003	9:22:41	9.5	0.158333	50.88	15.863	0.959	5.3	0.052	0.597
5/10/2003	9:22:41	10	0.166667	50.86	15.821	0.917	5.8	0.060	0.571
5/10/2003	9:22:42	10.6	0.176667	50.83	15.782	0.878	6.4	0.070	0.546
5/10/2003	9:22:42	11.3	0.188333	50.83	15.742	0.838	7.1	0.082	0.521
5/10/2003	9:22:43	11.9	0.198333	50.83	15.705	0.801	7.7	0.092	0.498
5/10/2003	9:22:44	12.6	0.21	50.83	15.662	0.758	8.4	0.103	0.472
5/10/2003	9:22:44	13.4	0.223333	50.83	15.614	0.71	9.2	0.117	0.442
5/10/2003	9:22:45	14.2	0.236667	50.83	15.558	0.654	10	0.130	0.407
5/10/2003	9:22:46	15	0.25	50.83	15.5	0.596	10.8	0.143	0.371
5/10/2003	9:22:47	15.9	0.265	50.83	15.472	0.568	11.7	0.158	0.353
5/10/2003	9:22:48	16.8	0.28	50.83	15.524	0.62	12.6	0.173	0.386
5/10/2003	9:22:49	17.8	0.296667	50.83	15.488	0.584	13.6	0.190	0.363
5/10/2003	9:22:50	18.9	0.315	50.83	15.447	0.543	14.7	0.208	0.338
5/10/2003	9:22:51	20	0.333333	50.83	15.406	0.502	15.8	0.227	0.312
5/10/2003	9:22:52	21.2	0.353333	50.83	15.371	0.467	17	0.247	0.291
5/10/2003	9:22:54	22.4	0.373333	50.83	15.332	0.428	18.2	0.267	0.266
5/10/2003	9:22:55	23.8	0.396667	50.83	15.304	0.4	19.6	0.290	0.249
5/10/2003	9:22:56	25.2	0.42	50.83	15.27	0.366	21	0.313	0.228
5/10/2003	9:22:58	26.7	0.445	50.83	15.231	0.327	22.5	0.338	0.203
5/10/2003	9:22:59	28.2	0.47	50.81	15.196	0.292	24	0.363	0.182
5/10/2003	9:23:01	29.8	0.496667	50.81	15.164	0.26	25.6	0.390	0.162
5/10/2003	9:23:03	31.5	0.525	50.81	15.13	0.226	27.3	0.418	0.141
5/10/2003	9:23:04	33.3	0.555	50.81	15.102	0.198	29.1	0.448	0.123
5/10/2003	9:23:06	35.2	0.586667	50.81	15.074	0.17	31	0.480	0.106
5/10/2003	9:23:08	37.3	0.621667	50.81	15.065	0.161	33.1	0.515	0.100
5/10/2003	9:23:11	39.5	0.658333	50.81	15.041	0.137	35.3	0.552	0.085
5/10/2003	9:23:13	41.8	0.696667	50.81	15.016	0.112	37.6	0.590	0.070
5/10/2003	9:23:15	44.3	0.738333	50.81	14.996	0.092	40.1	0.632	0.057
5/10/2003	9:23:18	46.9	0.781667	50.81	14.977	0.073	42.7	0.675	0.045
5/10/2003	9:23:21	49.7	0.828333	50.81	14.957	0.053	45.5	0.722	0.033
5/10/2003	9:23:24	52.6	0.876667	50.81	14.938	0.034	48.4	0.770	0.021
5/10/2003	9:23:27	55.7	0.928333	50.81	14.919	0.015	51.5	0.822	0.009
5/10/2003	9:23:30	59	0.983333	50.81	14.904	0	54.8	0.877	0.000
5/10/2003	9:23:34	62.5	1.041667	50.81	14.904	0	58.3	0.935	0.000
5/10/2003	9:23:37	66.2	1.103333	50.81	14.904	0	62	0.997	0.000
5/10/2003	9:23:41	70.1	1.168333	50.79	14.904	0	65.9	1.062	0.000
5/10/2003	9:23:45	74.3	1.238333	50.79	14.904	0	70.1	1.132	0.000
5/10/2003	9:23:50	78.7	1.311667	50.79	14.904	0	74.5	1.205	0.000
5/10/2003	9:23:54	83.4	1.39	50.79	14.904	0	79.2	1.283	0.000
5/10/2003	9:23:59	88.4	1.473333	50.79	14.904	0	84.2	1.367	0.000
5/10/2003	9:24:05	93.7	1.561667	50.79	14.904	0	89.5	1.455	0.000
5/10/2003	9:24:10	99.3	1.655	50.79	14.904	0	95.1	1.548	0.000
5/10/2003	9:24:16	105.2	1.753333	50.79	14.904	0	101	1.647	0.000
5/10/2003	9:24:23	111.5	1.858333	50.79	14.904	0	107.3	1.752	0.000
5/10/2003	9:24:29	118.1	1.968333	50.76	14.904	0	113.9	1.862	0.000
5/10/2003	9:24:36	125.1	2.085	50.76	14.904	0	120.9	1.978	0.000
5/10/2003	9:24:44	132.6	2.21	50.76	14.904	0	128.4	2.103	0.000
5/10/2003	9:24:52	140.5	2.341667	50.76	14.904	0	136.3	2.235	0.000
5/10/2003	9:25:00	148.9	2.481667	50.76	14.904	0	144.7	2.375	0.000
5/10/2003	9:25:09	157.8	2.63	50.76	14.904	0	153.6	2.523	0.000
5/10/2003	9:25:18	167.2	2.786667	50.76	14.904	0	163	2.680	0.000
5/10/2003	9:25:28	177.2	2.953333	50.76	14.904	0	173	2.847	0.000
5/10/2003	9:25:39	187.8	3.13	50.76	14.904	0	183.6	3.023	0.000

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT08
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	1.11 = To

Hydraulic Conductivity (K) :

1.50E-03	ft./min.
2.50E-05	ft./sec.
2.16E+00	ft./day
7.61E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: 13MW108

PROJECT NO.: 9060 CCO 0279 GEOLOGIST:

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 17.50'-7.50' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 2.80' DATE: 5/10/03

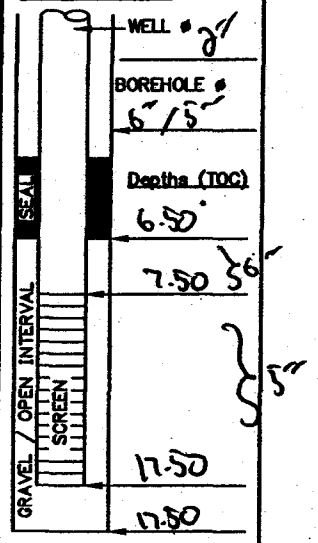
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 36" SOLID SLUG PAGE ..... OF .....

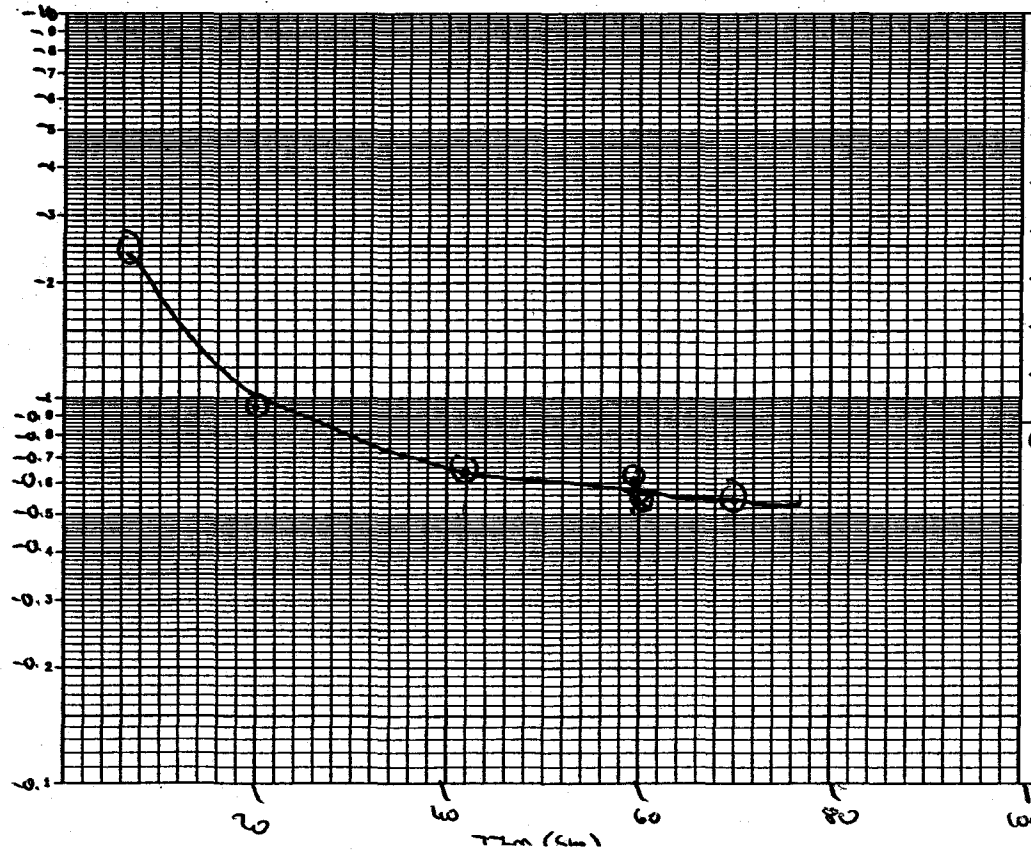
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	14.583	0	354.9	14.369	-.215
3	14.598	+0.015	597.0	14.573	-0.01
6.7	12.198	-2.385			
10	13.345	-1.238			
15	13.561	-1.022			
20	13.649	-0.934			
31.5	13.875	-0.708			
41.8	13.96	-0.623			
59	14.031	-0.552			
70.1	14.06	-0.532			
140.5	14.143	-0.44			
223.5	14.178	-0.405			

WELL SCHEMATIC



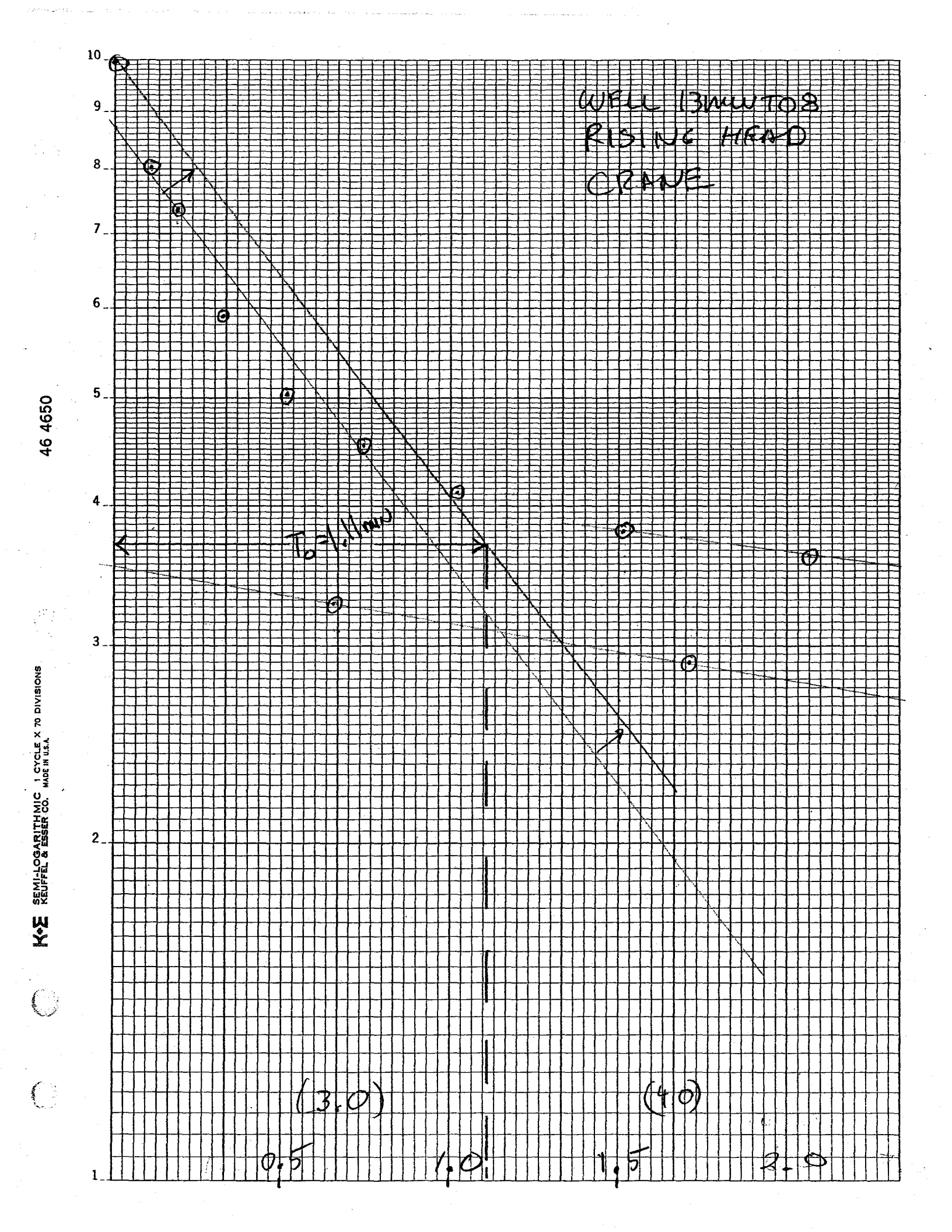
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 13MW TO 8
RISING HEAD
CRANE
$T_o = 1.1 (m^2/d)$
(3.0)
(4.0)
0.5
1.0
1.5
2.0
10
9
8
7
6
5
4
3
2
1
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 16:19:11
Report from file: ...\SN00824 2003-05-10 092753 13MWT08 Rising.bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 13MWT08 Rising

Test defined on: 5/10/2003 9:27:45
Test started on: 5/10/2003 9:27:53
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betwe Seconds.
Number of data samp 106

TOTAL DATA SAMPLE 106

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	time (min)	h/ho	adj time	ho= -1.269
5/10/2003	9:27:53	0	50.74	14.583	0	0			
5/10/2003	9:27:54	0.3	50.79	14.583	0	0.005			
5/10/2003	9:27:54	0.6	50.81	14.583	0	0.01			
5/10/2003	9:27:54	0.9	50.81	14.583	0	0.015			
5/10/2003	9:27:55	1.2	50.83	14.583	0	0.02			
5/10/2003	9:27:55	1.5	50.83	14.583	0	0.025			
5/10/2003	9:27:55	1.8	50.83	14.583	0	0.03			
5/10/2003	9:27:56	2.1	50.83	14.583	0	0.035			
5/10/2003	9:27:56	2.4	50.83	14.583	0	0.04			
5/10/2003	9:27:56	2.7	50.83	14.583	0	0.045			
5/10/2003	9:27:56	3	50.83	14.598	0.015	0.05			
5/10/2003	9:27:57	3.3	50.83	13.296	-1.287	0.055			
5/10/2003	9:27:57	3.6	50.83	13.783	-0.8	0.06			
5/10/2003	9:27:57	3.9	50.83	13.451	-1.132	0.065			
5/10/2003	9:27:58	4.2	50.86	13.497	-1.086	0.07			
5/10/2003	9:27:58	4.5	50.86	12.883	-1.7	0.075			
5/10/2003	9:27:58	4.8	50.86	12.711	-1.872	0.08			
5/10/2003	9:27:59	5.1	50.86	12.756	-1.827	0.085			
5/10/2003	9:27:59	5.4	50.86	12.678	-1.905	0.09			
5/10/2003	9:27:59	5.7	50.86	12.657	-1.926	0.095			
5/10/2003	9:27:59	6	50.86	12.618	-1.965	0.1			
5/10/2003	9:28:00	6.4	50.86	12.65	-1.933	0.106667			
5/10/2003	9:28:00	6.7	50.86	12.198	-2.385	0.111667	Plotted shaded values.		
5/10/2003	9:28:01	7.1	50.86	12.605	-1.978	0.118333			
5/10/2003	9:28:01	7.5	50.86	13.501	-1.082	0.125			
5/10/2003	9:28:01	8	50.86	13.395	-1.188	0.133333	h/ho	adj time	
5/10/2003	9:28:02	8.4	50.86	13.314	-1.269	0.14	1.0000	0.0000	

5/10/2003	9:28:02	8.9	50.86	13.313	-1.27	0.148333	1.0008	0.0083
5/10/2003	9:28:03	9.5	50.86	13.32	-1.263	0.158333	0.9953	0.0183
5/10/2003	9:28:04	10	50.83	13.345	-1.238	0.166667	0.9756	0.0267
5/10/2003	9:28:04	10.6	50.83	13.376	-1.207	0.176667	0.9511	0.0367
5/10/2003	9:28:05	11.3	50.83	13.427	-1.156	0.188333	0.9110	0.0483
5/10/2003	9:28:05	11.9	50.81	13.47	-1.113	0.198333	0.8771	0.0583
5/10/2003	9:28:06	12.6	50.81	13.485	-1.098	0.21	0.8652	0.0700
5/10/2003	9:28:07	13.4	50.81	13.52	-1.063	0.223333	0.8377	0.0833
5/10/2003	9:28:08	14.2	50.81	13.554	-1.029	0.236667	0.8109	0.0967
5/10/2003	9:28:08	15	50.81	13.561	-1.022	0.25	0.8053	0.1100
5/10/2003	9:28:09	15.9	50.81	13.587	-0.996	0.265	0.7849	0.1250
5/10/2003	9:28:10	16.8	50.81	13.592	-0.991	0.28	0.7809	0.1400
5/10/2003	9:28:11	17.8	50.81	13.556	-1.027	0.296667	0.8093	0.1567
5/10/2003	9:28:12	18.9	50.81	13.608	-0.975	0.315	0.7683	0.1750
5/10/2003	9:28:13	20	50.81	13.649	-0.934	0.333333	0.7360	0.1933
5/10/2003	9:28:15	21.2	50.81	13.689	-0.894	0.353333	0.7045	0.2133
5/10/2003	9:28:16	22.4	50.81	13.722	-0.861	0.373333	0.6785	0.2333
5/10/2003	9:28:17	23.8	50.81	13.752	-0.831	0.396667	0.6548	0.2567
5/10/2003	9:28:19	25.2	50.81	13.784	-0.799	0.42	0.6296	0.2800
5/10/2003	9:28:20	26.7	50.81	13.81	-0.773	0.445	0.6091	0.3050
5/10/2003	9:28:22	28.2	50.81	13.834	-0.749	0.47	0.5902	0.3300
5/10/2003	9:28:23	29.8	50.81	13.855	-0.728	0.496667	0.5737	0.3567
5/10/2003	9:28:25	31.5	50.81	13.875	-0.708	0.525	0.5579	0.3850
5/10/2003	9:28:27	33.3	50.81	13.894	-0.689	0.555	0.5429	0.4150
5/10/2003	9:28:29	35.2	50.81	13.913	-0.67	0.586667	0.5280	0.4467
5/10/2003	9:28:31	37.3	50.81	13.929	-0.654	0.621667	0.5154	0.4817
5/10/2003	9:28:33	39.5	50.79	13.945	-0.638	0.658333	0.5028	0.5183
5/10/2003	9:28:35	41.8	50.79	13.96	-0.623	0.696667	0.4909	0.5567
5/10/2003	9:28:38	44.3	50.79	13.975	-0.608	0.738333	0.4791	0.5983
5/10/2003	9:28:40	46.9	50.79	13.988	-0.595	0.781667	0.4689	0.6417
5/10/2003	9:28:43	49.7	50.79	13.999	-0.584	0.828333	0.4602	0.6883
5/10/2003	9:28:46	52.6	50.79	14.008	-0.575	0.876667	0.4531	0.7367
5/10/2003	9:28:49	55.7	50.79	14.019	-0.564	0.928333	0.4444	0.7883
5/10/2003	9:28:52	59	50.79	14.031	-0.552	0.983333	0.4350	0.8433
5/10/2003	9:28:56	62.5	50.79	14.042	-0.541	1.041667	0.4263	0.9017
5/10/2003	9:29:00	66.2	50.79	14.049	-0.534	1.103333	0.4208	0.9633
5/10/2003	9:29:04	70.1	50.79	14.06	-0.523	1.168333	0.4121	1.0283
5/10/2003	9:29:08	74.3	50.79	14.068	-0.515	1.238333	0.4058	1.0983
5/10/2003	9:29:12	78.7	50.79	14.077	-0.506	1.311667	0.3987	1.1717
5/10/2003	9:29:17	83.4	50.79	14.083	-0.5	1.39	0.3940	1.2500
5/10/2003	9:29:22	88.4	50.79	14.09	-0.493	1.473333	0.3885	1.3333
5/10/2003	9:29:27	93.7	50.79	14.096	-0.487	1.561667	0.3838	1.4217
5/10/2003	9:29:33	99.3	50.76	14.1	-0.483	1.655	0.3806	1.5150
5/10/2003	9:29:39	105.2	50.76	14.107	-0.476	1.753333	0.3751	1.6133
5/10/2003	9:29:45	111.5	50.76	14.111	-0.472	1.858333	0.3719	1.7183
5/10/2003	9:29:52	118.1	50.76	14.117	-0.466	1.968333	0.3672	1.8283
5/10/2003	9:29:59	125.1	50.76	14.12	-0.463	2.085	0.3649	1.9450
5/10/2003	9:30:06	132.6	50.76	14.124	-0.459	2.21	0.3617	2.0700
5/10/2003	9:30:14	140.5	50.76	14.143	-0.44	2.341667	0.3467	2.2017
5/10/2003	9:30:22	148.9	50.81	14.159	-0.424	2.481667	0.3341	2.3417
5/10/2003	9:30:31	157.8	50.81	14.163	-0.42	2.63	0.3310	2.4900
5/10/2003	9:30:41	167.2	50.83	14.164	-0.419	2.786667	0.3302	2.6467
5/10/2003	9:30:51	177.2	50.83	14.164	-0.419	2.953333	0.3302	2.8133
5/10/2003	9:31:01	187.8	50.83	14.166	-0.417	3.13	0.3286	2.9900
5/10/2003	9:31:12	199	50.83	14.166	-0.417	3.316667	0.3286	3.1767
5/10/2003	9:31:24	210.9	50.79	14.168	-0.415	3.515	0.3270	3.3750
5/10/2003	9:31:37	223.5	50.79	14.178	-0.405	3.725	0.3191	3.5850
5/10/2003	9:31:50	236.8	50.81	14.191	-0.392	3.946667	0.3089	3.8067
5/10/2003	9:32:04	250.9	50.81	14.205	-0.378	4.181667	0.2979	4.0417
5/10/2003	9:32:19	265.8	50.81	14.209	-0.374	4.43	0.2947	4.2900
5/10/2003	9:32:35	281.6	50.81	14.23	-0.353	4.693333	0.2782	4.5533
5/10/2003	9:32:52	298.4	50.81	14.26	-0.323	4.973333	0.2545	4.8333
5/10/2003	9:33:10	316.2	50.81	14.301	-0.282	5.27	0.2222	5.1300
5/10/2003	9:33:28	335	50.81	14.32	-0.263	5.583333	0.2072	5.4433
5/10/2003	9:33:48	354.9	50.81	14.368	-0.215	5.915	0.1694	5.7750

5/10/2003	9:34:09	376	50.79	14.395	-0.188	6.266667	0.1481	6.1267
5/10/2003	9:34:32	398.4	50.79	14.402	-0.181	6.64	0.1426	6.5000
5/10/2003	9:34:56	422.1	50.79	14.423	-0.16	7.035	0.1261	6.8950
5/10/2003	9:35:21	447.2	50.79	14.456	-0.127	7.453333	0.1001	7.3133
5/10/2003	9:35:47	473.8	50.76	14.489	-0.094	7.896667	0.0741	7.7567
5/10/2003	9:36:15	502	50.76	14.499	-0.084	8.366667	0.0662	8.2267
5/10/2003	9:36:45	531.9	50.76	14.52	-0.063	8.865	0.0496	8.7250
5/10/2003	9:37:17	563.5	50.74	14.565	-0.018	9.391667	0.0142	9.2517
5/10/2003	9:37:50	597	50.74	14.573	-0.01	9.95	0.0079	9.8100
5/10/2003	9:38:26	632.5	50.74	14.583	0			
5/10/2003	9:39:04	670.1	50.74	14.583	0			
5/10/2003	9:39:43	709.9	50.74	14.583	0			
5/10/2003	9:40:26	752.1	50.74	14.583	0			
5/10/2003	9:41:10	796.8	50.74	14.583	0			

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT11
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: 6/23/03 RWO

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	6.15 = To

Hydraulic Conductivity (K) :

2.70E-04	ft./min.
4.50E-06	ft./sec.
3.89E-01	ft./day
1.37E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MW14

PROJECT NO.: 9960 GW 0279 GEOLOGIST: BOB BALLOUER

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 17.80' TEST NO.: 5

STATIC WATER LEVEL (Depth/Elevation): 7.78' DATE: 5/9/03

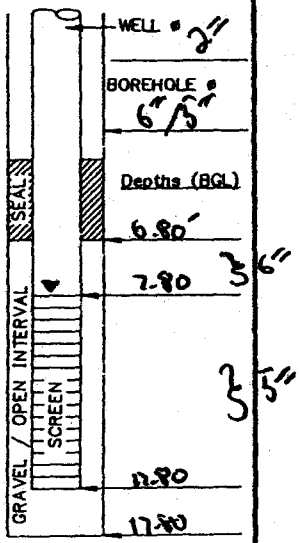
TEST TYPE (Rising/Falling/Constant Head): FALLING HEAD CHECKED:

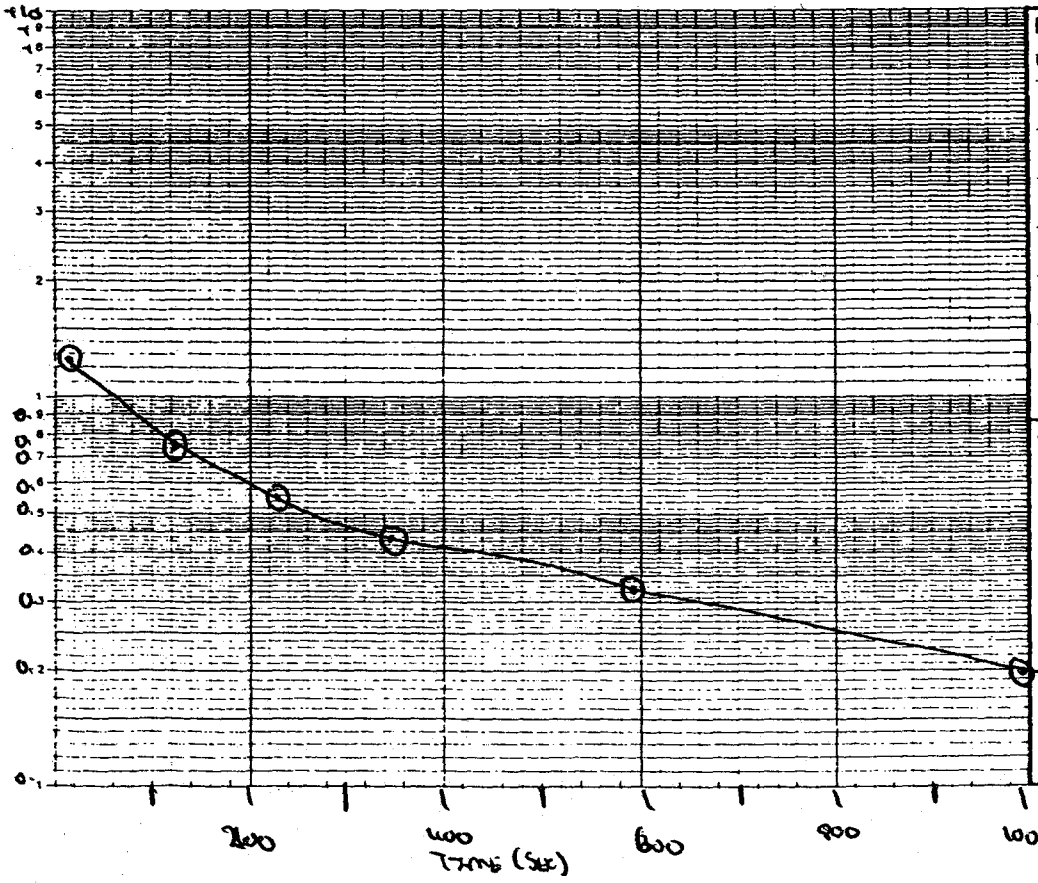
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 61.5" LONG SLUG PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 3.05'

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
START → 4.8	8.773	0	111.2	9.436	+0.663
5.1	9.213	+0.44	236.8	9.358	+0.585
5.4	12.345	+3.572	354.9	9.247	+0.474
10.0	10.142	+1.369	547.0	9.108	+0.335
20.0	10.010	+1.237	1003.8	8.984	+0.211
29.8	9.921	+1.148	1503.3	8.913	+0.14
41.8	9.836	+1.063	2005.7	8.871	+0.098
49.7	9.792	+1.019	2525.9	8.846	+0.073
59.0	9.745	+0.972			
93.7	9.606	+0.833			
111.5	9.558	+0.785			
125.1	9.531	+0.758			

WELL SCHEMATIC



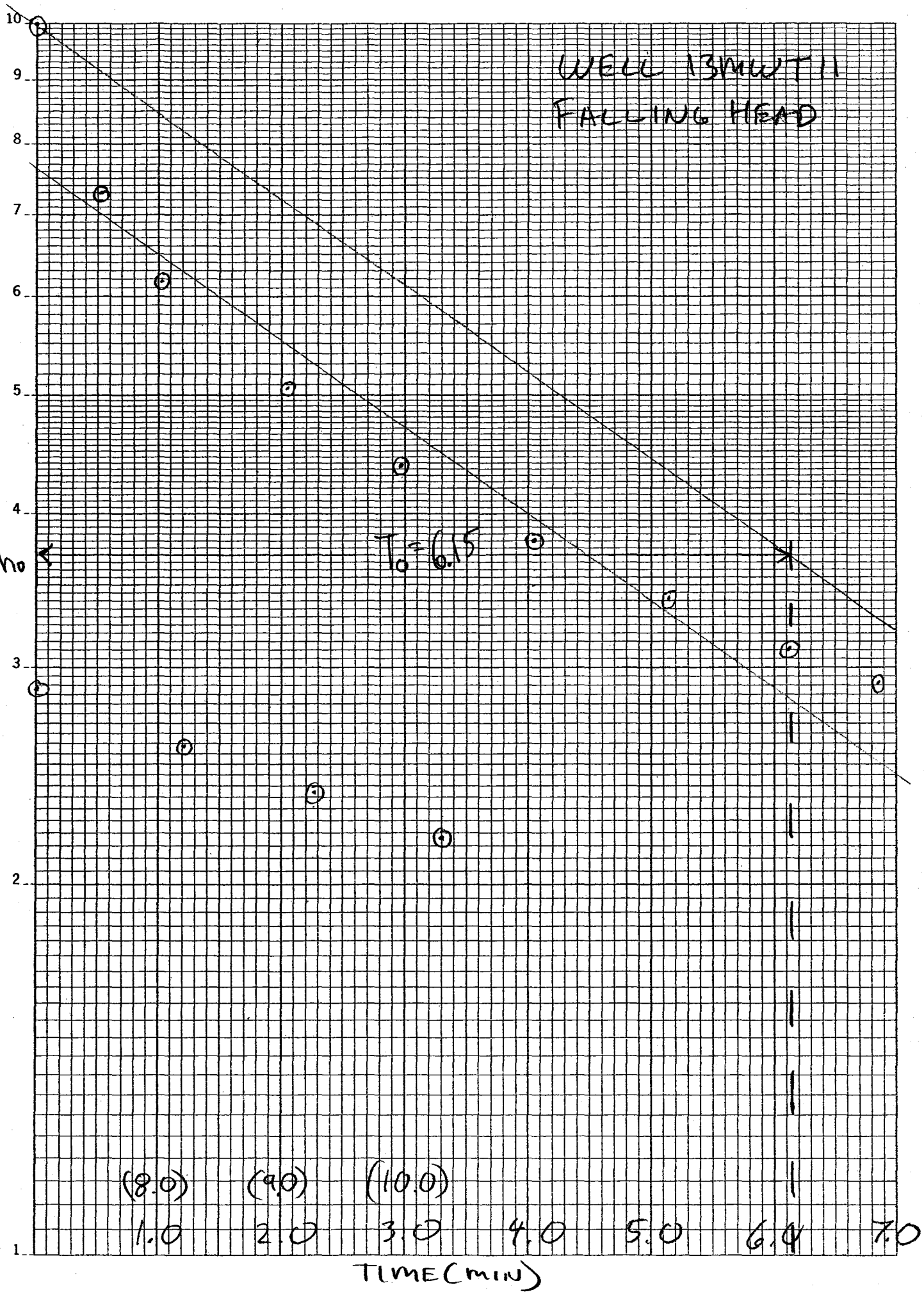


REMARKS:

WL 7.78

TD 17.80

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/9/2003 13:21:57
Report fror ...\SN09018 2003-05-09 130833 13MWT11 Falling.bin
Win-Situ V 4.41

Serial num 9018
Firmware \ 3.06
Unit name:

Test name: 13MWT11 Falling

Test define 5/9/2003 13:07:56
Test starte 5/9/2003 13:08:33
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 126

TOTAL DA 126

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= 1.47
5/9/2003	13:08:33	0	0	54.1	8.773	0			
5/9/2003	13:08:33	0.3	0.005	54.15	8.773	0			
5/9/2003	13:08:34	0.6	0.01	54.15	8.773	0			
5/9/2003	13:08:34	0.9	0.015	54.15	8.773	0			
5/9/2003	13:08:34	1.2	0.02	54.17	8.773	0			
5/9/2003	13:08:35	1.5	0.025	54.17	8.773	0			
5/9/2003	13:08:35	1.8	0.03	54.17	8.773	0			
5/9/2003	13:08:35	2.1	0.035	54.17	8.773	0			
5/9/2003	13:08:35	2.4	0.04	54.19	8.773	0			
5/9/2003	13:08:36	2.7	0.045	54.17	8.773	0			
5/9/2003	13:08:36	3	0.05	54.19	8.773	0			
5/9/2003	13:08:36	3.3	0.055	54.19	8.773	0			
5/9/2003	13:08:37	3.6	0.06	54.19	8.773	0			
5/9/2003	13:08:37	3.9	0.065	54.19	8.773	0			
5/9/2003	13:08:37	4.2	0.07	54.19	8.773	0			
5/9/2003	13:08:38	4.5	0.075	54.19	8.773	0			
5/9/2003	13:08:38	4.8	0.08	54.19	8.773	0			
5/9/2003	13:08:38	5.1	0.085	54.19	9.213	0.44			
5/9/2003	13:08:38	5.4	0.09	54.19	12.345	3.572			
5/9/2003	13:08:39	5.7	0.095	54.19	10.76	1.987			
5/9/2003	13:08:39	6	0.1	54.19	9.984	1.211			
5/9/2003	13:08:39	6.4	0.106667	54.19	10.534	1.761			
5/9/2003	13:08:40	6.7	0.111667	54.19	9.922	1.149			
5/9/2003	13:08:40	7.1	0.118333	54.19	10.204	1.431	Plotted shaded values.		
5/9/2003	13:08:41	7.5	0.125	54.22	10.283	1.51			
5/9/2003	13:08:41	8	0.133333	54.22	10.156	1.383			
5/9/2003	13:08:42	8.4	0.14	54.22	10.163	1.39	adjusted time	h/ho	

5/9/2003	13:08:42	8.9	0.148333	54.22	10.243	1.47	0.000	1.000
5/9/2003	13:08:43	9.5	0.158333	54.22	10.125	1.352	0.010	0.920
5/9/2003	13:08:43	10	0.166667	54.19	10.142	1.369	0.018	0.931
5/9/2003	13:08:44	10.6	0.176667	54.17	10.126	1.353	0.028	0.920
5/9/2003	13:08:44	11.3	0.188333	54.17	10.116	1.343	0.040	0.914
5/9/2003	13:08:45	11.9	0.198333	54.17	10.105	1.332	0.050	0.906
5/9/2003	13:08:46	12.6	0.21	54.17	10.095	1.322	0.062	0.899
5/9/2003	13:08:46	13.4	0.223333	54.17	10.084	1.311	0.075	0.892
5/9/2003	13:08:47	14.2	0.236667	54.17	10.072	1.299	0.088	0.884
5/9/2003	13:08:48	15	0.25	54.17	10.062	1.289	0.102	0.877
5/9/2003	13:08:49	15.9	0.265	54.17	10.057	1.284	0.117	0.873
5/9/2003	13:08:50	16.8	0.28	54.17	10.043	1.27	0.132	0.864
5/9/2003	13:08:51	17.8	0.296667	54.17	10.033	1.26	0.148	0.857
5/9/2003	13:08:52	18.9	0.315	54.15	10.02	1.247	0.167	0.848
5/9/2003	13:08:53	20	0.333333	54.17	10.01	1.237	0.185	0.841
5/9/2003	13:08:54	21.2	0.353333	54.15	10	1.227	0.205	0.835
5/9/2003	13:08:56	22.4	0.373333	54.15	9.985	1.212	0.225	0.824
5/9/2003	13:08:57	23.8	0.396667	54.15	9.971	1.198	0.248	0.815
5/9/2003	13:08:58	25.2	0.42	54.15	9.956	1.183	0.272	0.805
5/9/2003	13:09:00	26.7	0.445	54.15	9.944	1.171	0.297	0.797
5/9/2003	13:09:01	28.2	0.47	54.15	9.933	1.16	0.322	0.789
5/9/2003	13:09:03	29.8	0.496667	54.15	9.921	1.148	0.348	0.781
5/9/2003	13:09:05	31.5	0.525	54.15	9.908	1.135	0.377	0.772
5/9/2003	13:09:06	33.3	0.555	54.15	9.896	1.123	0.407	0.764
5/9/2003	13:09:08	35.2	0.586667	54.15	9.881	1.108	0.438	0.754
5/9/2003	13:09:10	37.3	0.621667	54.15	9.867	1.094	0.473	0.744
5/9/2003	13:09:13	39.5	0.658333	54.15	9.852	1.079	0.510	0.734
5/9/2003	13:09:15	41.8	0.696667	54.15	9.836	1.063	0.548	0.723
5/9/2003	13:09:17	44.3	0.738333	54.15	9.823	1.05	0.590	0.714
5/9/2003	13:09:20	46.9	0.781667	54.15	9.807	1.034	0.633	0.703
5/9/2003	13:09:23	49.7	0.828333	54.15	9.792	1.019	0.680	0.693
5/9/2003	13:09:26	52.6	0.876667	54.15	9.778	1.005	0.728	0.684
5/9/2003	13:09:29	55.7	0.928333	54.12	9.764	0.991	0.780	0.674
5/9/2003	13:09:32	59	0.983333	54.15	9.745	0.972	0.835	0.661
5/9/2003	13:09:36	62.5	1.041667	54.15	9.728	0.955	0.893	0.650
5/9/2003	13:09:39	66.2	1.103333	54.12	9.712	0.939	0.955	0.639
5/9/2003	13:09:43	70.1	1.168333	54.12	9.697	0.924	1.020	0.629
5/9/2003	13:09:47	74.3	1.238333	54.12	9.681	0.908	1.090	0.618
5/9/2003	13:09:52	78.7	1.311667	54.12	9.664	0.891	1.163	0.606
5/9/2003	13:09:56	83.4	1.39	54.12	9.645	0.872	1.242	0.593
5/9/2003	13:10:01	88.4	1.473333	54.12	9.629	0.856	1.325	0.582
5/9/2003	13:10:07	93.7	1.561667	54.12	9.606	0.833	1.413	0.567
5/9/2003	13:10:12	99.3	1.655	54.12	9.589	0.816	1.507	0.555
5/9/2003	13:10:18	105.2	1.753333	54.12	9.575	0.802	1.605	0.546
5/9/2003	13:10:25	111.5	1.858333	54.12	9.558	0.785	1.710	0.534
5/9/2003	13:10:31	118.1	1.968333	54.12	9.546	0.773	1.820	0.526
5/9/2003	13:10:38	125.1	2.085	54.12	9.531	0.758	1.937	0.516
5/9/2003	13:10:46	132.6	2.21	54.1	9.517	0.744	2.062	0.506
5/9/2003	13:10:54	140.5	2.341667	54.1	9.5	0.727	2.193	0.495
5/9/2003	13:11:02	148.9	2.481667	54.12	9.479	0.706	2.333	0.480
5/9/2003	13:11:11	157.8	2.63	54.1	9.467	0.694	2.482	0.472
5/9/2003	13:11:20	167.2	2.786667	54.12	9.452	0.679	2.638	0.462
5/9/2003	13:11:30	177.2	2.953333	54.1	9.436	0.663	2.805	0.451
5/9/2003	13:11:41	187.8	3.13	54.1	9.419	0.646	2.982	0.439
5/9/2003	13:11:52	199	3.316667	54.1	9.405	0.632	3.168	0.430
5/9/2003	13:12:04	210.9	3.515	54.1	9.39	0.617	3.367	0.420
5/9/2003	13:12:17	223.5	3.725	54.1	9.374	0.601	3.577	0.409
5/9/2003	13:12:30	236.8	3.946667	54.08	9.358	0.585	3.798	0.398
5/9/2003	13:12:44	250.9	4.181667	54.08	9.341	0.568	4.035	0.386
5/9/2003	13:12:59	265.8	4.43	54.08	9.324	0.551	4.282	0.375
5/9/2003	13:13:15	281.6	4.693333	54.08	9.31	0.537	4.545	0.365
5/9/2003	13:13:31	298.4	4.973333	54.08	9.293	0.52	4.825	0.354
5/9/2003	13:13:49	316.2	5.27	54.08	9.277	0.504	5.122	0.343
5/9/2003	13:14:08	335	5.583333	54.1	9.26	0.487	5.435	0.331
5/9/2003	13:14:28	354.9	5.915	54.1	9.247	0.474	5.767	0.322

5/9/2003	13:14:49	376	6.266667	54.12	9.23	0.457	6.118	0.311
5/9/2003	13:15:11	398.4	6.64	54.12	9.216	0.443	6.492	0.301
5/9/2003	13:15:35	422.1	7.035	54.12	9.201	0.428	6.887	0.291
5/9/2003	13:16:00	447.2	7.453333	54.15	9.184	0.411	7.305	0.280
5/9/2003	13:16:27	473.8	7.896667	54.19	9.167	0.394	7.748	0.268
5/9/2003	13:16:55	502	8.366667	54.22	9.154	0.381	8.216	0.259
5/9/2003	13:17:25	531.9	8.865	54.24	9.14	0.367	8.717	0.250
5/9/2003	13:17:57	563.5	9.391667	54.26	9.123	0.35	9.243	0.238
5/9/2003	13:18:30	597	9.95	54.26	9.108	0.335	9.802	0.228
5/9/2003	13:19:06	632.5	10.54167	54.28	9.093	0.32	10.393	0.218
5/9/2003	13:19:43	670.1	11.16833	54.28	9.079	0.306	11.020	0.208
5/9/2003	13:20:23	709.9	11.83167	54.31	9.064	0.291	11.683	0.198
5/9/2003	13:21:05	752.1	12.535	54.31	9.049	0.276	12.387	0.188
5/9/2003	13:21:50	796.8	13.28	54.31	9.035	0.262	13.132	0.178
5/9/2003	13:22:37	844.2	14.07	54.31	9.024	0.251	13.922	0.171
5/9/2003	13:23:27	894.4	14.90667	54.31	9.01	0.237	14.758	0.161
5/9/2003	13:24:21	947.5	15.79167	54.33	8.997	0.224	15.643	0.152
5/9/2003	13:25:17	1003.8	16.73	54.35	8.984	0.211	16.582	0.144
5/9/2003	13:26:16	1063.4	17.72333	54.35	8.974	0.201	17.575	0.137
5/9/2003	13:27:20	1126.6	18.77667	54.35	8.962	0.189	18.628	0.129
5/9/2003	13:28:27	1193.5	19.89167	54.38	8.953	0.18	19.743	0.122
5/9/2003	13:29:37	1264.4	21.07333	54.38	8.94	0.167	20.925	0.114
5/9/2003	13:30:53	1339.5	22.325	54.38	8.932	0.159	22.177	0.108
5/9/2003	13:32:12	1419	23.65	54.38	8.922	0.149	23.502	0.101
5/9/2003	13:33:36	1503.3	25.055	54.38	8.913	0.14	24.907	0.095
5/9/2003	13:35:06	1592.6	26.54333	54.35	8.903	0.13	26.395	0.088
5/9/2003	13:36:40	1687.1	28.11833	54.35	8.895	0.122	27.970	0.083
5/9/2003	13:38:20	1787.2	29.78667	54.35	8.887	0.114	29.638	0.078
5/9/2003	13:40:06	1893.3	31.555	54.33	8.879	0.106	31.407	0.072
5/9/2003	13:41:59	2005.7	33.42833	54.33	8.871	0.098	33.280	0.067
5/9/2003	13:43:58	2124.7	35.41167	54.33	8.864	0.091	35.263	0.062
5/9/2003	13:46:04	2250.8	37.51333	54.31	8.858	0.085	37.365	0.058
5/9/2003	13:48:17	2384.4	39.74	54.28	8.85	0.077	39.592	0.052
5/9/2003	13:50:39	2525.9	42.09833	54.28	8.846	0.073	41.950	0.050

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT11
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	15.10 = To

Hydraulic Conductivity (K) :

1.10E-04	ft./min.
1.83E-06	ft./sec.
1.59E-01	ft./day
5.59E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MWTH

PROJECT NO.: 9060 CTO 0219 GEOLOGIST: BOB BALLCOVEC

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' TEST NO.: 7

STATIC WATER LEVEL (Depth/Elevation): 7.78' DATE: 5/9/03

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

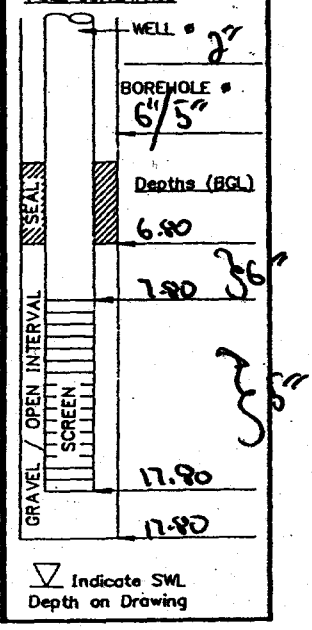
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 61.5" LONG SLUG PAGE OF

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

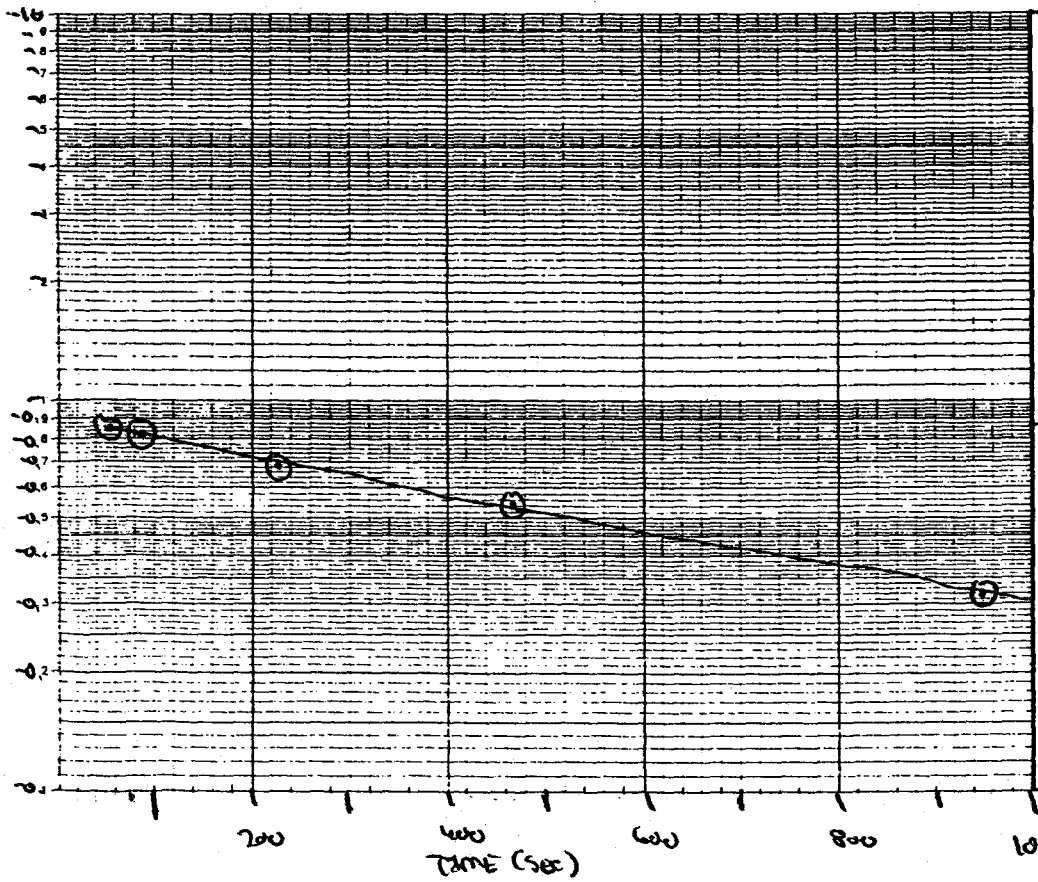
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
2.7	8.854		236.8	8.164	-0.69
3.0	6.969	-2.085	473.8	8.294	-0.56
5.1	7.485	-1.369	947.5	8.524	-0.33
6.0	7.681	-1.173	1787.2	8.651	-0.203
7.1	7.806	-1.048			
10.0	7.889	-0.965			
15.0	7.925	-0.929			
20.0	7.944	-0.91			
29.8	7.966	-0.888			
59.0	8.012	-0.842			
93.7	8.054	-0.8			
148.9	8.104	-0.75			

Static Start

WELL SCHEMATIC

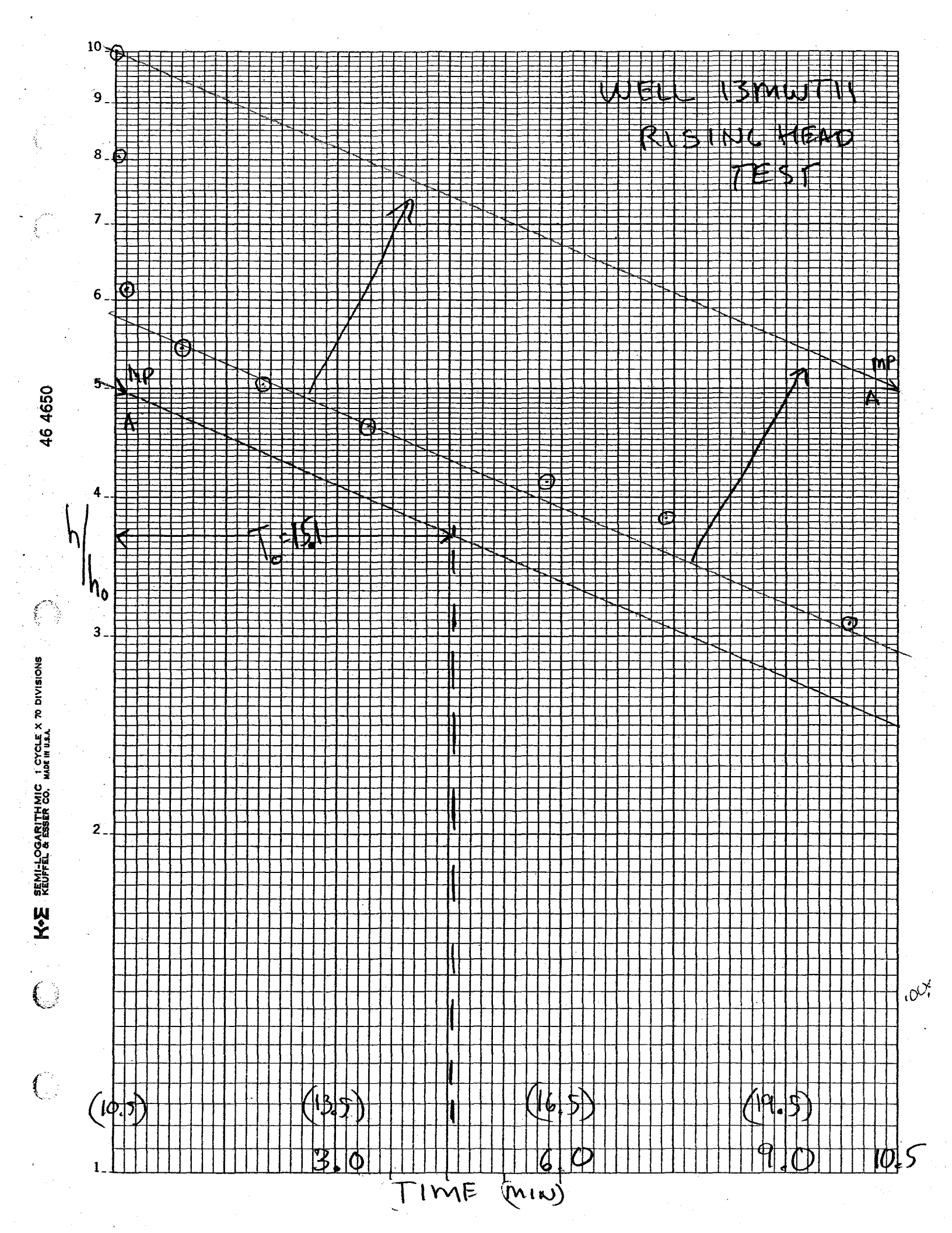


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


WELL 13MW11
RISING HEAD
TEST
MP
A
MP
A
h/h_0
$T_0 = 15.1$
TIME (MIN)
(10.5)
(13.5)
(16.5)
(19.5)
3.0
6.0
9.0
10.5
10
9
8
7
6
5
4
3
2
1
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/9/2003 14:25:46
Report fror ...\SN09018 2003-05-09 135929 13MWT11 Rising.bin
Win-Situ V 4.41

Serial num 9018
Firmware \ 3.06
Unit name:

Test name: 13MWT11 Rising

Test define 5/9/2003 13:56:07
Test starte 5/9/2003 13:59:29
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 136

TOTAL DA 136

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O		adjusted time	h/ho	ho= -1.693
5/9/2003	13:59:29	0	0	54.24	8.854	0			
5/9/2003	13:59:29	0.3	0.005	54.28	8.854	0			
5/9/2003	13:59:29	0.6	0.01	54.31	8.854	0			
5/9/2003	13:59:29	0.9	0.015	54.31	8.854	0			
5/9/2003	13:59:30	1.2	0.02	54.31	8.854	0			
5/9/2003	13:59:30	1.5	0.025	54.33	8.854	0			
5/9/2003	13:59:30	1.8	0.03	54.33	8.854	0			
5/9/2003	13:59:31	2.1	0.035	54.33	8.854	0			
5/9/2003	13:59:31	2.4	0.04	54.33	8.854	0			
5/9/2003	13:59:31	2.7	0.045	54.33	8.854	0			
5/9/2003	13:59:32	3	0.05	54.33	6.769	-2.085			
5/9/2003	13:59:32	3.3	0.055	54.33	6.993	-1.861	Plotted shaded values.		
5/9/2003	13:59:32	3.6	0.06	54.33	7.161	-1.693			
5/9/2003	13:59:32	3.9	0.065	54.33	7.217	-1.637			
5/9/2003	13:59:33	4.2	0.07	54.33	7.157	-1.697	adjusted time	h/ho	
5/9/2003	13:59:33	4.5	0.075	54.33	7.323	-1.531	0.000	1.000	
5/9/2003	13:59:33	4.8	0.08	54.33	7.404	-1.45	0.005	0.947	
5/9/2003	13:59:34	5.1	0.085	54.33	7.485	-1.369	0.010	0.894	
5/9/2003	13:59:34	5.4	0.09	54.33	7.564	-1.29	0.015	0.843	
5/9/2003	13:59:34	5.7	0.095	54.35	7.625	-1.229	0.020	0.803	
5/9/2003	13:59:35	6	0.1	54.35	7.681	-1.173	0.025	0.766	
5/9/2003	13:59:35	6.4	0.106667	54.35	7.733	-1.121	0.032	0.732	
5/9/2003	13:59:35	6.7	0.111667	54.35	7.777	-1.077	0.037	0.703	
5/9/2003	13:59:36	7.1	0.118333	54.35	7.806	-1.048	0.043	0.685	
5/9/2003	13:59:36	7.5	0.125	54.35	7.825	-1.029	0.050	0.672	
5/9/2003	13:59:37	8	0.133333	54.35	7.852	-1.002	0.058	0.654	
5/9/2003	13:59:37	8.4	0.14	54.35	7.866	-0.988	0.065	0.645	

5/9/2003	13:59:37	8.9	0.148333	54.35	7.879	-0.975	0.073	0.637
5/9/2003	13:59:38	9.5	0.158333	54.35	7.887	-0.967	0.083	0.632
5/9/2003	13:59:39	10	0.166667	54.33	7.889	-0.965	0.092	0.630
5/9/2003	13:59:39	10.6	0.176667	54.33	7.895	-0.959	0.102	0.626
5/9/2003	13:59:40	11.3	0.188333	54.33	7.902	-0.952	0.113	0.622
5/9/2003	13:59:40	11.9	0.198333	54.33	7.906	-0.948	0.123	0.619
5/9/2003	13:59:41	12.6	0.21	54.31	7.912	-0.942	0.135	0.615
5/9/2003	13:59:42	13.4	0.223333	54.31	7.917	-0.937	0.148	0.612
5/9/2003	13:59:43	14.2	0.236667	54.31	7.921	-0.933	0.162	0.609
5/9/2003	13:59:44	15	0.25	54.31	7.925	-0.929	0.175	0.607
5/9/2003	13:59:44	15.9	0.265	54.31	7.927	-0.927	0.190	0.605
5/9/2003	13:59:45	16.8	0.28	54.31	7.931	-0.923	0.205	0.603
5/9/2003	13:59:46	17.8	0.296667	54.31	7.937	-0.917	0.222	0.599
5/9/2003	13:59:47	18.9	0.315	54.31	7.939	-0.915	0.240	0.598
5/9/2003	13:59:49	20	0.333333	54.31	7.944	-0.91	0.258	0.594
5/9/2003	13:59:50	21.2	0.353333	54.31	7.946	-0.908	0.278	0.593
5/9/2003	13:59:51	22.4	0.373333	54.31	7.95	-0.904	0.298	0.590
5/9/2003	13:59:52	23.8	0.396667	54.31	7.954	-0.9	0.322	0.588
5/9/2003	13:59:54	25.2	0.42	54.31	7.956	-0.898	0.345	0.587
5/9/2003	13:59:55	26.7	0.445	54.31	7.96	-0.894	0.370	0.584
5/9/2003	13:59:57	28.2	0.47	54.31	7.964	-0.89	0.395	0.581
5/9/2003	13:59:58	29.8	0.496667	54.31	7.966	-0.888	0.422	0.580
5/9/2003	14:00:00	31.5	0.525	54.31	7.97	-0.884	0.450	0.577
5/9/2003	14:00:02	33.3	0.555	54.31	7.975	-0.879	0.480	0.574
5/9/2003	14:00:04	35.2	0.586667	54.31	7.977	-0.877	0.512	0.573
5/9/2003	14:00:06	37.3	0.621667	54.31	7.981	-0.873	0.547	0.570
5/9/2003	14:00:08	39.5	0.658333	54.28	7.985	-0.869	0.583	0.568
5/9/2003	14:00:10	41.8	0.696667	54.28	7.989	-0.865	0.622	0.565
5/9/2003	14:00:13	44.3	0.738333	54.28	7.992	-0.862	0.663	0.563
5/9/2003	14:00:15	46.9	0.781667	54.28	7.996	-0.858	0.707	0.560
5/9/2003	14:00:18	49.7	0.828333	54.28	8	-0.854	0.753	0.558
5/9/2003	14:00:21	52.6	0.876667	54.28	8.004	-0.85	0.802	0.555
5/9/2003	14:00:24	55.7	0.928333	54.28	8.008	-0.846	0.853	0.553
5/9/2003	14:00:28	59	0.983333	54.28	8.012	-0.842	0.908	0.550
5/9/2003	14:00:31	62.5	1.041667	54.28	8.019	-0.835	0.967	0.545
5/9/2003	14:00:35	66.2	1.103333	54.28	8.023	-0.831	1.028	0.543
5/9/2003	14:00:39	70.1	1.168333	54.28	8.029	-0.825	1.093	0.539
5/9/2003	14:00:43	74.3	1.238333	54.28	8.033	-0.821	1.163	0.536
5/9/2003	14:00:47	78.7	1.311667	54.26	8.038	-0.816	1.237	0.533
5/9/2003	14:00:52	83.4	1.39	54.26	8.044	-0.81	1.315	0.529
5/9/2003	14:00:57	88.4	1.473333	54.26	8.05	-0.804	1.398	0.525
5/9/2003	14:01:02	93.7	1.561667	54.26	8.054	-0.8	1.487	0.523
5/9/2003	14:01:08	99.3	1.655	54.26	8.06	-0.794	1.580	0.519
5/9/2003	14:01:14	105.2	1.753333	54.26	8.067	-0.787	1.678	0.514
5/9/2003	14:01:20	111.5	1.858333	54.26	8.073	-0.781	1.783	0.510
5/9/2003	14:01:27	118.1	1.968333	54.26	8.077	-0.777	1.893	0.508
5/9/2003	14:01:34	125.1	2.085	54.26	8.083	-0.771	2.010	0.504
5/9/2003	14:01:41	132.6	2.21	54.24	8.092	-0.762	2.135	0.498
5/9/2003	14:01:49	140.5	2.341667	54.24	8.098	-0.756	2.267	0.494
5/9/2003	14:01:57	148.9	2.481667	54.24	8.104	-0.75	2.407	0.490
5/9/2003	14:02:06	157.8	2.63	54.24	8.113	-0.741	2.555	0.484
5/9/2003	14:02:16	167.2	2.786667	54.24	8.121	-0.733	2.712	0.479
5/9/2003	14:02:26	177.2	2.953333	54.24	8.127	-0.727	2.878	0.475
5/9/2003	14:02:36	187.8	3.13	54.24	8.131	-0.723	3.055	0.472
5/9/2003	14:02:48	199	3.316667	54.24	8.142	-0.712	3.242	0.465
5/9/2003	14:02:59	210.9	3.515	54.24	8.148	-0.706	3.440	0.461
5/9/2003	14:03:12	223.5	3.725	54.24	8.158	-0.696	3.650	0.455
5/9/2003	14:03:25	236.8	3.946667	54.24	8.164	-0.69	3.872	0.451
5/9/2003	14:03:39	250.9	4.181667	54.24	8.173	-0.681	4.107	0.445
5/9/2003	14:03:54	265.8	4.43	54.24	8.181	-0.673	4.355	0.440
5/9/2003	14:04:10	281.6	4.693333	54.24	8.187	-0.667	4.618	0.436
5/9/2003	14:04:27	298.4	4.973333	54.22	8.196	-0.658	4.898	0.430
5/9/2003	14:04:45	316.2	5.27	54.22	8.206	-0.648	5.195	0.423
5/9/2003	14:05:04	335	5.583333	54.22	8.212	-0.642	5.508	0.419
5/9/2003	14:05:23	354.9	5.915	54.22	8.221	-0.633	5.840	0.413

5/9/2003	14:05:45	376	6.266667	54.22	8.229	-0.625	6.192	0.408
5/9/2003	14:06:07	398.4	6.64	54.22	8.239	-0.615	6.565	0.402
5/9/2003	14:06:31	422.1	7.035	54.22	8.248	-0.606	6.960	0.396
5/9/2003	14:06:56	447.2	7.453333	54.22	8.266	-0.588	7.378	0.384
5/9/2003	14:07:22	473.8	7.896667	54.19	8.294	-0.56	7.822	0.366
5/9/2003	14:07:51	502	8.366667	54.19	8.319	-0.535	8.292	0.349
5/9/2003	14:08:20	531.9	8.865	54.19	8.341	-0.513	8.790	0.335
5/9/2003	14:08:52	563.5	9.391667	54.19	8.362	-0.492	9.317	0.321
5/9/2003	14:09:26	597	9.95	54.19	8.383	-0.471	9.875	0.308
5/9/2003	14:10:01	632.5	10.54167	54.19	8.402	-0.452	10.467	0.295
5/9/2003	14:10:39	670.1	11.16833	54.19	8.422	-0.432	11.093	0.282
5/9/2003	14:11:18	709.9	11.83167	54.19	8.443	-0.411	11.757	0.268
5/9/2003	14:12:01	752.1	12.535	54.19	8.46	-0.394	12.460	0.257
5/9/2003	14:12:45	796.8	13.28	54.19	8.478	-0.376	13.205	0.246
5/9/2003	14:13:33	844.2	14.07	54.19	8.495	-0.359	13.995	0.234
5/9/2003	14:14:23	894.4	14.90667	54.19	8.509	-0.345	14.832	0.225
5/9/2003	14:15:16	947.5	15.79167	54.19	8.524	-0.33	15.717	0.216
5/9/2003	14:16:12	1003.8	16.73	54.19	8.536	-0.318	16.655	0.208
5/9/2003	14:17:12	1063.4	17.72333	54.19	8.553	-0.301	17.648	0.197
5/9/2003	14:18:15	1126.6	18.77667	54.19	8.565	-0.289	18.702	0.189
5/9/2003	14:19:22	1193.5	19.89167	54.19	8.576	-0.278	19.817	0.182
5/9/2003	14:20:33	1264.4	21.07333	54.17	8.591	-0.263	20.998	0.172
5/9/2003	14:21:48	1339.5	22.325	54.17	8.601	-0.253	22.250	0.165
5/9/2003	14:23:08	1419	23.65	54.17	8.614	-0.24	23.575	0.157
5/9/2003	14:24:32	1503.3	25.055	54.17	8.624	-0.23	24.980	0.150
5/9/2003	14:26:01	1592.6	26.54333	54.17	8.63	-0.224	26.468	0.146
5/9/2003	14:27:36	1687.1	28.11833	54.17	8.638	-0.216	28.043	0.141
5/9/2003	14:29:16	1787.2	29.78667	54.15	8.651	-0.203	29.712	0.133
5/9/2003	14:31:02	1893.3	31.555	54.15	8.662	-0.192	31.480	0.125
5/9/2003	14:32:54	2005.7	33.42833	54.15	8.666	-0.188	33.353	0.123
5/9/2003	14:34:53	2124.7	35.41167	54.15	8.672	-0.182	35.337	0.119
5/9/2003	14:36:59	2250.8	37.51333	54.15	8.68	-0.174	37.438	0.114
5/9/2003	14:39:13	2384.4	39.74	54.15	8.684	-0.17	39.665	0.111
5/9/2003	14:41:34	2525.9	42.09833	54.12	8.691	-0.163	42.023	0.106
5/9/2003	14:44:04	2675.8	44.59667	54.1	8.693	-0.161	44.522	0.105
5/9/2003	14:46:43	2834.6	47.24333	54.08	8.696	-0.158	47.168	0.103
5/9/2003	14:49:31	3002.8	50.04667	54.06	8.711	-0.143	49.972	0.093
5/9/2003	14:52:29	3180.9	53.015	54.08	8.71	-0.144	52.940	0.094
5/9/2003	14:55:38	3369.6	56.16	54.06	8.713	-0.141	56.085	0.092
5/9/2003	14:58:58	3569.5	59.49167	54.06	8.719	-0.135	59.417	0.088
5/9/2003	15:02:30	3781.2	63.02	54.08	8.721	-0.133	62.945	0.087
5/9/2003	15:06:14	4005.5	66.75833	54.08	8.725	-0.129	66.683	0.084
5/9/2003	15:10:12	4243.1	70.71833	54.06	8.731	-0.123	70.643	0.080
5/9/2003	15:14:23	4494.7	74.91167	54.06	8.738	-0.116	74.837	0.076

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT14
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RMS 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	1.43 = To

Hydraulic Conductivity (K) :

1.16E-03	ft./min.
1.94E-05	ft./sec.
1.67E+00	ft./day
5.91E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: BMWT14

PROJECT NO.: 9060 CO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 25.63' T.O. TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 13.02' DATE: 5/10/03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

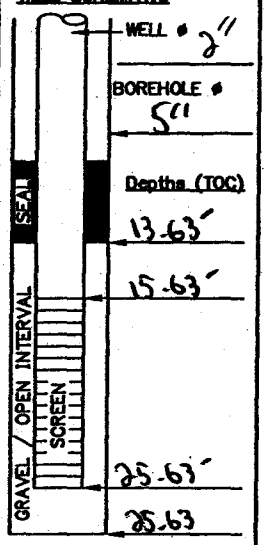
METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 38" SOLID SLUG PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

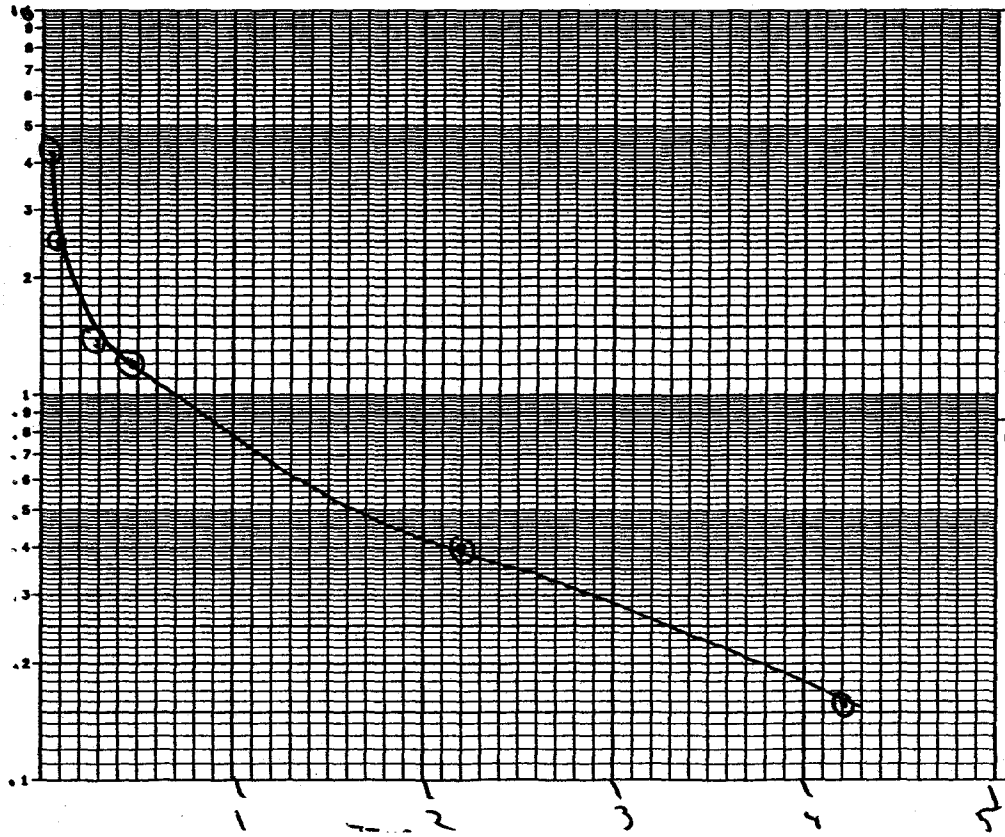
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	11.619	0	6.64	11.689	0.07
0.035	18.032	+6.413			
0.04	16.573	+4.954			
0.05	15.428	+4.309			
0.08	14.124	+2.505			
0.14	13.19	+1.57			
0.28	13.017	+1.398			
0.47	12.819	+1.2			
0.78	12.573	+0.954			
2.21	12.02	+0.401			
2.78	11.946	+0.327			
4.18	11.782	+0.163			

WELL SCHEMATIC

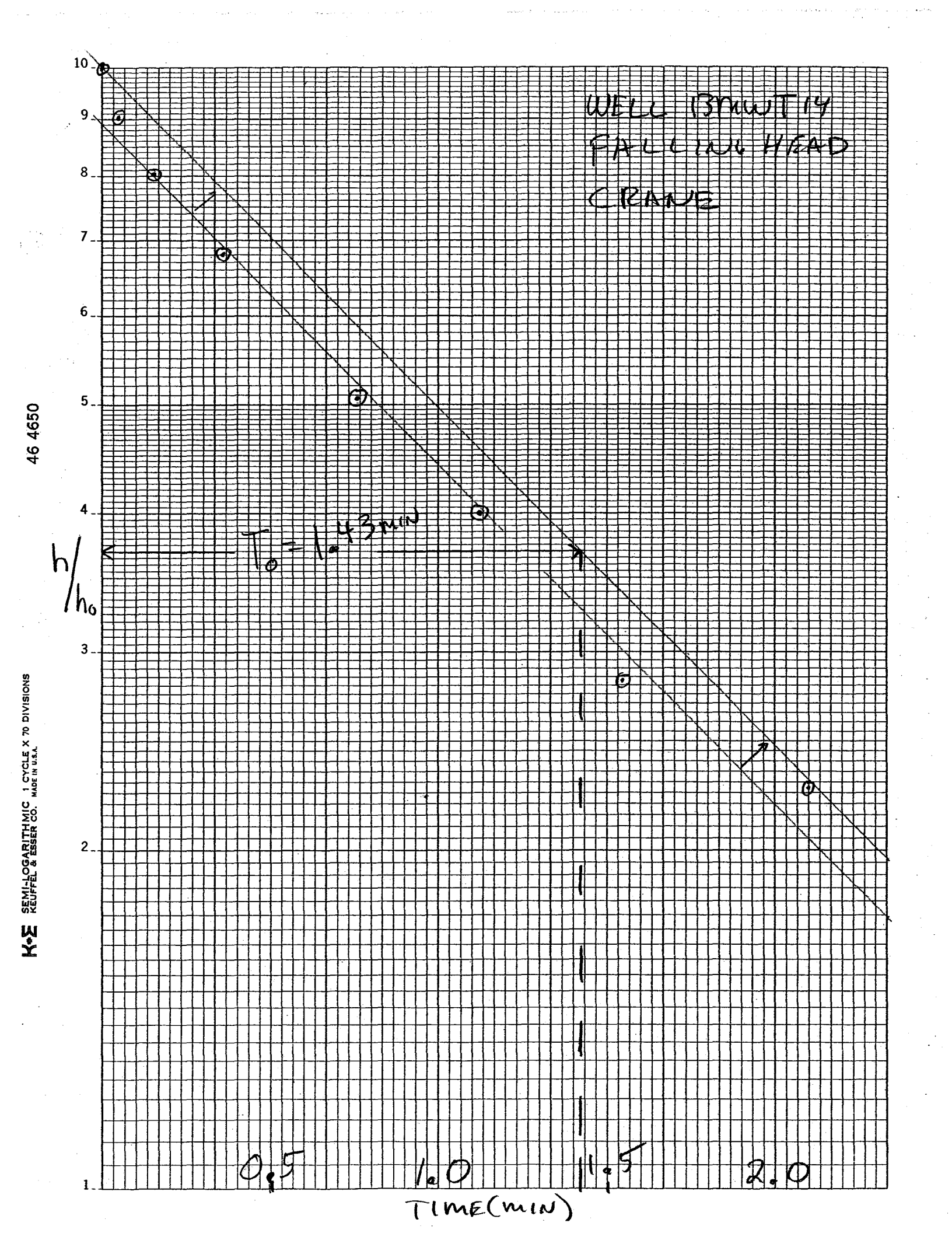


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS,SKETCH MAPS, ETC.:


WELL BRUNT 14
FALLING HEAD
CRANE
$T_0 = 1.43$ MIN
h/h_0
10
9
8
7
6
5
4
3
2
1
0.5
1.0
1.5
2.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/11/2003 16:20:49
Report fror ...\SN00824 2003-05-10 113006 13MWT14 Falling.bin
Win-Situ V 4.41

Serial num 824
Firmware \ 3.06
Unit name:

Test name: 13MWT14 Falling

Test define 5/10/2003 11:29:01
Test starte 5/10/2003 11:30:06
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 120

TOTAL DA 120

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacemen Feet	adjusted time	h/ho	ho= 1.764
5/10/2003	11:30:06	0	0	55.42	11.619	0			
5/10/2003	11:30:06	0.3	0.005	55.45	11.619	0			
5/10/2003	11:30:06	0.6	0.01	55.47	11.619	0			
5/10/2003	11:30:07	0.9	0.015	55.47	11.619	0			
5/10/2003	11:30:07	1.2	0.02	55.47	11.619	0			
5/10/2003	11:30:07	1.5	0.025	55.49	11.637	0.018			
5/10/2003	11:30:08	1.8	0.03	55.49	11.671	0.052			
5/10/2003	11:30:08	2.1	0.035	55.49	18.032	6.413			
5/10/2003	11:30:08	2.4	0.04	55.52	16.573	4.954			
5/10/2003	11:30:09	2.7	0.045	55.49	16.502	4.883			
5/10/2003	11:30:09	3	0.05	55.49	15.928	4.309			
5/10/2003	11:30:09	3.3	0.055	55.49	15.534	3.915			
5/10/2003	11:30:09	3.6	0.06	55.52	15.425	3.806			
5/10/2003	11:30:10	3.9	0.065	55.52	14.783	3.164			
5/10/2003	11:30:10	4.2	0.07	55.52	14.824	3.205			
5/10/2003	11:30:10	4.5	0.075	55.52	14.625	3.006			
5/10/2003	11:30:11	4.8	0.08	55.52	14.124	2.505			
5/10/2003	11:30:11	5.1	0.085	55.52	13.767	2.148			
5/10/2003	11:30:11	5.4	0.09	55.52	13.535	1.916	Plotted shaded values.		
5/10/2003	11:30:12	5.7	0.095	55.52	13.338	1.719			
5/10/2003	11:30:12	6	0.1	55.52	13.093	1.474			
5/10/2003	11:30:12	6.4	0.106667	55.52	13.895	2.276	adjusted time	h/ho	
5/10/2003	11:30:13	6.7	0.111667	55.52	13.383	1.764	0.000	1.000	
5/10/2003	11:30:13	7.1	0.118333	55.52	13.258	1.639	0.007	0.929	
5/10/2003	11:30:13	7.5	0.125	55.52	13.185	1.566	0.013	0.888	
5/10/2003	11:30:14	8	0.133333	55.52	13.284	1.665	0.022	0.944	
5/10/2003	11:30:14	8.4	0.14	55.52	13.19	1.571	0.028	0.891	

5/10/2003	11:30:15	8.9	0.148333	55.52	13.2	1.581	0.037	0.896
5/10/2003	11:30:15	9.5	0.158333	55.52	13.207	1.588	0.047	0.900
5/10/2003	11:30:16	10	0.166667	55.49	13.161	1.542	0.055	0.874
5/10/2003	11:30:16	10.6	0.176667	55.49	13.163	1.544	0.065	0.875
5/10/2003	11:30:17	11.3	0.188333	55.49	13.138	1.519	0.077	0.861
5/10/2003	11:30:18	11.9	0.198333	55.49	13.116	1.497	0.087	0.849
5/10/2003	11:30:18	12.6	0.21	55.49	13.105	1.486	0.098	0.842
5/10/2003	11:30:19	13.4	0.223333	55.47	13.09	1.471	0.112	0.834
5/10/2003	11:30:20	14.2	0.236667	55.47	13.071	1.452	0.125	0.823
5/10/2003	11:30:21	15	0.25	55.49	13.051	1.432	0.138	0.812
5/10/2003	11:30:22	15.9	0.265	55.47	13.034	1.415	0.153	0.802
5/10/2003	11:30:23	16.8	0.28	55.47	13.017	1.398	0.168	0.793
5/10/2003	11:30:24	17.8	0.296667	55.47	12.997	1.378	0.185	0.781
5/10/2003	11:30:25	18.9	0.315	55.47	12.976	1.357	0.203	0.769
5/10/2003	11:30:26	20	0.333333	55.47	12.954	1.335	0.222	0.757
5/10/2003	11:30:27	21.2	0.353333	55.47	12.935	1.316	0.242	0.746
5/10/2003	11:30:28	22.4	0.373333	55.47	12.913	1.294	0.262	0.734
5/10/2003	11:30:30	23.8	0.396667	55.47	12.887	1.268	0.285	0.719
5/10/2003	11:30:31	25.2	0.42	55.47	13.002	1.383	0.308	0.784
5/10/2003	11:30:33	26.7	0.445	55.47	12.823	1.204	0.333	0.683
5/10/2003	11:30:34	28.2	0.47	55.47	12.819	1.2	0.358	0.680
5/10/2003	11:30:36	29.8	0.496667	55.47	12.797	1.178	0.385	0.668
5/10/2003	11:30:37	31.5	0.525	55.47	12.771	1.152	0.413	0.653
5/10/2003	11:30:39	33.3	0.555	55.47	12.743	1.124	0.443	0.637
5/10/2003	11:30:41	35.2	0.586667	55.47	12.718	1.099	0.475	0.623
5/10/2003	11:30:43	37.3	0.621667	55.47	12.69	1.071	0.510	0.607
5/10/2003	11:30:45	39.5	0.658333	55.47	12.661	1.042	0.547	0.591
5/10/2003	11:30:48	41.8	0.696667	55.47	12.634	1.015	0.585	0.575
5/10/2003	11:30:50	44.3	0.738333	55.47	12.605	0.986	0.627	0.559
5/10/2003	11:30:53	46.9	0.781667	55.47	12.573	0.954	0.670	0.541
5/10/2003	11:30:56	49.7	0.828333	55.47	12.543	0.924	0.717	0.524
5/10/2003	11:30:58	52.6	0.876667	55.45	12.515	0.896	0.765	0.508
5/10/2003	11:31:02	55.7	0.928333	55.45	12.483	0.864	0.817	0.490
5/10/2003	11:31:05	59	0.983333	55.45	12.452	0.833	0.872	0.472
5/10/2003	11:31:08	62.5	1.041667	55.45	12.42	0.801	0.930	0.454
5/10/2003	11:31:12	66.2	1.103333	55.45	12.388	0.769	0.992	0.436
5/10/2003	11:31:16	70.1	1.168333	55.45	12.356	0.737	1.057	0.418
5/10/2003	11:31:20	74.3	1.238333	55.42	12.325	0.706	1.127	0.400
5/10/2003	11:31:25	78.7	1.311667	55.42	12.293	0.674	1.200	0.382
5/10/2003	11:31:29	83.4	1.39	55.42	12.26	0.641	1.278	0.363
5/10/2003	11:31:34	88.4	1.473333	55.52	12.12	0.501	1.362	0.284
5/10/2003	11:31:40	93.7	1.561667	55.54	12.12	0.501	1.450	0.284
5/10/2003	11:31:45	99.3	1.655	55.54	12.118	0.499	1.543	0.283
5/10/2003	11:31:51	105.2	1.753333	55.54	12.116	0.497	1.642	0.282
5/10/2003	11:31:57	111.5	1.858333	55.54	12.115	0.496	1.747	0.281
5/10/2003	11:32:04	118.1	1.968333	55.47	12.078	0.459	1.857	0.260
5/10/2003	11:32:11	125.1	2.085	55.47	12.048	0.429	1.973	0.243
5/10/2003	11:32:18	132.6	2.21	55.49	12.02	0.401	2.098	0.227
5/10/2003	11:32:26	140.5	2.341667	55.52	11.993	0.374	2.230	0.212
5/10/2003	11:32:35	148.9	2.481667	55.52	11.965	0.346	2.370	0.196
5/10/2003	11:32:44	157.8	2.63	55.56	11.941	0.322	2.518	0.183
5/10/2003	11:32:53	167.2	2.786667	55.56	11.916	0.297	2.675	0.168
5/10/2003	11:33:03	177.2	2.953333	55.58	11.892	0.273	2.842	0.155
5/10/2003	11:33:14	187.8	3.13	55.61	11.871	0.252	3.018	0.143
5/10/2003	11:33:25	199	3.316667	55.61	11.85	0.231	3.205	0.131
5/10/2003	11:33:37	210.9	3.515	55.61	11.832	0.213	3.403	0.121
5/10/2003	11:33:49	223.5	3.725	55.61	11.813	0.194	3.613	0.110
5/10/2003	11:34:03	236.8	3.946667	55.61	11.796	0.177	3.835	0.100
5/10/2003	11:34:17	250.9	4.181667	55.56	11.782	0.163	4.070	0.092
5/10/2003	11:34:32	265.8	4.43	55.54	11.765	0.146	4.318	0.083
5/10/2003	11:34:47	281.6	4.693333	55.54	11.75	0.131	4.582	0.074
5/10/2003	11:35:04	298.4	4.973333	55.49	11.74	0.121	4.862	0.069
5/10/2003	11:35:22	316.2	5.27	55.47	11.727	0.108	5.158	0.061
5/10/2003	11:35:41	335	5.583333	55.42	11.716	0.097	5.472	0.055
5/10/2003	11:36:01	354.9	5.915	55.38	11.706	0.087	5.803	0.049

5/10/2003	11:36:22	376	6.266667	55.33	11.697	0.078	6.155	0.044
5/10/2003	11:36:44	398.4	6.64	55.33	11.689	0.07	6.528	0.040
5/10/2003	11:37:08	422.1	7.035	55.31	11.682	0.063	6.923	0.036
5/10/2003	11:37:33	447.2	7.453333	55.31	11.677	0.058	7.342	0.033
5/10/2003	11:38:00	473.8	7.896667	55.29	11.669	0.05	7.785	0.028
5/10/2003	11:38:28	502	8.366667	55.24	11.664	0.045	8.255	0.026
5/10/2003	11:38:58	531.9	8.865	55.22	11.659	0.04	8.753	0.023
5/10/2003	11:39:29	563.5	9.391667	55.2	11.654	0.035	9.280	0.020
5/10/2003	11:40:03	597	9.95	55.15	11.649	0.03	9.838	0.017
5/10/2003	11:40:38	632.5	10.54167	55.15	11.645	0.026	10.430	0.015
5/10/2003	11:41:16	670.1	11.16833	55.13	11.641	0.022	11.057	0.012
5/10/2003	11:41:56	709.9	11.83167	55.13	11.639	0.02	11.720	0.011
5/10/2003	11:42:38	752.1	12.535	55.1	11.636	0.017	12.423	0.010
5/10/2003	11:43:23	796.8	13.28	55.1	11.632	0.013	13.168	0.007
5/10/2003	11:44:10	844.2	14.07	55.1	11.632	0.013	13.958	0.007
5/10/2003	11:45:00	894.4	14.90667	55.08	11.627	0.008	14.795	0.005
5/10/2003	11:45:53	947.5	15.79167	55.08	11.627	0.008	15.680	0.005
5/10/2003	11:46:50	1003.8	16.73	55.06	11.623	0.004	16.618	0.002
5/10/2003	11:47:49	1063.4	17.72333	55.06	11.622	0.003	17.612	0.002
5/10/2003	11:48:52	1126.6	18.77667	55.06	11.62	0.001	18.665	0.001
5/10/2003	11:49:59	1193.5	19.89167	55.04	11.618	-0.001	19.780	-0.001
5/10/2003	11:51:10	1264.4	21.07333	55.04	11.618	-0.001	20.962	-0.001
5/10/2003	11:52:25	1339.5	22.325	55.06	11.618	-0.001	22.213	-0.001
5/10/2003	11:53:45	1419	23.65	55.06	11.616	-0.003	23.538	-0.002
5/10/2003	11:55:09	1503.3	25.055	55.06	11.616	-0.003	24.943	-0.002
5/10/2003	11:56:38	1592.6	26.54333	55.08	11.616	-0.003	26.432	-0.002
5/10/2003	11:58:13	1687.1	28.11833	55.08	11.616	-0.003	28.007	-0.002
5/10/2003	11:59:53	1787.2	29.78667	55.08	11.618	-0.001	29.675	-0.001

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT14
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RWS 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	1.90 = To

Hydraulic Conductivity (K) :

8.75E-04	ft./min.
1.46E-05	ft./sec.
1.26E+00	ft./day
4.44E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: BMW714

PROJECT NO.: 9060 C10 0279 GEOLOGIST: BOB BALLOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 25.63' T.D. TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 13.02' DATE: 5/10/03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

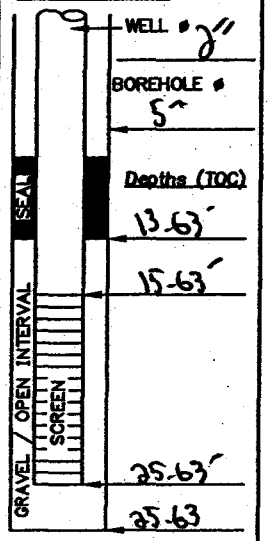
METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 3ft SOLID SLUG PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

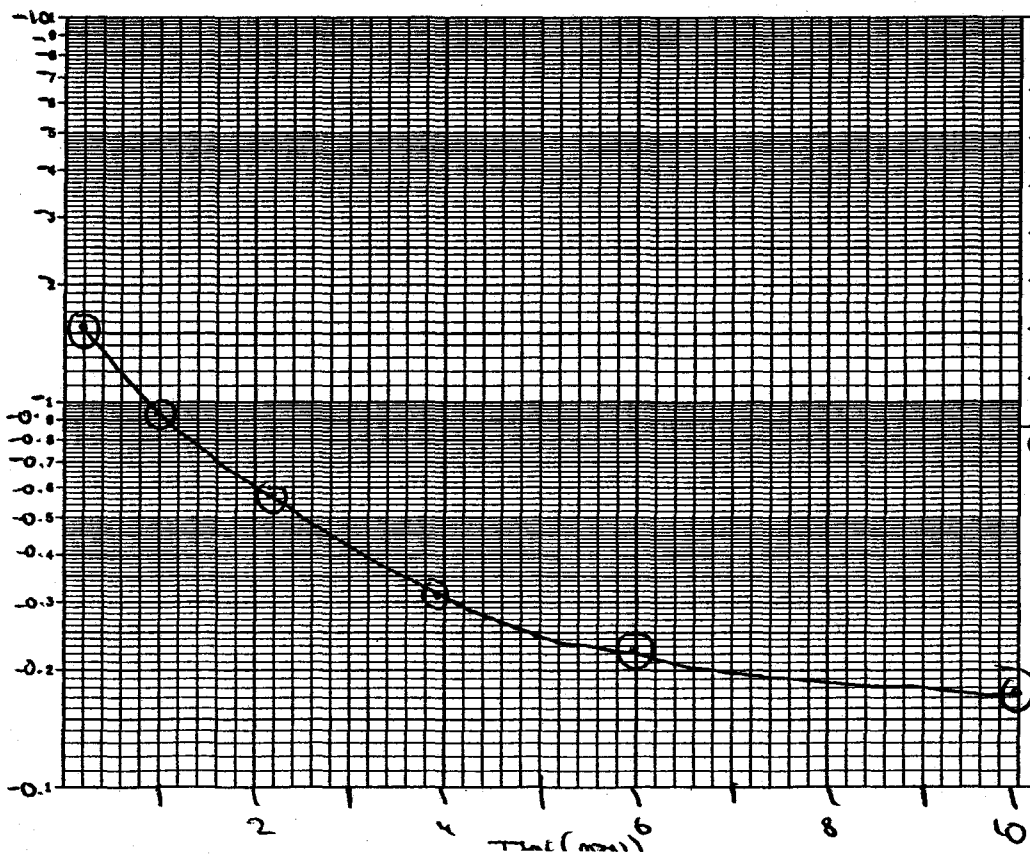
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	11.633	0	1.75	11.032	-0.601
0.02	7.743	-3.89	2.21	11.093	-0.54
0.045	8.75	-2.883	2.95	11.221	-0.412
0.065	9.79	-1.843	3.94	11.32	-0.313
0.085	9.898	-1.735	5.915	11.403	-0.23
0.125	9.943	-1.69	9.95	11.463	-0.173
0.21	10.063	-1.57			
0.42	10.246	-1.387			
0.658	10.427	-1.206			
1.04	10.677	-0.956			
1.31	10.805	-0.828			
1.47	10.87	-0.763			

WELL SCHEMATIC

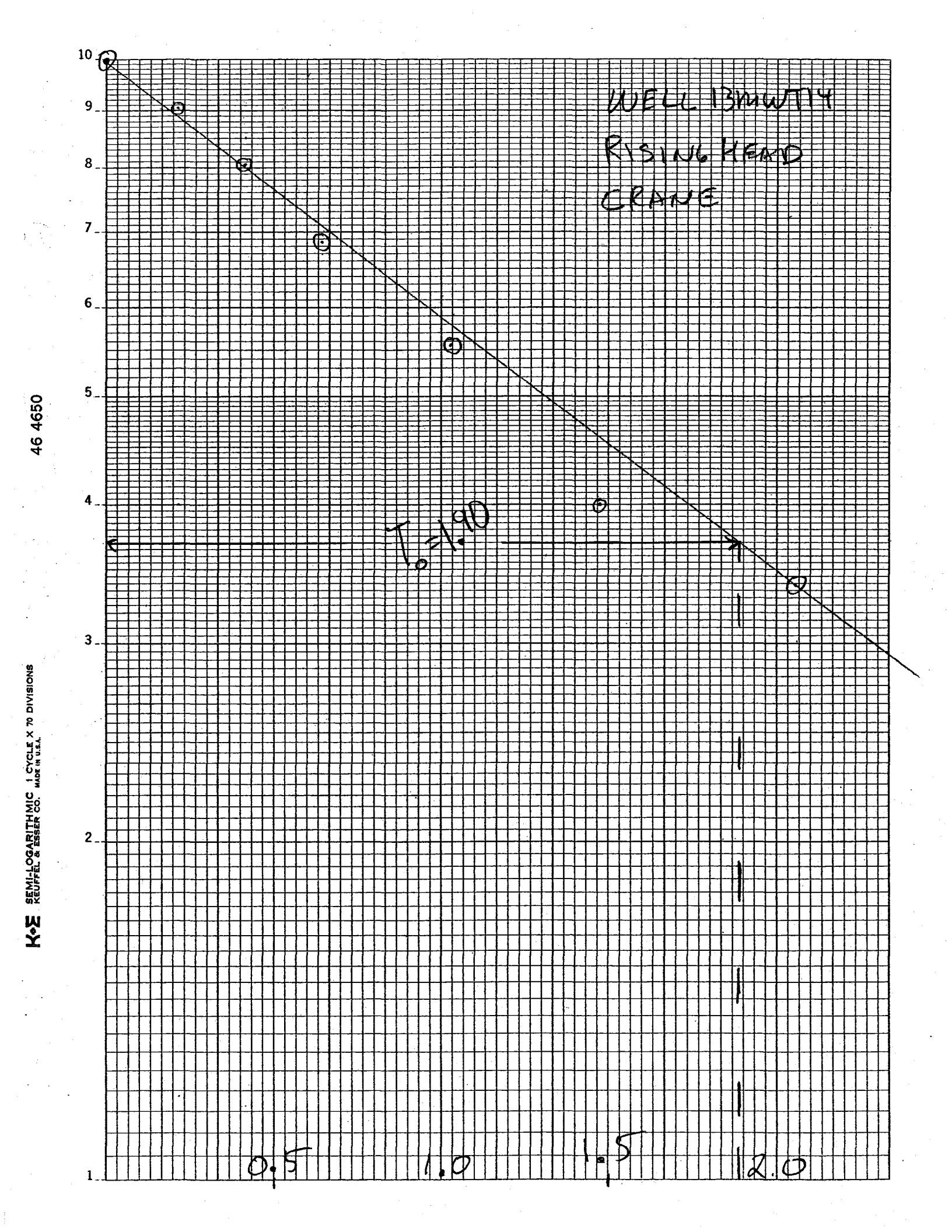


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


WELL 13MW114
RISING HEAD
CRANE
T₀=1.90
10
9
8
7
6
5
4
3
2
1
0.5
1.0
1.5
2.0
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/11/2003 16:21:44
Report fror ...\SN00824 2003-05-10 120155 13MWT14 Rising.bin
Win-Situ V 4.41

Serial num 824
Firmware \ 3.06
Unit name:

Test name: 13MWT14 Rising

Test define 5/10/2003 12:01:28
Test starte 5/10/2003 12:01:55
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 141

TOTAL DA 141

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= -1.499
5/10/2003	12:01:55	0	0	55.15	11.633	0			
5/10/2003	12:01:55	0.3	0.005	55.17	11.633	0			
5/10/2003	12:01:55	0.6	0.01	55.17	11.633	0			
5/10/2003	12:01:56	0.9	0.015	55.2	11.633	0			
5/10/2003	12:01:56	1.2	0.02	55.2	7.743	-3.89			
5/10/2003	12:01:56	1.5	0.025	55.2	8.46	-3.173			
5/10/2003	12:01:56	1.8	0.03	55.2	8.544	-3.089			
5/10/2003	12:01:57	2.1	0.035	55.2	8.981	-2.652			
5/10/2003	12:01:57	2.4	0.04	55.22	8.789	-2.844			
5/10/2003	12:01:57	2.7	0.045	55.22	8.75	-2.883			
5/10/2003	12:01:58	3	0.05	55.22	9.178	-2.455			
5/10/2003	12:01:58	3.3	0.055	55.22	9.491	-2.142			
5/10/2003	12:01:58	3.6	0.06	55.22	9.9	-1.733			
5/10/2003	12:01:59	3.9	0.065	55.22	9.79	-1.843			
5/10/2003	12:01:59	4.2	0.07	55.22	9.795	-1.838			
5/10/2003	12:01:59	4.8	0.08	55.22	9.805	-1.828			
5/10/2003	12:02:00	5.1	0.085	55.22	9.898	-1.735			
5/10/2003	12:02:00	5.4	0.09	55.22	9.848	-1.785			
5/10/2003	12:02:00	5.7	0.095	55.22	9.906	-1.727			
5/10/2003	12:02:01	6	0.1	55.22	9.883	-1.75			
5/10/2003	12:02:01	6.4	0.106667	55.22	9.906	-1.727			
5/10/2003	12:02:01	6.7	0.111667	55.24	9.92	-1.713			
5/10/2003	12:02:02	7.1	0.118333	55.24	9.926	-1.707			
5/10/2003	12:02:02	7.5	0.125	55.24	9.943	-1.69			
5/10/2003	12:02:03	8	0.133333	55.24	9.959	-1.674			
5/10/2003	12:02:03	8.4	0.14	55.24	9.971	-1.662			
5/10/2003	12:02:04	8.9	0.148333	55.24	9.989	-1.644			

5/10/2003	12:02:04	9.5	0.158333	55.24	10	-1.633			
5/10/2003	12:02:05	10	0.166667	55.22	10.01	-1.623			
5/10/2003	12:02:05	10.6	0.176667	55.22	10.016	-1.617			
5/10/2003	12:02:06	11.3	0.188333	55.22	10.029	-1.604			
5/10/2003	12:02:07	11.9	0.198333	55.2	10.046	-1.587			
5/10/2003	12:02:07	12.6	0.21	55.2	10.063	-1.57			
5/10/2003	12:02:08	13.4	0.223333	55.2	10.087	-1.546			
5/10/2003	12:02:09	14.2	0.236667	55.2	10.093	-1.54	Plotted shaded values.		
5/10/2003	12:02:10	15	0.25	55.2	10.1	-1.533			
5/10/2003	12:02:11	15.9	0.265	55.2	10.119	-1.514	adjusted time	h/ho	
5/10/2003	12:02:12	16.8	0.28	55.2	10.134	-1.499	0.000	1.000	
5/10/2003	12:02:13	17.8	0.296667	55.2	10.149	-1.484	0.017	0.990	
5/10/2003	12:02:14	18.9	0.315	55.2	10.156	-1.477	0.035	0.985	
5/10/2003	12:02:15	20	0.333333	55.2	10.177	-1.456	0.053	0.971	
5/10/2003	12:02:16	21.2	0.353333	55.2	10.193	-1.44	0.073	0.961	
5/10/2003	12:02:17	22.4	0.373333	55.2	10.201	-1.432	0.093	0.955	
5/10/2003	12:02:18	23.8	0.396667	55.2	10.223	-1.41	0.117	0.941	
5/10/2003	12:02:20	25.2	0.42	55.2	10.246	-1.387	0.140	0.925	
5/10/2003	12:02:21	26.7	0.445	55.2	10.248	-1.385	0.165	0.924	
5/10/2003	12:02:23	28.2	0.47	55.2	10.253	-1.38	0.190	0.921	
5/10/2003	12:02:24	29.8	0.496667	55.2	10.277	-1.356	0.217	0.905	
5/10/2003	12:02:26	31.5	0.525	55.2	10.304	-1.329	0.245	0.887	
5/10/2003	12:02:28	33.3	0.555	55.2	10.328	-1.305	0.275	0.871	
5/10/2003	12:02:30	35.2	0.586667	55.2	10.365	-1.268	0.307	0.846	
5/10/2003	12:02:32	37.3	0.621667	55.2	10.397	-1.236	0.342	0.825	
5/10/2003	12:02:34	39.5	0.658333	55.2	10.427	-1.206	0.378	0.805	
5/10/2003	12:02:36	41.8	0.696667	55.2	10.429	-1.204	0.417	0.803	
5/10/2003	12:02:39	44.3	0.738333	55.2	10.487	-1.146	0.458	0.765	
5/10/2003	12:02:42	46.9	0.781667	55.2	10.511	-1.122	0.502	0.748	
5/10/2003	12:02:44	49.7	0.828333	55.17	10.543	-1.09	0.548	0.727	
5/10/2003	12:02:47	52.6	0.876667	55.17	10.575	-1.058	0.597	0.706	
5/10/2003	12:02:50	55.7	0.928333	55.17	10.608	-1.025	0.648	0.684	
5/10/2003	12:02:54	59	0.983333	55.17	10.638	-0.995	0.703	0.664	
5/10/2003	12:02:57	62.5	1.041667	55.17	10.677	-0.956	0.762	0.638	
5/10/2003	12:03:01	66.2	1.103333	55.15	10.706	-0.927	0.823	0.618	
5/10/2003	12:03:05	70.1	1.168333	55.15	10.737	-0.896	0.888	0.598	
5/10/2003	12:03:09	74.3	1.238333	55.15	10.769	-0.864	0.958	0.576	
5/10/2003	12:03:13	78.7	1.311667	55.13	10.805	-0.828	1.032	0.552	
5/10/2003	12:03:18	83.4	1.39	55.13	10.838	-0.795	1.110	0.530	
5/10/2003	12:03:23	88.4	1.473333	55.13	10.87	-0.763	1.193	0.509	
5/10/2003	12:03:28	93.7	1.561667	55.1	11.012	-0.621	1.282	0.414	
5/10/2003	12:03:34	99.3	1.655	55.13	11.027	-0.606	1.375	0.404	
5/10/2003	12:03:40	105.2	1.753333	55.15	11.032	-0.601	1.473	0.401	
5/10/2003	12:03:46	111.5	1.858333	55.15	11.034	-0.599	1.578	0.400	
5/10/2003	12:03:53	118.1	1.968333	55.1	11.033	-0.6	1.688	0.400	
5/10/2003	12:04:00	125.1	2.085	55.08	11.065	-0.568	1.805	0.379	
5/10/2003	12:04:07	132.6	2.21	55.1	11.093	-0.54	1.930	0.360	
5/10/2003	12:04:15	140.5	2.341667	55.1	11.121	-0.512	2.062	0.342	
5/10/2003	12:04:24	148.9	2.481667	55.1	11.147	-0.486	2.202	0.324	
5/10/2003	12:04:32	157.8	2.63	55.1	11.173	-0.46	2.350	0.307	
5/10/2003	12:04:42	167.2	2.786667	55.1	11.201	-0.432	2.507	0.288	
5/10/2003	12:04:52	177.2	2.953333	55.1	11.221	-0.412	2.673	0.275	
5/10/2003	12:05:02	187.8	3.13	55.1	11.242	-0.391	2.850	0.261	
5/10/2003	12:05:14	199	3.316667	55.1	11.264	-0.369	3.037	0.246	
5/10/2003	12:05:26	210.9	3.515	55.13	11.285	-0.348	3.235	0.232	
5/10/2003	12:05:38	223.5	3.725	55.1	11.304	-0.329	3.445	0.219	
5/10/2003	12:05:51	236.8	3.946667	55.13	11.32	-0.313	3.667	0.209	
5/10/2003	12:06:06	250.9	4.181667	55.13	11.335	-0.298	3.902	0.199	
5/10/2003	12:06:20	265.8	4.43	55.13	11.346	-0.287	4.150	0.191	
5/10/2003	12:06:36	281.6	4.693333	55.15	11.361	-0.272	4.413	0.181	
5/10/2003	12:06:53	298.4	4.973333	55.15	11.372	-0.261	4.693	0.174	
5/10/2003	12:07:11	316.2	5.27	55.15	11.385	-0.248	4.990	0.165	
5/10/2003	12:07:30	335	5.583333	55.17	11.394	-0.239	5.303	0.159	
5/10/2003	12:07:50	354.9	5.915	55.2	11.403	-0.23	5.635	0.153	
5/10/2003	12:08:11	376	6.266667	55.2	11.413	-0.22	5.987	0.147	

5/10/2003	12:08:33	398.4	6.64	55.22	11.42	-0.213	6.360	0.142
5/10/2003	12:08:57	422.1	7.035	55.24	11.427	-0.206	6.755	0.137
5/10/2003	12:09:22	447.2	7.453333	55.26	11.434	-0.199	7.173	0.133
5/10/2003	12:09:48	473.8	7.896667	55.26	11.438	-0.195	7.617	0.130
5/10/2003	12:10:17	502	8.366667	55.29	11.445	-0.188	8.087	0.125
5/10/2003	12:10:47	531.9	8.865	55.31	11.451	-0.182	8.585	0.121
5/10/2003	12:11:18	563.5	9.391667	55.31	11.454	-0.179	9.112	0.119
5/10/2003	12:11:52	597	9.95	55.33	11.46	-0.173	9.670	0.115
5/10/2003	12:12:27	632.5	10.54167	55.36	11.463	-0.17	10.262	0.113
5/10/2003	12:13:05	670.1	11.16833	55.36	11.467	-0.166	10.888	0.111
5/10/2003	12:13:45	709.9	11.83167	55.38	11.47	-0.163	11.552	0.109
5/10/2003	12:14:27	752.1	12.535	55.4	11.474	-0.159	12.255	0.106
5/10/2003	12:15:11	796.8	13.28	55.42	11.475	-0.158	13.000	0.105
5/10/2003	12:15:59	844.2	14.07	55.45	11.481	-0.152	13.790	0.101
5/10/2003	12:16:49	894.4	14.90667	55.42	11.483	-0.15	14.627	0.100
5/10/2003	12:17:42	947.5	15.79167	55.4	11.485	-0.148	15.512	0.099
5/10/2003	12:18:38	1003.8	16.73	55.4	11.487	-0.146	16.450	0.097
5/10/2003	12:19:38	1063.4	17.72333	55.4	11.489	-0.144	17.443	0.096
5/10/2003	12:20:41	1126.6	18.77667	55.42	11.49	-0.143	18.497	0.095
5/10/2003	12:21:48	1193.5	19.89167	55.42	11.494	-0.139	19.612	0.093
5/10/2003	12:22:59	1264.4	21.07333	55.4	11.492	-0.141	20.793	0.094
5/10/2003	12:24:14	1339.5	22.325	55.36	11.497	-0.136	22.045	0.091
5/10/2003	12:25:34	1419	23.65	55.33	11.501	-0.132	23.370	0.088
5/10/2003	12:26:58	1503.3	25.055	55.31	11.499	-0.134	24.775	0.089
5/10/2003	12:28:27	1592.6	26.54333	55.22	11.5	-0.133	26.263	0.089
5/10/2003	12:30:02	1687.1	28.11833	55.15	11.503	-0.13	27.838	0.087
5/10/2003	12:31:42	1787.2	29.78667	55.22	11.506	-0.127	29.507	0.085
5/10/2003	12:33:28	1893.3	31.555	55.22	11.504	-0.129	31.275	0.086
5/10/2003	12:35:20	2005.7	33.42833	55.24	11.506	-0.127	33.148	0.085
5/10/2003	12:37:19	2124.7	35.41167	55.24	11.507	-0.126	35.132	0.084
5/10/2003	12:39:25	2250.8	37.51333	55.24	11.509	-0.124	37.233	0.083
5/10/2003	12:41:39	2384.4	39.74	55.15	11.51	-0.123	39.460	0.082
5/10/2003	12:44:01	2525.9	42.09833	55.08	11.513	-0.12	41.818	0.080
5/10/2003	12:46:30	2675.8	44.59667	55.06	11.51	-0.123	44.317	0.082
5/10/2003	12:49:09	2834.6	47.24333	55.1	11.511	-0.122	46.963	0.081
5/10/2003	12:51:57	3002.8	50.04667	55.15	11.51	-0.123	49.767	0.082
5/10/2003	12:54:56	3180.9	53.015	55.08	11.513	-0.12	52.735	0.080
5/10/2003	12:58:04	3369.6	56.16	54.94	11.515	-0.118	55.880	0.079
5/10/2003	13:01:24	3569.5	59.49167	54.94	11.517	-0.116	59.212	0.077
5/10/2003	13:04:56	3781.2	63.02	54.94	11.515	-0.118	62.740	0.079
5/10/2003	13:08:40	4005.5	66.75833	54.97	11.514	-0.119	66.478	0.079
5/10/2003	13:12:38	4243.1	70.71833	54.9	11.511	-0.122	70.438	0.081
5/10/2003	13:16:49	4494.7	74.91167	54.88	11.51	-0.123	74.632	0.082
5/10/2003	13:21:16	4761.3	79.355	54.97	11.503	-0.13	79.075	0.087
5/10/2003	13:25:58	5043.7	84.06167	54.99	11.499	-0.134	83.782	0.089
5/10/2003	13:30:57	5342.8	89.04667	55.06	11.5	-0.133	88.767	0.089
5/10/2003	13:36:14	5659.6	94.32667	55.01	11.501	-0.132	94.047	0.088
5/10/2003	13:41:50	5995.2	99.92	54.94	11.502	-0.131	99.640	0.087

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT15
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RWB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	12.30 = To

Hydraulic Conductivity (K) :

1.35E-04	ft./min.
2.25E-06	ft./sec.
1.95E-01	ft./day
6.87E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MW715

PROJECT NO.: 9060 030279 GEOLOGIST:

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 27.72' TEST NO.: 4

STATIC WATER LEVEL (Depth/Elevation): 12.80' DATE: 5/9/03

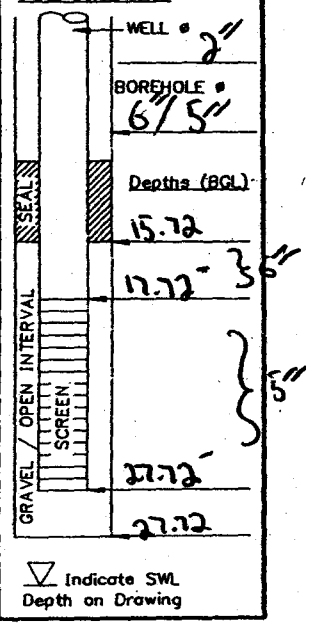
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

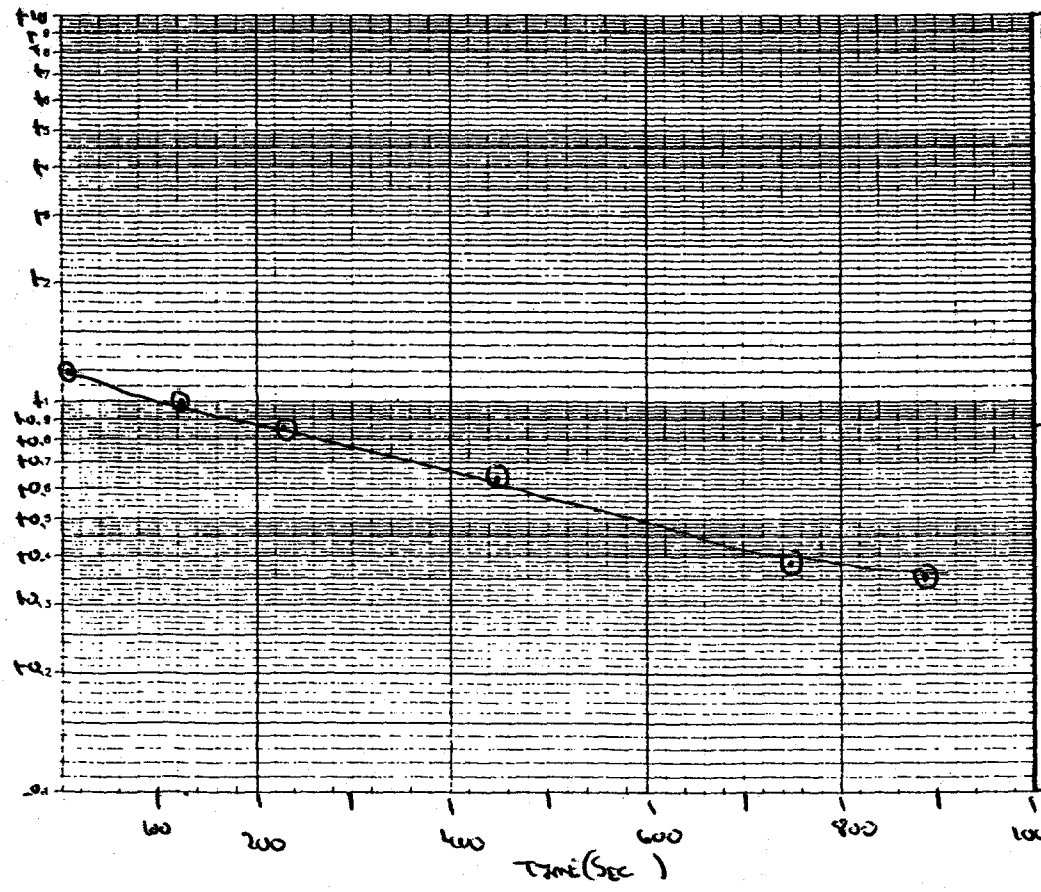
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 4' SOLID SLUG PAGE OF

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
STATIC → 6.0	13.4761	0	335.0	14.749	+0.755
SLUG 8.4	15.262	+1.788	447.2	14.644	+0.644
15.0	15.210	+1.236	632.5	14.493	+0.519
20.0	15.196	+1.222	709.9	14.440	+0.466
29.8	15.171	+1.197	752.1	14.415	+0.441
39.5	15.149	+1.175	796.8	14.387	+0.413
49.7	15.130	+1.156	844.2	14.362	+0.388
59.0	15.113	+1.139	894.4	14.336	+0.362
125.1	15.007	+1.033	947.5	14.311	+0.337
177.2	14.935	+0.961	1003.8	14.286	+0.312
236.8	14.859	+0.885	2005.7	14.047	+0.073
298.4	14.789	+0.815	3002.8	13.985	+0.011

WELL SCHEMATIC



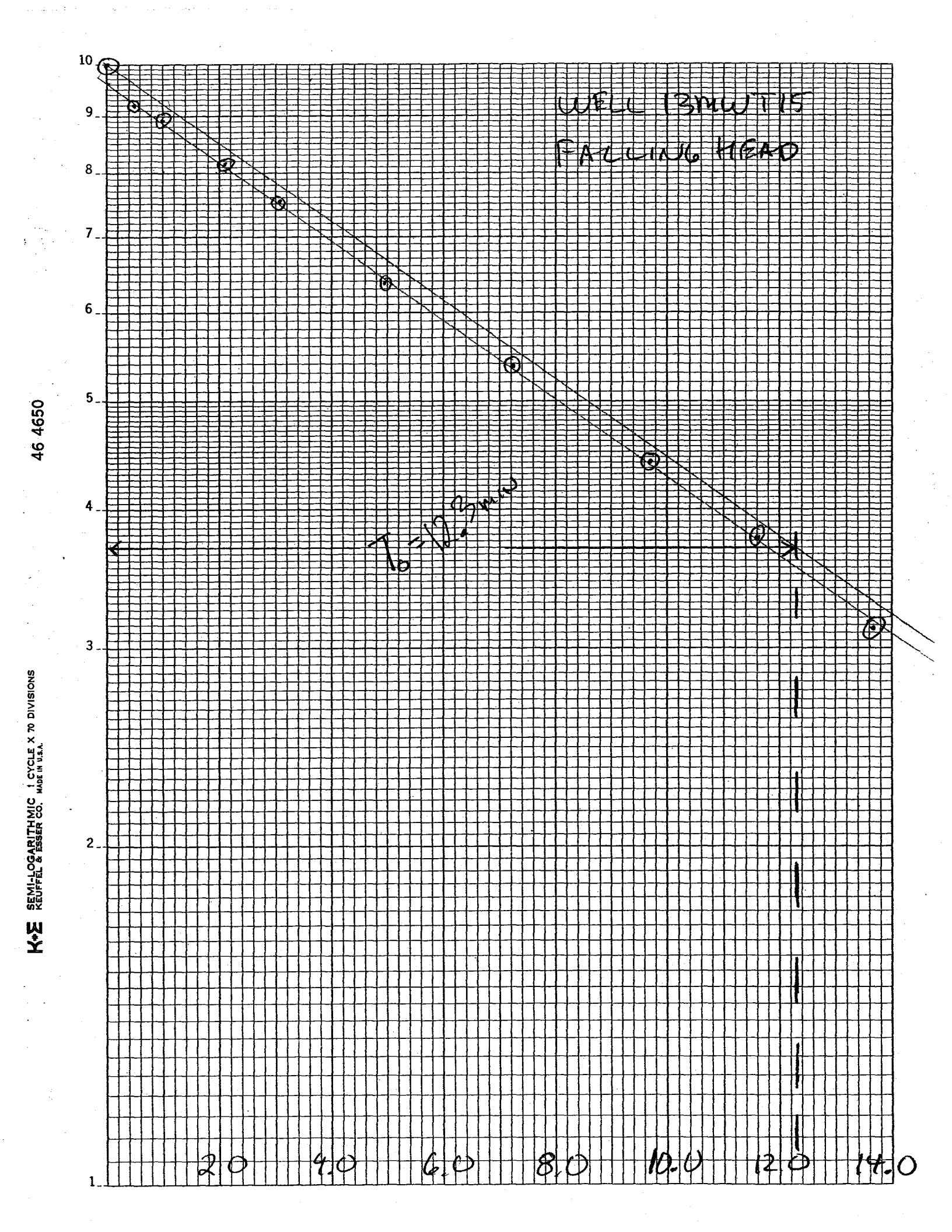


REMARKS:

WL = 12.80

TD = 27.72

CALCS, SKETCH MAPS, ETC.:


WELL 13MW115
FALLING HEAD
$T_o = 10.2\ m^2/day$
10
9
8
7
6
5
4
3
2
1
2.0
4.0
6.0
8.0
10.0
12.0
14.0
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/9/2003 13:23:25
Report from file: ...\SN09015 2003-05-09 124252 13MWT15 Falling.bin
Win-Situ Version 4.41

Serial number: 9015
Firmware Version 3.04
Unit name: MW-14FW

Test name: 13MWT15 Falling

Test defined on: 5/9/2003 12:41:50
Test started on: 5/9/2003 12:42:52
Test stopped on: 5/9/2003 13:35:29
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time bet Seconds.
Number of data sa 129

TOTAL DATA SAMF 129

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	adjusted time	h/ho	ho= -1.24
5/9/2003	12:42:52	0	0	54.91	13.952			
5/9/2003	12:42:52	0.3	0.005	54.95	13.963			
5/9/2003	12:42:53	0.6	0.01	54.95	13.967			
5/9/2003	12:42:53	0.9	0.015	54.98	13.969			
5/9/2003	12:42:53	1.2	0.02	54.98	13.971			
5/9/2003	12:42:54	1.5	0.025	54.98	13.973			
5/9/2003	12:42:54	1.8	0.03	55	13.972			
5/9/2003	12:42:54	2.1	0.035	55	13.972			
5/9/2003	12:42:54	2.4	0.04	55	13.972	displacement		
5/9/2003	12:42:55	2.7	0.045	55	13.972			
5/9/2003	12:42:55	3	0.05	55	13.974	0		
5/9/2003	12:42:55	3.3	0.055	55	13.974	0		
5/9/2003	12:42:56	3.6	0.06	55	13.974	0		
5/9/2003	12:42:56	3.9	0.065	55	13.974	0		
5/9/2003	12:42:56	4.2	0.07	55	13.974	0		
5/9/2003	12:42:57	4.5	0.075	55	13.974	0		
5/9/2003	12:42:57	4.8	0.08	55	13.974	0		
5/9/2003	12:42:57	5.1	0.085	55	13.974	0		
5/9/2003	12:42:57	5.4	0.09	55.02	13.974	0		
5/9/2003	12:42:58	5.7	0.095	55.02	13.974	0		
5/9/2003	12:42:58	6	0.1	55.02	13.976	-0.002		
5/9/2003	12:42:58	6.4	0.106667	55.02	13.98	-0.006		
5/9/2003	12:42:59	6.7	0.111667	55.02	15.936	-1.962		
5/9/2003	12:42:59	7.1	0.118333	55.02	14.653	-0.679		
5/9/2003	12:43:00	7.5	0.125	55.02	15.19	-1.216		
5/9/2003	12:43:00	8	0.133333	55.02	15.52	-1.546		
5/9/2003	12:43:00	8.4	0.14	55.02	15.762	-1.788		

5/9/2003	12:43:01	8.9	0.148333	55.02	15.114	-1.14		
5/9/2003	12:43:02	9.5	0.158333	55.02	15.219	-1.245		
5/9/2003	12:43:02	10	0.166667	55	15.233	-1.259		
5/9/2003	12:43:03	10.6	0.176667	55	15.233	-1.259		
5/9/2003	12:43:03	11.3	0.188333	55	15.225	-1.251		
5/9/2003	12:43:04	11.9	0.198333	55	15.221	-1.247	Plotted shaded values.	
5/9/2003	12:43:05	12.6	0.21	55	15.219	-1.245		
5/9/2003	12:43:05	13.4	0.223333	54.98	15.218	-1.244	adjusted time	h/ho
5/9/2003	12:43:06	14.2	0.236667	55	15.214	-1.24	0.000	1.000
5/9/2003	12:43:07	15	0.25	54.98	15.21	-1.236	0.013	0.997
5/9/2003	12:43:08	15.9	0.265	54.98	15.208	-1.234	0.028	0.995
5/9/2003	12:43:09	16.8	0.28	54.98	15.206	-1.232	0.043	0.994
5/9/2003	12:43:10	17.8	0.296667	54.98	15.204	-1.23	0.060	0.992
5/9/2003	12:43:11	18.9	0.315	54.98	15.2	-1.226	0.078	0.989
5/9/2003	12:43:12	20	0.333333	54.98	15.196	-1.222	0.097	0.985
5/9/2003	12:43:13	21.2	0.353333	54.98	15.192	-1.218	0.117	0.982
5/9/2003	12:43:14	22.4	0.373333	54.98	15.188	-1.214	0.137	0.979
5/9/2003	12:43:16	23.8	0.396667	54.98	15.186	-1.212	0.160	0.977
5/9/2003	12:43:17	25.2	0.42	54.98	15.183	-1.209	0.183	0.975
5/9/2003	12:43:19	26.7	0.445	54.95	15.179	-1.205	0.208	0.972
5/9/2003	12:43:20	28.2	0.47	54.95	15.175	-1.201	0.233	0.969
5/9/2003	12:43:22	29.8	0.496667	54.95	15.171	-1.197	0.260	0.965
5/9/2003	12:43:24	31.5	0.525	54.98	15.167	-1.193	0.288	0.962
5/9/2003	12:43:25	33.3	0.555	54.95	15.163	-1.189	0.318	0.959
5/9/2003	12:43:27	35.2	0.586667	54.98	15.159	-1.185	0.350	0.956
5/9/2003	12:43:29	37.3	0.621667	54.95	15.155	-1.181	0.385	0.952
5/9/2003	12:43:32	39.5	0.658333	54.98	15.149	-1.175	0.422	0.948
5/9/2003	12:43:34	41.8	0.696667	54.95	15.146	-1.172	0.460	0.945
5/9/2003	12:43:36	44.3	0.738333	54.95	15.14	-1.166	0.502	0.940
5/9/2003	12:43:39	46.9	0.781667	54.95	15.136	-1.162	0.545	0.937
5/9/2003	12:43:42	49.7	0.828333	54.95	15.13	-1.156	0.592	0.932
5/9/2003	12:43:45	52.6	0.876667	54.95	15.126	-1.152	0.640	0.929
5/9/2003	12:43:48	55.7	0.928333	54.95	15.118	-1.144	0.692	0.923
5/9/2003	12:43:51	59	0.983333	54.95	15.113	-1.139	0.747	0.919
5/9/2003	12:43:55	62.5	1.041667	54.95	15.107	-1.133	0.805	0.914
5/9/2003	12:43:58	66.2	1.103333	54.95	15.101	-1.127	0.867	0.909
5/9/2003	12:44:02	70.1	1.168333	54.95	15.095	-1.121	0.932	0.904
5/9/2003	12:44:06	74.3	1.238333	54.93	15.087	-1.113	1.002	0.898
5/9/2003	12:44:11	78.7	1.311667	54.93	15.08	-1.106	1.075	0.892
5/9/2003	12:44:15	83.4	1.39	54.93	15.07	-1.096	1.153	0.884
5/9/2003	12:44:20	88.4	1.473333	54.93	15.064	-1.09	1.237	0.879
5/9/2003	12:44:26	93.7	1.561667	54.93	15.054	-1.08	1.325	0.871
5/9/2003	12:44:31	99.3	1.655	54.93	15.046	-1.072	1.418	0.865
5/9/2003	12:44:37	105.2	1.753333	54.93	15.037	-1.063	1.517	0.857
5/9/2003	12:44:44	111.5	1.858333	54.93	15.027	-1.053	1.622	0.849
5/9/2003	12:44:50	118.1	1.968333	54.93	15.017	-1.043	1.732	0.841
5/9/2003	12:44:57	125.1	2.085	54.93	15.007	-1.033	1.848	0.833
5/9/2003	12:45:05	132.6	2.21	54.91	14.996	-1.022	1.973	0.824
5/9/2003	12:45:13	140.5	2.341667	54.91	14.986	-1.012	2.105	0.816
5/9/2003	12:45:21	148.9	2.481667	54.91	14.972	-0.998	2.245	0.805
5/9/2003	12:45:30	157.8	2.63	54.91	14.961	-0.987	2.393	0.796
5/9/2003	12:45:39	167.2	2.786667	54.91	14.949	-0.975	2.550	0.786
5/9/2003	12:45:49	177.2	2.953333	54.91	14.935	-0.961	2.717	0.775
5/9/2003	12:46:00	187.8	3.13	54.91	14.922	-0.948	2.893	0.765
5/9/2003	12:46:11	199	3.316667	54.89	14.906	-0.932	3.080	0.752
5/9/2003	12:46:23	210.9	3.515	54.89	14.891	-0.917	3.278	0.740
5/9/2003	12:46:36	223.5	3.725	54.89	14.877	-0.903	3.488	0.728
5/9/2003	12:46:49	236.8	3.946667	54.89	14.859	-0.885	3.710	0.714
5/9/2003	12:47:03	250.9	4.181667	54.89	14.842	-0.868	3.945	0.700
5/9/2003	12:47:18	265.8	4.43	54.89	14.826	-0.852	4.193	0.687
5/9/2003	12:47:34	281.6	4.693333	54.89	14.809	-0.835	4.457	0.673
5/9/2003	12:47:50	298.4	4.973333	54.89	14.789	-0.815	4.737	0.657
5/9/2003	12:48:08	316.2	5.27	54.86	14.77	-0.796	5.033	0.642
5/9/2003	12:48:27	335	5.583333	54.86	14.748	-0.774	5.347	0.624
5/9/2003	12:48:47	354.9	5.915	54.86	14.729	-0.755	5.678	0.609

5/9/2003	12:49:08	376	6.266667	54.86	14.707	-0.733	6.030	0.591
5/9/2003	12:49:30	398.4	6.64	54.86	14.686	-0.712	6.403	0.574
5/9/2003	12:49:54	422.1	7.035	54.86	14.661	-0.687	6.798	0.554
5/9/2003	12:50:19	447.2	7.453333	54.86	14.641	-0.667	7.217	0.539
5/9/2003	12:50:46	473.8	7.896667	54.86	14.618	-0.644	7.660	0.519
5/9/2003	12:51:14	502	8.366667	54.84	14.594	-0.62	8.130	0.500
5/9/2003	12:51:44	531.9	8.865	54.84	14.571	-0.597	8.628	0.481
5/9/2003	12:52:16	563.5	9.391667	54.84	14.546	-0.572	9.155	0.461
5/9/2003	12:52:49	597	9.95	54.84	14.52	-0.546	9.713	0.440
5/9/2003	12:53:25	632.5	10.54167	54.84	14.493	-0.519	10.305	0.419
5/9/2003	12:54:02	670.1	11.16833	54.86	14.465	-0.491	10.932	0.396
5/9/2003	12:54:42	709.9	11.83167	54.86	14.44	-0.466	11.595	0.376
5/9/2003	12:55:24	752.1	12.535	54.86	14.415	-0.441	12.298	0.356
5/9/2003	12:56:09	796.8	13.28	54.86	14.387	-0.413	13.043	0.333
5/9/2003	12:56:56	844.2	14.07	54.86	14.362	-0.388	13.833	0.313
5/9/2003	12:57:46	894.4	14.90667	54.89	14.336	-0.362	14.670	0.292
5/9/2003	12:58:40	947.5	15.79167	54.89	14.311	-0.337	15.555	0.272
5/9/2003	12:59:36	1003.8	16.73	54.89	14.286	-0.312	16.493	0.252
5/9/2003	13:00:35	1063.4	17.72333	54.89	14.26	-0.286	17.487	0.231
5/9/2003	13:01:39	1126.6	18.77667	54.91	14.237	-0.263	18.540	0.212
5/9/2003	13:02:46	1193.5	19.89167	54.91	14.213	-0.239	19.655	0.193
5/9/2003	13:03:56	1264.4	21.07333	54.91	14.192	-0.218	20.837	0.176
5/9/2003	13:05:12	1339.5	22.325	54.91	14.17	-0.196	22.088	0.158
5/9/2003	13:06:31	1419	23.65	54.91	14.149	-0.175	23.413	0.141
5/9/2003	13:07:55	1503.3	25.055	54.91	14.129	-0.155	24.818	0.125
5/9/2003	13:09:25	1592.6	26.54333	54.91	14.11	-0.136	26.307	0.110
5/9/2003	13:10:59	1687.1	28.11833	54.91	14.092	-0.118	27.882	0.095
5/9/2003	13:12:39	1787.2	29.78667	54.91	14.077	-0.103	29.550	0.083
5/9/2003	13:14:25	1893.3	31.555	54.93	14.061	-0.087	31.318	0.070
5/9/2003	13:16:18	2005.7	33.42833	54.93	14.047	-0.073	33.192	0.059
5/9/2003	13:18:17	2124.7	35.41167	54.93	14.035	-0.061	35.175	0.049
5/9/2003	13:20:23	2250.8	37.51333	54.93	14.024	-0.05	37.277	0.040
5/9/2003	13:22:36	2384.4	39.74	54.91	14.014	-0.04	39.503	0.032
5/9/2003	13:24:58	2525.9	42.09833	54.91	14.004	-0.03	41.862	0.024
5/9/2003	13:27:28	2675.8	44.59667	54.91	13.997	-0.023	44.360	0.019
5/9/2003	13:30:07	2834.6	47.24333	54.86	13.989	-0.015	47.007	0.012
5/9/2003	13:32:55	3002.8	50.04667	54.86	13.985	-0.011	49.810	0.009

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT15
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RWS 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	18.70 = To

Hydraulic Conductivity (K) :

8.89E-05	ft./min.
1.48E-06	ft./sec.
1.28E-01	ft./day
4.52E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: BRW15

PROJECT NO.: 9060 GW 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 22.72' TEST NO.: 5

STATIC WATER LEVEL (Depth/Elevation): 12.80' DATE: 5/9/03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

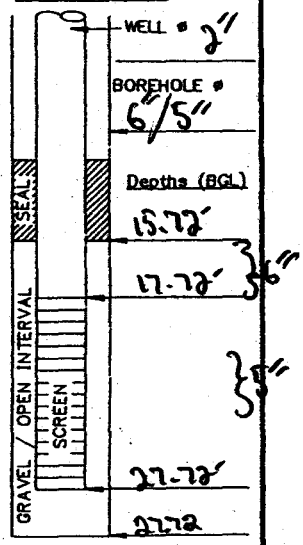
METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 4' SOLID SLUG PAGE OF

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

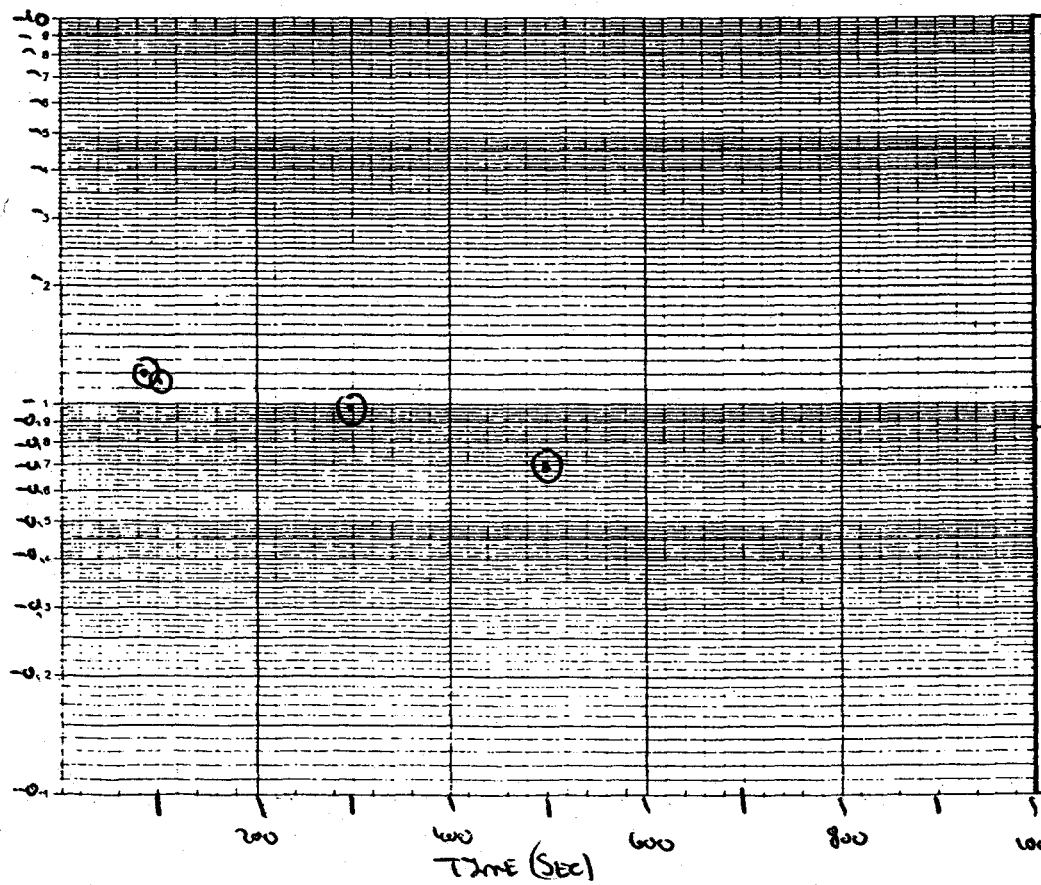
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
4.2	13.991		298.4	12.979	-1.012
6.7	12.593	-1.398	709.9	13.291	-0.7
10.0	12.679	-1.312	1126.6	13.496	-0.495
20.0	12.695	-1.296	2250.8	13.784	-0.202
29.8	12.713	-1.278	3569.5	13.901	-0.09
39.5	12.726	-1.265			
49.7	12.738	-1.253			
59.0	12.750	-1.241			
70.1	12.764	-1.227			
78.7	12.773	-1.218			
93.7	12.791	-1.20			
105.2	12.803	-1.188			

START →

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

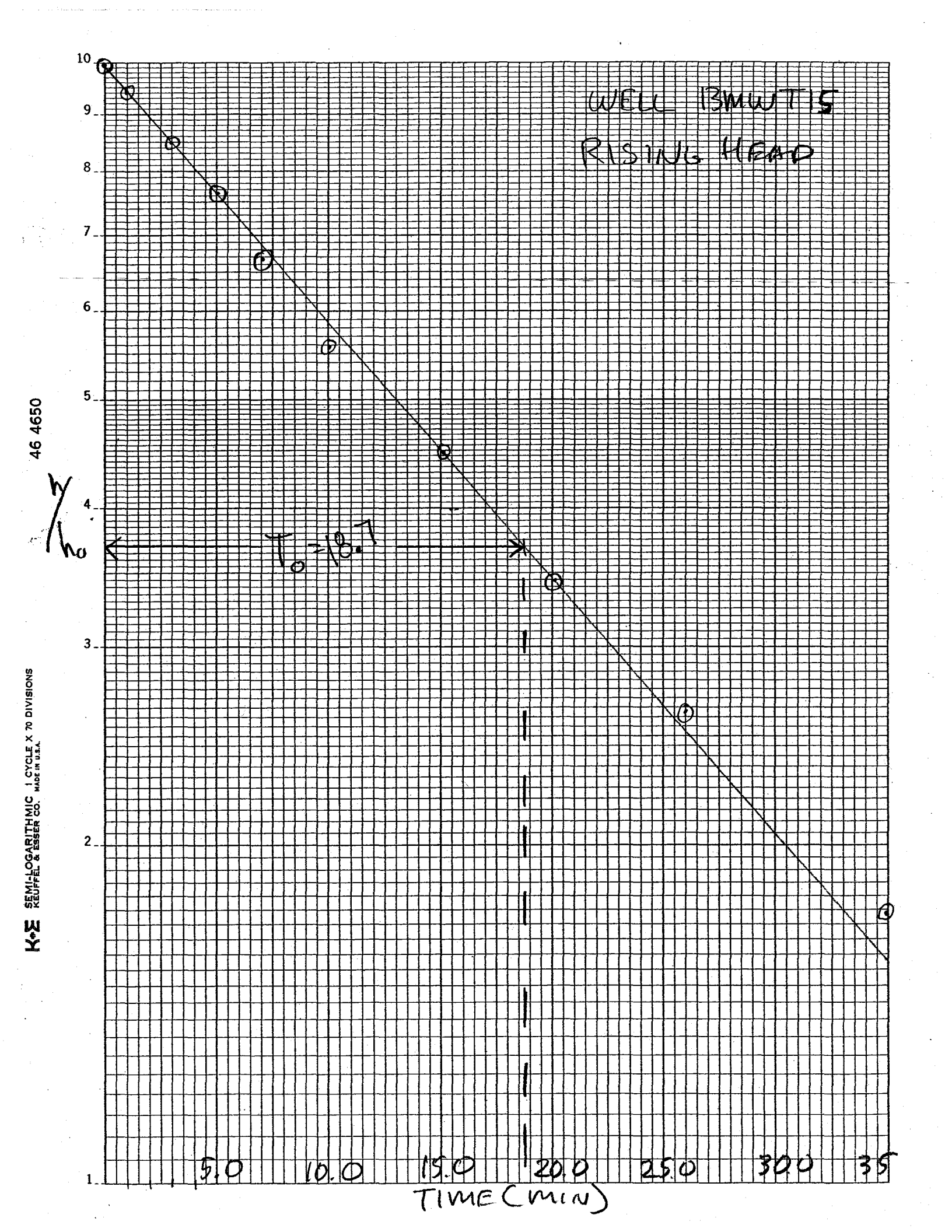


REMARKS:

WL = 12.80

TD = 22.72

CALCS, SKETCH MAPS, ETC.:


WELL BMWT15
RISING HEAD
$\frac{h}{h_0}$
$T_0 = 18.7$
10
9
8
7
6
5
4
3
2
1
5.0
10.0
15.0
20.0
25.0
30.0
35
TIME (MIN)
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/9/2003 14:24:21
Report from file: ...\SN09015 2003-05-09 134024 13MWT15 Rising.bin
Win-Situ Version 4.41

Serial number: 9015
Firmware Version 3.04
Unit name: MW-14FW

Test name: 13MWT15 Rising

Test defined on: 5/9/2003 13:39:58
Test started on: 5/9/2003 13:40:24
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between Seconds.
Number of data samples 134

TOTAL DATA SAMPLES 134

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= -1.3
5/9/2003	13:40:24	0	0	54.82	13.991	0			
5/9/2003	13:40:25	0.3	0.005	54.84	13.991	0			
5/9/2003	13:40:25	0.6	0.01	54.86	13.991	0			
5/9/2003	13:40:25	0.9	0.015	54.86	13.991	0			
5/9/2003	13:40:25	1.2	0.02	54.86	13.991	0			
5/9/2003	13:40:26	1.5	0.025	54.89	13.991	0			
5/9/2003	13:40:26	1.8	0.03	54.89	13.991	0			
5/9/2003	13:40:26	2.1	0.035	54.89	13.991	0			
5/9/2003	13:40:27	2.4	0.04	54.89	13.991	0			
5/9/2003	13:40:27	2.7	0.045	54.89	13.991	0			
5/9/2003	13:40:27	3	0.05	54.89	13.991	0			
5/9/2003	13:40:28	3.3	0.055	54.89	13.991	0			
5/9/2003	13:40:28	3.6	0.06	54.91	13.991	0			
5/9/2003	13:40:28	3.9	0.065	54.91	13.991	0			
5/9/2003	13:40:28	4.2	0.07	54.89	13.991	0			
5/9/2003	13:40:29	4.5	0.075	54.91	13.579	-0.412			
5/9/2003	13:40:29	4.8	0.08	54.91	11.691	-2.3			
5/9/2003	13:40:29	5.1	0.085	54.91	13.589	-0.402			
5/9/2003	13:40:30	5.4	0.09	54.91	13.007	-0.984			
5/9/2003	13:40:30	5.7	0.095	54.91	11.902	-2.089			
5/9/2003	13:40:30	6	0.1	54.91	13.06	-0.931			
5/9/2003	13:40:31	6.4	0.106667	54.91	12.712	-1.279			
5/9/2003	13:40:31	6.7	0.111667	54.91	12.593	-1.398			
5/9/2003	13:40:31	7.1	0.118333	54.91	12.654	-1.337			
5/9/2003	13:40:32	7.5	0.125	54.91	12.693	-1.298			
5/9/2003	13:40:32	8	0.133333	54.91	12.697	-1.294			
5/9/2003	13:40:33	8.4	0.14	54.91	12.699	-1.292			

5/9/2003	13:40:33	8.9	0.148333	54.91	12.691	-1.3			
5/9/2003	13:40:34	9.5	0.158333	54.91	12.703	-1.288			
5/9/2003	13:40:34	10	0.166667	54.91	12.679	-1.312			
5/9/2003	13:40:35	10.6	0.176667	54.89	12.67	-1.321			
5/9/2003	13:40:35	11.3	0.188333	54.89	12.658	-1.333			
5/9/2003	13:40:36	11.9	0.198333	54.89	12.638	-1.353			
5/9/2003	13:40:37	12.6	0.21	54.89	12.636	-1.355			
5/9/2003	13:40:38	13.4	0.223333	54.89	12.648	-1.343			
5/9/2003	13:40:38	14.2	0.236667	54.89	12.664	-1.327			
5/9/2003	13:40:39	15	0.25	54.89	12.689	-1.302			
5/9/2003	13:40:40	15.9	0.265	54.86	12.689	-1.302			
5/9/2003	13:40:41	16.8	0.28	54.89	12.689	-1.302			
5/9/2003	13:40:42	17.8	0.296667	54.86	12.691	-1.3			
5/9/2003	13:40:43	18.9	0.315	54.86	12.693	-1.298	Plotted shaded values.		
5/9/2003	13:40:44	20	0.333333	54.86	12.695	-1.296			
5/9/2003	13:40:45	21.2	0.353333	54.86	12.699	-1.292			
5/9/2003	13:40:47	22.4	0.373333	54.86	12.701	-1.29			
5/9/2003	13:40:48	23.8	0.396667	54.86	12.703	-1.288			
5/9/2003	13:40:49	25.2	0.42	54.86	12.705	-1.286			
5/9/2003	13:40:51	26.7	0.445	54.86	12.707	-1.284	adjusted time	h/ho	
5/9/2003	13:40:52	28.2	0.47	54.86	12.711	-1.28	0.000	1.000	
5/9/2003	13:40:54	29.8	0.496667	54.86	12.713	-1.278	0.027	0.998	
5/9/2003	13:40:56	31.5	0.525	54.86	12.715	-1.276	0.055	0.997	
5/9/2003	13:40:57	33.3	0.555	54.86	12.719	-1.272	0.085	0.994	
5/9/2003	13:40:59	35.2	0.586667	54.86	12.72	-1.271	0.117	0.993	
5/9/2003	13:41:01	37.3	0.621667	54.86	12.724	-1.267	0.152	0.990	
5/9/2003	13:41:04	39.5	0.658333	54.86	12.726	-1.265	0.188	0.988	
5/9/2003	13:41:06	41.8	0.696667	54.86	12.728	-1.263	0.227	0.987	
5/9/2003	13:41:08	44.3	0.738333	54.86	12.732	-1.259	0.268	0.984	
5/9/2003	13:41:11	46.9	0.781667	54.86	12.736	-1.255	0.312	0.980	
5/9/2003	13:41:14	49.7	0.828333	54.86	12.738	-1.253	0.358	0.979	
5/9/2003	13:41:17	52.6	0.876667	54.86	12.742	-1.249	0.407	0.976	
5/9/2003	13:41:20	55.7	0.928333	54.84	12.746	-1.245	0.458	0.973	
5/9/2003	13:41:23	59	0.983333	54.84	12.75	-1.241	0.513	0.970	
5/9/2003	13:41:27	62.5	1.041667	54.84	12.754	-1.237	0.572	0.966	
5/9/2003	13:41:30	66.2	1.103333	54.84	12.76	-1.231	0.633	0.962	
5/9/2003	13:41:34	70.1	1.168333	54.84	12.764	-1.227	0.698	0.959	
5/9/2003	13:41:38	74.3	1.238333	54.84	12.767	-1.224	0.768	0.956	
5/9/2003	13:41:43	78.7	1.311667	54.84	12.773	-1.218	0.842	0.952	
5/9/2003	13:41:48	83.4	1.39	54.82	12.777	-1.214	0.920	0.948	
5/9/2003	13:41:53	88.4	1.473333	54.82	12.785	-1.206	1.003	0.942	
5/9/2003	13:41:58	93.7	1.561667	54.82	12.791	-1.2	1.092	0.937	
5/9/2003	13:42:03	99.3	1.655	54.82	12.797	-1.194	1.185	0.933	
5/9/2003	13:42:09	105.2	1.753333	54.82	12.803	-1.188	1.283	0.928	
5/9/2003	13:42:16	111.5	1.858333	54.82	12.811	-1.18	1.388	0.922	
5/9/2003	13:42:22	118.1	1.968333	54.8	12.815	-1.176	1.498	0.919	
5/9/2003	13:42:29	125.1	2.085	54.8	12.823	-1.168	1.615	0.912	
5/9/2003	13:42:37	132.6	2.21	54.8	12.83	-1.161	1.740	0.907	
5/9/2003	13:42:45	140.5	2.341667	54.8	12.838	-1.153	1.872	0.901	
5/9/2003	13:42:53	148.9	2.481667	54.8	12.846	-1.145	2.012	0.895	
5/9/2003	13:43:02	157.8	2.63	54.77	12.854	-1.137	2.160	0.888	
5/9/2003	13:43:11	167.2	2.786667	54.77	12.864	-1.127	2.317	0.880	
5/9/2003	13:43:21	177.2	2.953333	54.77	12.871	-1.12	2.483	0.875	
5/9/2003	13:43:32	187.8	3.13	54.77	12.883	-1.108	2.660	0.866	
5/9/2003	13:43:43	199	3.316667	54.77	12.893	-1.098	2.847	0.858	
5/9/2003	13:43:55	210.9	3.515	54.77	12.903	-1.088	3.045	0.850	
5/9/2003	13:44:08	223.5	3.725	54.77	12.914	-1.077	3.255	0.841	
5/9/2003	13:44:21	236.8	3.946667	54.77	12.926	-1.065	3.477	0.832	
5/9/2003	13:44:35	250.9	4.181667	54.77	12.94	-1.051	3.712	0.821	
5/9/2003	13:44:50	265.8	4.43	54.75	12.952	-1.039	3.960	0.812	
5/9/2003	13:45:06	281.6	4.693333	54.75	12.965	-1.026	4.223	0.802	
5/9/2003	13:45:23	298.4	4.973333	54.75	12.979	-1.012	4.503	0.791	
5/9/2003	13:45:40	316.2	5.27	54.75	12.993	-0.998	4.800	0.780	
5/9/2003	13:45:59	335	5.583333	54.75	13.008	-0.983	5.113	0.768	
5/9/2003	13:46:19	354.9	5.915	54.75	13.024	-0.967	5.445	0.755	

5/9/2003	13:46:40	376	6.266667	54.77	13.041	-0.95	5.797	0.742
5/9/2003	13:47:03	398.4	6.64	54.77	13.059	-0.932	6.170	0.728
5/9/2003	13:47:26	422.1	7.035	54.77	13.104	-0.887	6.565	0.693
5/9/2003	13:47:51	447.2	7.453333	54.77	13.121	-0.87	6.983	0.680
5/9/2003	13:48:18	473.8	7.896667	54.77	13.141	-0.85	7.427	0.664
5/9/2003	13:48:46	502	8.366667	54.8	13.16	-0.831	7.897	0.649
5/9/2003	13:49:16	531.9	8.865	54.8	13.182	-0.809	8.395	0.632
5/9/2003	13:49:48	563.5	9.391667	54.8	13.201	-0.79	8.922	0.617
5/9/2003	13:50:21	597	9.95	54.8	13.223	-0.768	9.480	0.600
5/9/2003	13:50:57	632.5	10.54167	54.8	13.246	-0.745	10.072	0.582
5/9/2003	13:51:34	670.1	11.16833	54.77	13.268	-0.723	10.698	0.565
5/9/2003	13:52:14	709.9	11.83167	54.77	13.291	-0.7	11.362	0.547
5/9/2003	13:52:56	752.1	12.535	54.8	13.314	-0.677	12.065	0.529
5/9/2003	13:53:41	796.8	13.28	54.8	13.34	-0.651	12.810	0.509
5/9/2003	13:54:28	844.2	14.07	54.8	13.365	-0.626	13.600	0.489
5/9/2003	13:55:19	894.4	14.90667	54.8	13.39	-0.601	14.437	0.470
5/9/2003	13:56:12	947.5	15.79167	54.77	13.416	-0.575	15.322	0.449
5/9/2003	13:57:08	1003.8	16.73	54.77	13.443	-0.548	16.260	0.428
5/9/2003	13:58:08	1063.4	17.72333	54.75	13.469	-0.522	17.253	0.408
5/9/2003	13:59:11	1126.6	18.77667	54.73	13.496	-0.495	18.307	0.387
5/9/2003	14:00:18	1193.5	19.89167	54.7	13.522	-0.469	19.422	0.366
5/9/2003	14:01:29	1264.4	21.07333	54.7	13.549	-0.442	20.603	0.345
5/9/2003	14:02:44	1339.5	22.325	54.73	13.575	-0.416	21.855	0.325
5/9/2003	14:04:03	1419	23.65	54.73	13.602	-0.389	23.180	0.304
5/9/2003	14:05:27	1503.3	25.055	54.73	13.627	-0.364	24.585	0.284
5/9/2003	14:06:57	1592.6	26.54333	54.73	13.653	-0.338	26.073	0.264
5/9/2003	14:08:31	1687.1	28.11833	54.7	13.678	-0.313	27.648	0.245
5/9/2003	14:10:11	1787.2	29.78667	54.7	13.702	-0.289	29.317	0.226
5/9/2003	14:11:57	1893.3	31.555	54.73	13.725	-0.266	31.085	0.208
5/9/2003	14:13:50	2005.7	33.42833	54.73	13.746	-0.245	32.958	0.191
5/9/2003	14:15:49	2124.7	35.41167	54.7	13.768	-0.223	34.943	0.174
5/9/2003	14:17:55	2250.8	37.51333	54.7	13.789	-0.202	37.043	0.158
5/9/2003	14:20:09	2384.4	39.74	54.68	13.807	-0.184	39.270	0.144
5/9/2003	14:22:30	2525.9	42.09833	54.68	13.825	-0.166	41.628	0.130
5/9/2003	14:25:00	2675.8	44.59667	54.68	13.84	-0.151	44.127	0.118
5/9/2003	14:27:39	2834.6	47.24333	54.66	13.856	-0.135	46.773	0.105
5/9/2003	14:30:27	3002.8	50.04667	54.66	13.87	-0.121	49.577	0.095
5/9/2003	14:33:25	3180.9	53.015	54.66	13.882	-0.109	52.545	0.085
5/9/2003	14:36:34	3369.6	56.16	54.66	13.893	-0.098	55.690	0.077
5/9/2003	14:39:54	3569.5	59.49167	54.64	13.901	-0.09	59.022	0.070
5/9/2003	14:43:25	3781.2	63.02	54.64	13.905	-0.086	62.550	0.067
5/9/2003	14:47:10	4005.5	66.75833	54.61	13.919	-0.072	66.288	0.056

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT17
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RMS 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.23 = To

Hydraulic Conductivity (K) :

7.39E-03	ft./min.
1.23E-04	ft./sec.
1.06E+01	ft./day
3.75E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MW17

PROJECT NO.: 9060 CO 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 20.30' T.D. TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 8.34' / DATE: 5/9/93

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" DIAM x 56.5" LONG SLUG. PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOP OF X-DCR

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
Surface → 10	10.871	0	140.5	10.924	+0.054
START 10.6	13.186	+1.315	281.6	10.901	+0.031
11.9	12.438	+1.567	354.9	10.894	+0.024
20	11.211	+0.341	422.1	10.890	+0.02
31.5	11.057	+0.187	502.0	10.888	+0.018
41.8	11.088	+0.138	531.9	10.886	+0.016
49.7	10.989	+0.119	563.5	10.886	+0.016
59.0	10.975	+0.105	620.1	10.883	+0.013
70.0	10.961	+0.090	709.9	10.881	+0.011
83.4	10.951	+0.082	796.8	10.878	+0.008
105.2	10.939	+0.069			
125.1	10.932	+0.062			

WELL SCHEMATIC

WELL = 2"

BOREHOLE = 5"

Depths (BGL)

SEAL 8.30

10.30

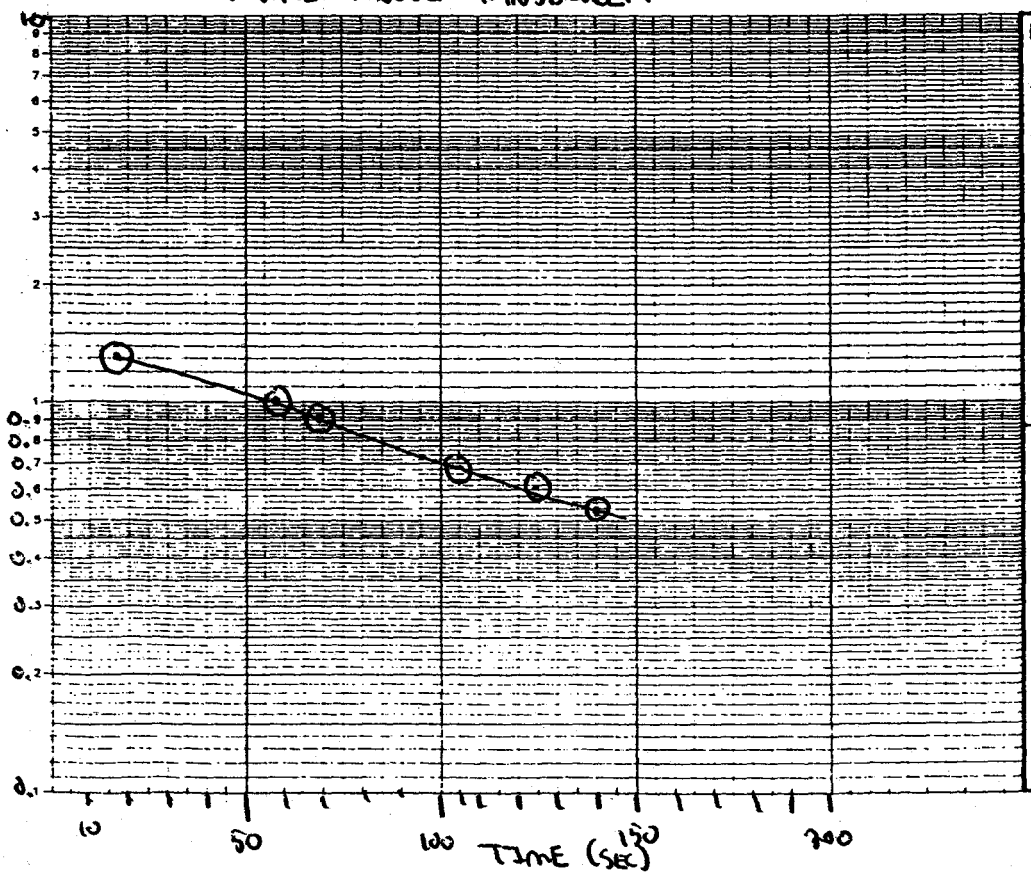
GRAVEL / OPEN INTERVAL SCREEN

20.30'

20.30'

▽ Indicate SWL Depth on Drawing

* WATER ABOVE TRANSDUCER

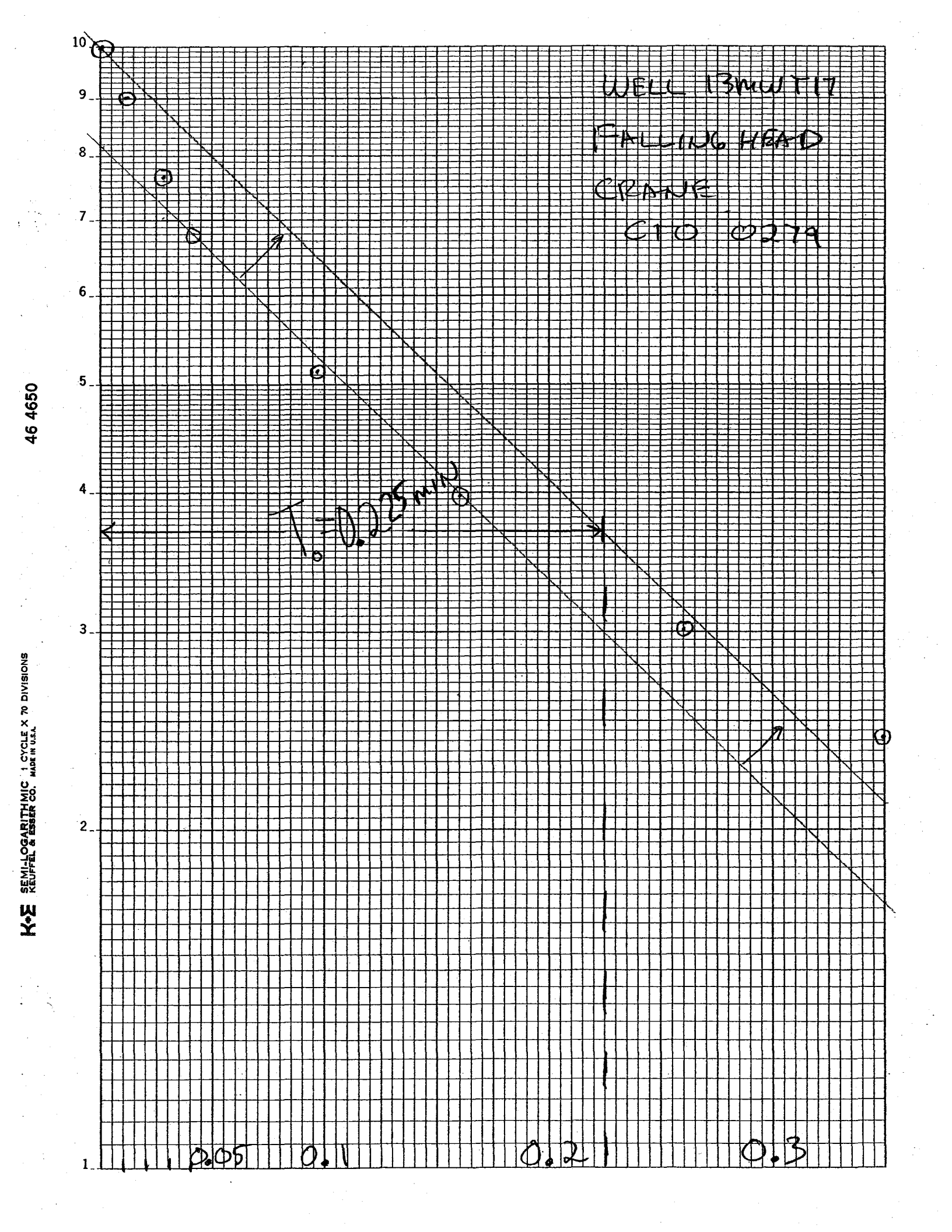


REMARKS:

WL = 8.34' T.O.C

TD = 20.30' TOC

CALCS, SKETCH MAPS, ETC.:


WELL 13MW17
FALLING HEAD
CRANE
C10 0279
$T_o = 0.22 m^2/s$
10
9
8
7
6
5
4
3
2
1
0.05
0.1
0.2
0.3
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/9/2003 8:48:21
Report fror ...\SN00824 2003-05-09 091206 13MWT17 Falling.bin
Win-Situ V 4.41

Serial num 824
Firmware \ 3.06
Unit name:

Test name: 13MWT17 Falling

Test define 5/9/2003 9:07:26
Test starte 5/9/2003 9:12:06
Test stopp 5/9/2003 9:27:32
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 108

TOTAL DA 108

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	adjusted time	h/ho	ho= 0.666
5/9/2003	9:12:06	0	0	54.01	10.852				
5/9/2003	9:12:07	0.3	0.005	54.03	10.862				
5/9/2003	9:12:07	0.6	0.01	54.03	10.868				
5/9/2003	9:12:07	0.9	0.015	54.05	10.87				
5/9/2003	9:12:08	1.2	0.02	54.05	10.872				
5/9/2003	9:12:08	1.5	0.025	54.05	10.873				
5/9/2003	9:12:08	1.8	0.03	54.05	10.873				
5/9/2003	9:12:08	2.1	0.035	54.08	10.873				
5/9/2003	9:12:09	2.4	0.04	54.08	10.875				
5/9/2003	9:12:09	2.7	0.045	54.08	10.875				
5/9/2003	9:12:09	3	0.05	54.08	10.877				
5/9/2003	9:12:10	3.3	0.055	54.08	10.875				
5/9/2003	9:12:10	3.6	0.06	54.08	10.875				
5/9/2003	9:12:10	3.9	0.065	54.08	10.875				
5/9/2003	9:12:11	4.2	0.07	54.08	10.877				
5/9/2003	9:12:11	4.5	0.075	54.08	10.879				
5/9/2003	9:12:11	4.8	0.08	54.08	10.877				
5/9/2003	9:12:11	5.1	0.085	54.08	10.877				
5/9/2003	9:12:12	5.4	0.09	54.08	10.877				
5/9/2003	9:12:12	5.7	0.095	54.08	10.877				
5/9/2003	9:12:12	6	0.1	54.08	10.877				
5/9/2003	9:12:13	6.4	0.106667	54.08	10.879				
5/9/2003	9:12:13	6.7	0.111667	54.1	10.877				
5/9/2003	9:12:13	7.1	0.118333	54.08	10.879				
5/9/2003	9:12:14	7.5	0.125	54.1	10.878				
5/9/2003	9:12:14	8	0.133333	54.1	10.878				
5/9/2003	9:12:15	8.4	0.14	54.1	10.878	Displacement			

5/9/2003	9:12:15	8.9	0.148333	54.1	10.877 Feet			
5/9/2003	9:12:16	9.5	0.158333	54.1	10.878 ----------			
5/9/2003	9:12:16	10	0.166667	54.08	10.871 10.87 Static			
5/9/2003	9:12:17	10.6	0.176667	54.08	12.186	1.316	Plotted shaded values.	
5/9/2003	9:12:18	11.3	0.188333	54.05	12.789	1.919		
5/9/2003	9:12:18	11.9	0.198333	54.05	12.438	1.568		
5/9/2003	9:12:19	12.6	0.21	54.05	11.52	0.65		
5/9/2003	9:12:20	13.4	0.223333	54.05	11.503	0.633		
5/9/2003	9:12:21	14.2	0.236667	54.05	11.536	0.666	0.000	1.000
5/9/2003	9:12:21	15	0.25	54.05	11.473	0.603	0.013	0.965
5/9/2003	9:12:22	15.9	0.265	54.05	11.381	0.511	0.026	0.787
5/9/2003	9:12:23	16.8	0.28	54.05	11.323	0.453	0.043	0.680
5/9/2003	9:12:24	17.8	0.296667	54.05	11.282	0.412	0.060	0.619
5/9/2003	9:12:25	18.9	0.315	54.03	11.247	0.377	0.078	0.566
5/9/2003	9:12:26	20	0.333333	54.05	11.211	0.341	0.097	0.512
5/9/2003	9:12:28	21.2	0.353333	54.05	11.183	0.313	0.117	0.470
5/9/2003	9:12:29	22.4	0.373333	54.05	11.159	0.289	0.137	0.434
5/9/2003	9:12:30	23.8	0.396667	54.05	11.135	0.265	0.160	0.398
5/9/2003	9:12:32	25.2	0.42	54.03	11.116	0.246	0.183	0.369
5/9/2003	9:12:33	26.7	0.445	54.05	11.097	0.227	0.208	0.341
5/9/2003	9:12:35	28.2	0.47	54.03	11.083	0.213	0.233	0.320
5/9/2003	9:12:36	29.8	0.496667	54.05	11.071	0.201	0.260	0.302
5/9/2003	9:12:38	31.5	0.525	54.03	11.057	0.187	0.288	0.281
5/9/2003	9:12:40	33.3	0.555	54.03	11.044	0.174	0.318	0.261
5/9/2003	9:12:42	35.2	0.586667	54.03	11.032	0.162	0.350	0.243
5/9/2003	9:12:44	37.3	0.621667	54.03	11.023	0.153	0.385	0.230
5/9/2003	9:12:46	39.5	0.658333	54.03	11.016	0.146	0.422	0.219
5/9/2003	9:12:48	41.8	0.696667	54.03	11.008	0.138	0.460	0.207
5/9/2003	9:12:51	44.3	0.738333	54.03	11.001	0.131	0.502	0.197
5/9/2003	9:12:53	46.9	0.781667	54.03	10.997	0.127	0.545	0.191
5/9/2003	9:12:56	49.7	0.828333	54.03	10.989	0.119	0.592	0.179
5/9/2003	9:12:59	52.6	0.876667	54.03	10.984	0.114	0.640	0.171
5/9/2003	9:13:02	55.7	0.928333	54.03	10.98	0.11	0.692	0.165
5/9/2003	9:13:05	59	0.983333	54.03	10.975	0.105	0.747	0.158
5/9/2003	9:13:09	62.5	1.041667	54.03	10.971	0.101	0.805	0.152
5/9/2003	9:13:13	66.2	1.103333	54.03	10.967	0.097	0.867	0.146
5/9/2003	9:13:16	70.1	1.168333	54.03	10.961	0.091	0.932	0.137
5/9/2003	9:13:21	74.3	1.238333	54.03	10.958	0.088	1.002	0.132
5/9/2003	9:13:25	78.7	1.311667	54.01	10.956	0.086	1.075	0.129
5/9/2003	9:13:30	83.4	1.39	54.01	10.952	0.082	1.153	0.123
5/9/2003	9:13:35	88.4	1.473333	54.01	10.951	0.081	1.237	0.122
5/9/2003	9:13:40	93.7	1.561667	54.01	10.945	0.075	1.325	0.113
5/9/2003	9:13:46	99.3	1.655	54.01	10.941	0.071	1.418	0.107
5/9/2003	9:13:52	105.2	1.753333	54.01	10.939	0.069	1.517	0.104
5/9/2003	9:13:58	111.5	1.858333	54.01	10.934	0.064	1.622	0.096
5/9/2003	9:14:04	118.1	1.968333	54.01	10.934	0.064	1.732	0.096
5/9/2003	9:14:11	125.1	2.085	54.01	10.932	0.062	1.848	0.093
5/9/2003	9:14:19	132.6	2.21	54.01	10.926	0.056	1.973	0.084
5/9/2003	9:14:27	140.5	2.341667	54.01	10.924	0.054	2.105	0.081
5/9/2003	9:14:35	148.9	2.481667	54.01	10.921	0.051	2.245	0.077
5/9/2003	9:14:44	157.8	2.63	54.01	10.919	0.049	2.393	0.074
5/9/2003	9:14:54	167.2	2.786667	53.99	10.917	0.047	2.550	0.071
5/9/2003	9:15:04	177.2	2.953333	53.99	10.915	0.045	2.717	0.068
5/9/2003	9:15:14	187.8	3.13	53.99	10.912	0.042	2.893	0.063
5/9/2003	9:15:25	199	3.316667	53.96	10.91	0.04	3.080	0.060
5/9/2003	9:15:37	210.9	3.515	53.96	10.908	0.038	3.278	0.057
5/9/2003	9:15:50	223.5	3.725	53.96	10.904	0.034	3.488	0.051
5/9/2003	9:16:03	236.8	3.946667	53.96	10.904	0.034	3.710	0.051
5/9/2003	9:16:17	250.9	4.181667	53.94	10.903	0.033	3.945	0.050
5/9/2003	9:16:32	265.8	4.43	53.94	10.901	0.031	4.193	0.047
5/9/2003	9:16:48	281.6	4.693333	53.94	10.901	0.031	4.457	0.047
5/9/2003	9:17:05	298.4	4.973333	53.94	10.897	0.027	4.737	0.041
5/9/2003	9:17:23	316.2	5.27	53.92	10.896	0.026	5.033	0.039
5/9/2003	9:17:41	335	5.583333	53.92	10.894	0.024	5.347	0.036
5/9/2003	9:18:01	354.9	5.915	53.92	10.894	0.024	5.678	0.036

5/9/2003	9:18:22	376	6.266667	53.92	10.892	0.022	6.030	0.033
5/9/2003	9:18:45	398.4	6.64	53.89	10.89	0.02	6.403	0.030
5/9/2003	9:19:08	422.1	7.035	53.92	10.89	0.02	6.798	0.030
5/9/2003	9:19:34	447.2	7.453333	53.92	10.89	0.02	7.217	0.030
5/9/2003	9:20:00	473.8	7.896667	53.92	10.888	0.018	7.660	0.027
5/9/2003	9:20:28	502	8.366667	53.92	10.888	0.018	8.130	0.027
5/9/2003	9:20:58	531.9	8.865	53.89	10.886	0.016	8.628	0.024
5/9/2003	9:21:30	563.5	9.391667	53.89	10.886	0.016	9.155	0.024
5/9/2003	9:22:03	597	9.95	53.89	10.885	0.015	9.713	0.023
5/9/2003	9:22:39	632.5	10.54167	53.89	10.885	0.015	10.305	0.023
5/9/2003	9:23:16	670.1	11.16833	53.87	10.883	0.013	10.932	0.020
5/9/2003	9:23:56	709.9	11.83167	53.85	10.881	0.011	11.595	0.017
5/9/2003	9:24:38	752.1	12.535	53.85	10.88	0.01	12.298	0.015
5/9/2003	9:25:23	796.8	13.28	53.85	10.878	0.008	13.043	0.012
5/9/2003	9:26:11	844.2	14.07	53.83	10.876	0.006	13.833	0.009
5/9/2003	9:27:01	894.4	14.90667	53.85	10.876	0.006	14.670	0.009

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT17
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.14 = To

Hydraulic Conductivity (K) :

1.20E-02	ft./min.
2.01E-04	ft./sec.
1.73E+01	ft./day
6.12E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: BMW17

PROJECT NO.: 9060 CW 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 20-30' TEST NO.: 2

STATIC WATER LEVEL (Depth/Elevation): 8.34' DATE: 5/9/03

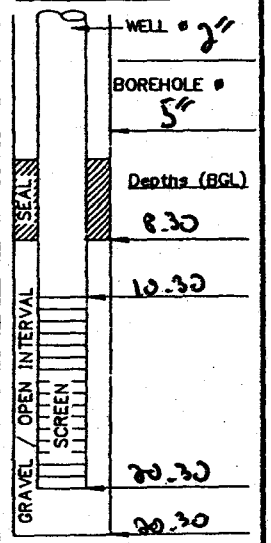
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" DIAM ~ 56.5" LONG SLUG PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 30 PSI XDCR

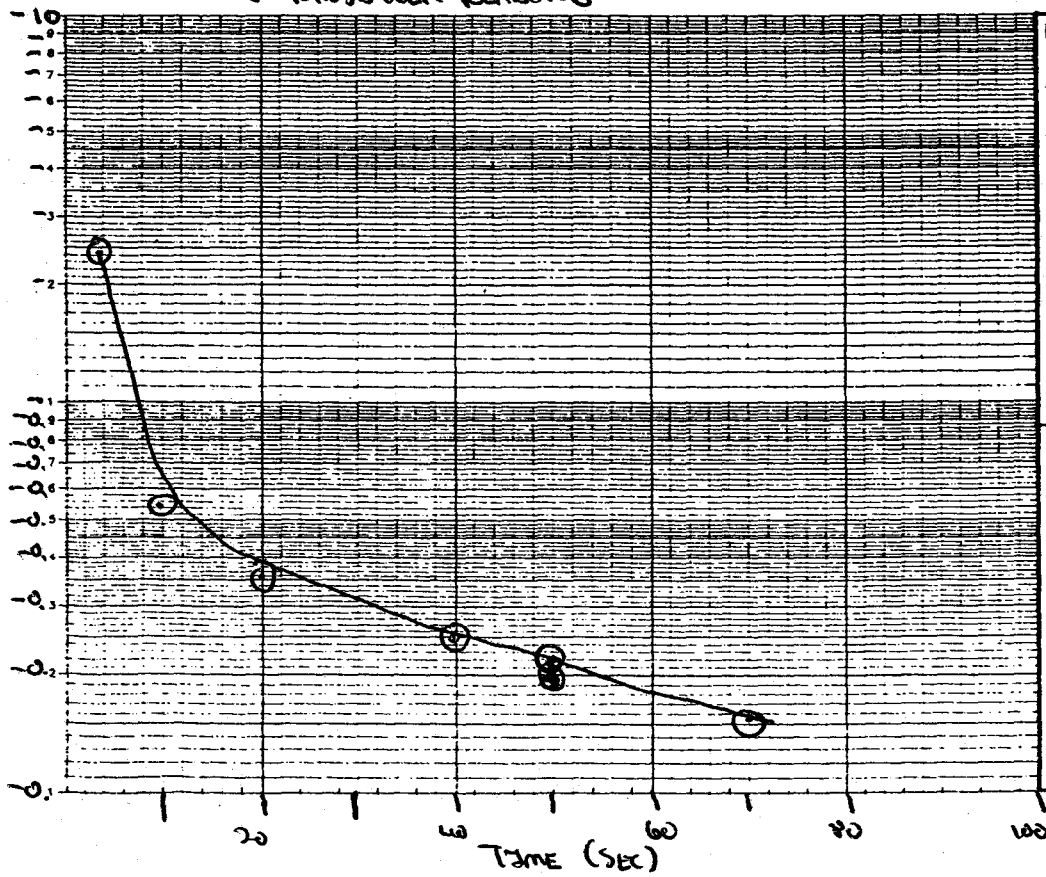
ELAPSED TIME (min. or sec.)	* MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
START → 3.3	10.896	0	52.6	10.754	-0.232
START → 3.9	8.533	-2.453	70.1	10.718	-0.208
4.8	9.639	-1.347	105.2	10.794	-0.192
5.7	9.994	-0.992	140.5	10.807	-0.179
6.0	10.055	-0.931	199.0	10.820	-0.166
10.0	10.425	-0.561			
12.0	10.515	-0.471			
15.0	10.569	-0.417			
20.0	10.634	-0.352			
25.2	10.676	-0.31			
31.5	10.705	-0.281			
39.5	10.730	-0.256			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

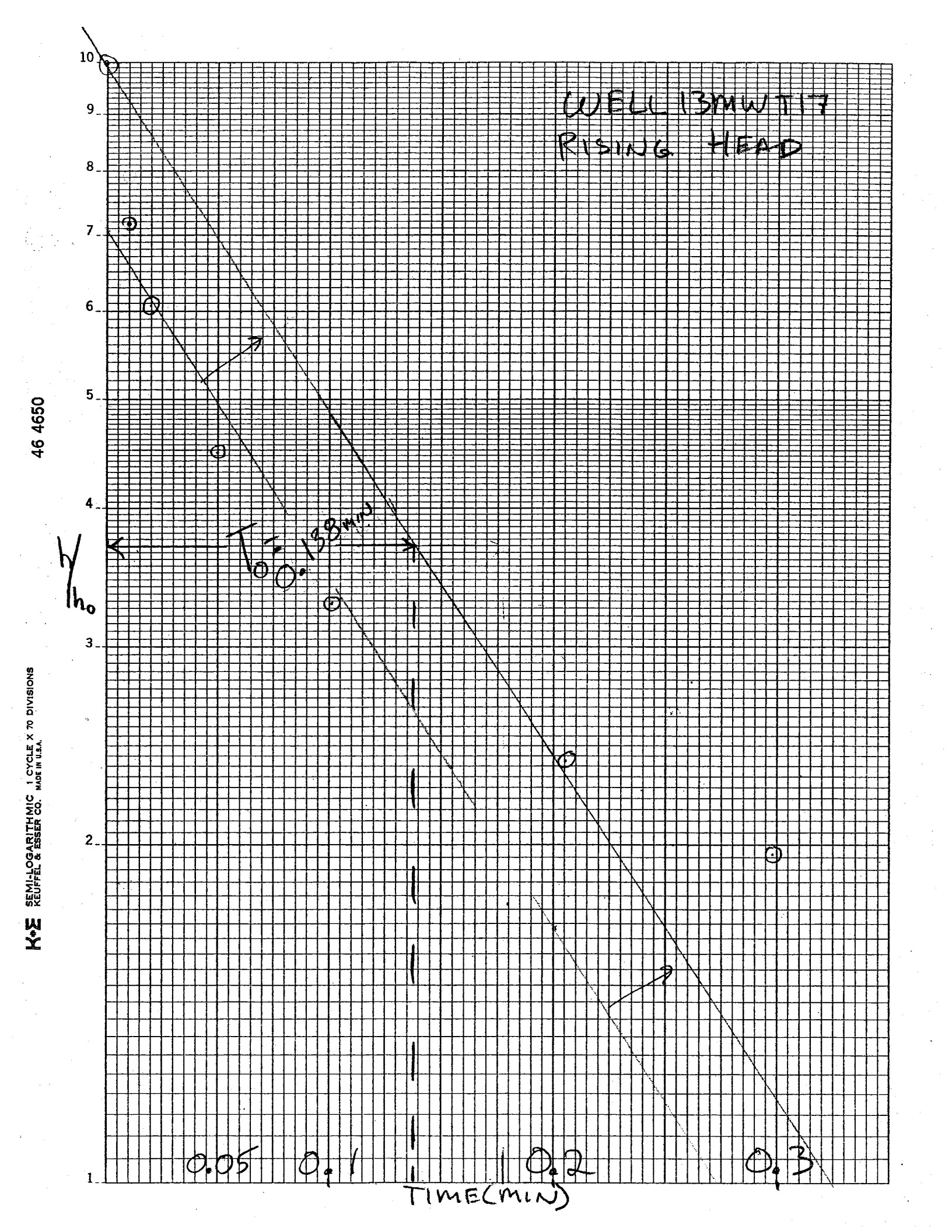
* TRANSDUCER READING



REMARKS:

W.L.= 8.34'

CALCS, SKETCH MAPS, ETC.:


WELL 13MW17
RISING HEAD
10
9
8
7
6
5
4
3
2
1
h/h0
T0 = 0.138 min
0.05
0.1
0.2
0.3
TIME(MIN)
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report gen 5/9/2003 8:49:43
Report fror ...\SN00824 2003-05-09 092853 13MWT17 Rising.bin
Win-Situ V 4.41

Serial num 824
Firmware \ 3.06
Unit name:

Test name: 13MWT17 Rising

Test define 5/9/2003 9:28:12
Test starte 5/9/2003 9:28:53
Test stopp N/A N/A
Test extrac N/A N/A

Data gathered using Logarithmic testing
Maximun Seconds.
Number 105

TOTAL DA 105

Channel number [1]
Measurer Temperature
Channel r Temperature

Channel number [2]
Measurer Pressure
Channel r Depth
Sensor R 30 PSIG.
Specific g 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O		adjusted time	h/ho	ho=	-1.637
5/9/2003	9:28:53	0	0.0000	53.83	10.874					
5/9/2003	9:28:53	0.3	0.0050	53.87	10.885					
5/9/2003	9:28:53	0.6	0.0100	53.87	10.889					
5/9/2003	9:28:54	0.9	0.0150	53.89	10.89					
5/9/2003	9:28:54	1.2	0.0200	53.89	10.892					
5/9/2003	9:28:54	1.5	0.0250	53.89	10.894					
5/9/2003	9:28:55	1.8	0.0300	53.92	10.894					
5/9/2003	9:28:55	2.1	0.0350	53.89	10.894					
5/9/2003	9:28:55	2.4	0.0400	53.89	10.896	10.896 Static	Plotted shaded values.			
5/9/2003	9:28:56	2.7	0.0450	53.92	10.896					
5/9/2003	9:28:56	3	0.0500	53.92	10.896	Displacement				
5/9/2003	9:28:56	3.3	0.0550	53.92	10.896	Feet				
5/9/2003	9:28:56	3.6	0.0600	53.92	10.445	-0.541				
5/9/2003	9:28:57	3.9	0.0650	53.92	8.533	-2.453				
5/9/2003	9:28:57	4.2	0.0700	53.92	9.022	-1.964				
5/9/2003	9:28:57	4.5	0.0750	53.92	9.349	-1.637	0.000	1.000		
5/9/2003	9:28:58	4.8	0.0800	53.92	9.639	-1.347	0.005	0.823		
5/9/2003	9:28:58	5.1	0.0850	53.92	9.816	-1.17	0.010	0.715		
5/9/2003	9:28:58	5.4	0.0900	53.92	9.921	-1.065	0.015	0.651		
5/9/2003	9:28:59	5.7	0.0950	53.92	9.994	-0.992	0.020	0.606		
5/9/2003	9:28:59	6	0.1000	53.92	10.055	-0.931	0.025	0.569		
5/9/2003	9:28:59	6.4	0.1067	53.92	10.111	-0.875	0.032	0.535		
5/9/2003	9:29:00	6.7	0.1117	53.92	10.167	-0.819	0.037	0.500		
5/9/2003	9:29:00	7.1	0.1183	53.92	10.216	-0.77	0.043	0.470		
5/9/2003	9:29:00	7.5	0.1250	53.92	10.255	-0.731	0.050	0.447		
5/9/2003	9:29:01	8	0.1333	53.92	10.287	-0.699	0.058	0.427		
5/9/2003	9:29:01	8.4	0.1400	53.92	10.326	-0.66	0.065	0.403		

5/9/2003	9:29:02	8.9	0.1483	53.92	10.373	-0.613	0.073	0.374
5/9/2003	9:29:02	9.5	0.1583	53.92	10.404	-0.582	0.083	0.356
5/9/2003	9:29:03	10	0.1667	53.89	10.425	-0.561	0.092	0.343
5/9/2003	9:29:03	10.6	0.1767	53.89	10.449	-0.537	0.102	0.328
5/9/2003	9:29:04	11.3	0.1883	53.89	10.474	-0.512	0.113	0.313
5/9/2003	9:29:05	11.9	0.1983	53.89	10.494	-0.492	0.123	0.301
5/9/2003	9:29:05	12.6	0.2100	53.89	10.515	-0.471	0.135	0.288
5/9/2003	9:29:06	13.4	0.2233	53.89	10.534	-0.452	0.148	0.276
5/9/2003	9:29:07	14.2	0.2367	53.89	10.552	-0.434	0.162	0.265
5/9/2003	9:29:08	15	0.2500	53.89	10.569	-0.417	0.175	0.255
5/9/2003	9:29:09	15.9	0.2650	53.89	10.59	-0.396	0.190	0.242
5/9/2003	9:29:10	16.8	0.2800	53.89	10.597	-0.389	0.205	0.230
5/9/2003	9:29:11	17.8	0.2967	53.87	10.61	-0.376	0.222	0.230
5/9/2003	9:29:12	18.9	0.3150	53.87	10.622	-0.364	0.240	0.222
5/9/2003	9:29:13	20	0.3333	53.89	10.634	-0.352	0.258	0.215
5/9/2003	9:29:14	21.2	0.3533	53.89	10.647	-0.339	0.278	0.207
5/9/2003	9:29:15	22.4	0.3733	53.87	10.665	-0.321	0.298	0.196
5/9/2003	9:29:17	23.8	0.3967	53.87	10.668	-0.318	0.322	0.194
5/9/2003	9:29:18	25.2	0.4200	53.87	10.676	-0.31	0.345	0.189
5/9/2003	9:29:20	26.7	0.4450	53.89	10.685	-0.301	0.370	0.184
5/9/2003	9:29:21	28.2	0.4700	53.87	10.693	-0.293	0.395	0.179
5/9/2003	9:29:23	29.8	0.4967	53.87	10.7	-0.286	0.422	0.175
5/9/2003	9:29:24	31.5	0.5250	53.89	10.705	-0.281	0.450	0.172
5/9/2003	9:29:26	33.3	0.5550	53.87	10.711	-0.275	0.480	0.168
5/9/2003	9:29:28	35.2	0.5867	53.87	10.719	-0.267	0.512	0.163
5/9/2003	9:29:30	37.3	0.6217	53.87	10.724	-0.262	0.547	0.160
5/9/2003	9:29:32	39.5	0.6583	53.87	10.73	-0.256	0.583	0.156
5/9/2003	9:29:35	41.8	0.6967	53.87	10.734	-0.252	0.622	0.154
5/9/2003	9:29:37	44.3	0.7383	53.87	10.739	-0.247	0.663	0.151
5/9/2003	9:29:40	46.9	0.7817	53.87	10.745	-0.241	0.707	0.147
5/9/2003	9:29:43	49.7	0.8283	53.87	10.75	-0.236	0.753	0.144
5/9/2003	9:29:45	52.6	0.8767	53.87	10.754	-0.232	0.802	0.142
5/9/2003	9:29:49	55.7	0.9283	53.87	10.758	-0.228	0.853	0.139
5/9/2003	9:29:52	59	0.9833	53.87	10.762	-0.224	0.908	0.137
5/9/2003	9:29:55	62.5	1.0417	53.87	10.765	-0.221	0.967	0.135
5/9/2003	9:29:59	66.2	1.1033	53.87	10.771	-0.215	1.028	0.131
5/9/2003	9:30:03	70.1	1.1683	53.87	10.778	-0.208	1.093	0.127
5/9/2003	9:30:07	74.3	1.2383	53.87	10.775	-0.211	1.163	0.129
5/9/2003	9:30:12	78.7	1.3117	53.87	10.78	-0.206	1.237	0.126
5/9/2003	9:30:16	83.4	1.3900	53.87	10.784	-0.202	1.315	0.123
5/9/2003	9:30:21	88.4	1.4733	53.87	10.786	-0.2	1.398	0.122
5/9/2003	9:30:27	93.7	1.5617	53.87	10.788	-0.198	1.487	0.121
5/9/2003	9:30:32	99.3	1.6550	53.87	10.79	-0.196	1.580	0.120
5/9/2003	9:30:38	105.2	1.7533	53.85	10.794	-0.192	1.678	0.117
5/9/2003	9:30:44	111.5	1.8583	53.85	10.799	-0.187	1.783	0.114
5/9/2003	9:30:51	118.1	1.9683	53.87	10.801	-0.185	1.893	0.113
5/9/2003	9:30:58	125.1	2.0850	53.87	10.801	-0.185	2.010	0.113
5/9/2003	9:31:05	132.6	2.2100	53.85	10.805	-0.181	2.135	0.111
5/9/2003	9:31:13	140.5	2.3417	53.85	10.807	-0.179	2.267	0.109
5/9/2003	9:31:22	148.9	2.4817	53.85	10.809	-0.177	2.407	0.108
5/9/2003	9:31:31	157.8	2.6300	53.85	10.812	-0.174	2.555	0.106
5/9/2003	9:31:40	167.2	2.7867	53.85	10.816	-0.17	2.712	0.104
5/9/2003	9:31:50	177.2	2.9533	53.85	10.816	-0.17	2.878	0.104
5/9/2003	9:32:01	187.8	3.1300	53.85	10.818	-0.168	3.055	0.103
5/9/2003	9:32:12	199	3.3167	53.83	10.82	-0.166	3.242	0.101
5/9/2003	9:32:24	210.9	3.5150	53.85	10.822	-0.164	3.440	0.100
5/9/2003	9:32:36	223.5	3.7250	53.85	10.825	-0.161	3.650	0.098
5/9/2003	9:32:50	236.8	3.9467	53.85	10.825	-0.161	3.872	0.098
5/9/2003	9:33:04	250.9	4.1817	53.83	10.828	-0.158	4.107	0.097
5/9/2003	9:33:19	265.8	4.4300	53.83	10.828	-0.158	4.355	0.097
5/9/2003	9:33:34	281.6	4.6933	53.83	10.831	-0.155	4.618	0.095
5/9/2003	9:33:51	298.4	4.9733	53.83	10.833	-0.153	4.898	0.093
5/9/2003	9:34:09	316.2	5.2700	53.83	10.835	-0.151	5.195	0.092
5/9/2003	9:34:28	335	5.5833	53.83	10.837	-0.149	5.508	0.091
5/9/2003	9:34:48	354.9	5.9150	53.83	10.837	-0.149	5.840	0.091

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT20
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling Head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	17.70 = To

Hydraulic Conductivity (K) :

9.39E-05	ft./min.
1.57E-06	ft./sec.
1.35E-01	ft./day
4.77E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: BMW720

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALKOVIC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' 22.83' T.D. TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 4.18' DATE: 5/10/03

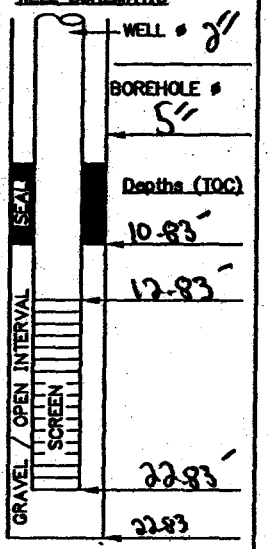
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 42" SOLID SLUG PAGE 1 OF 1

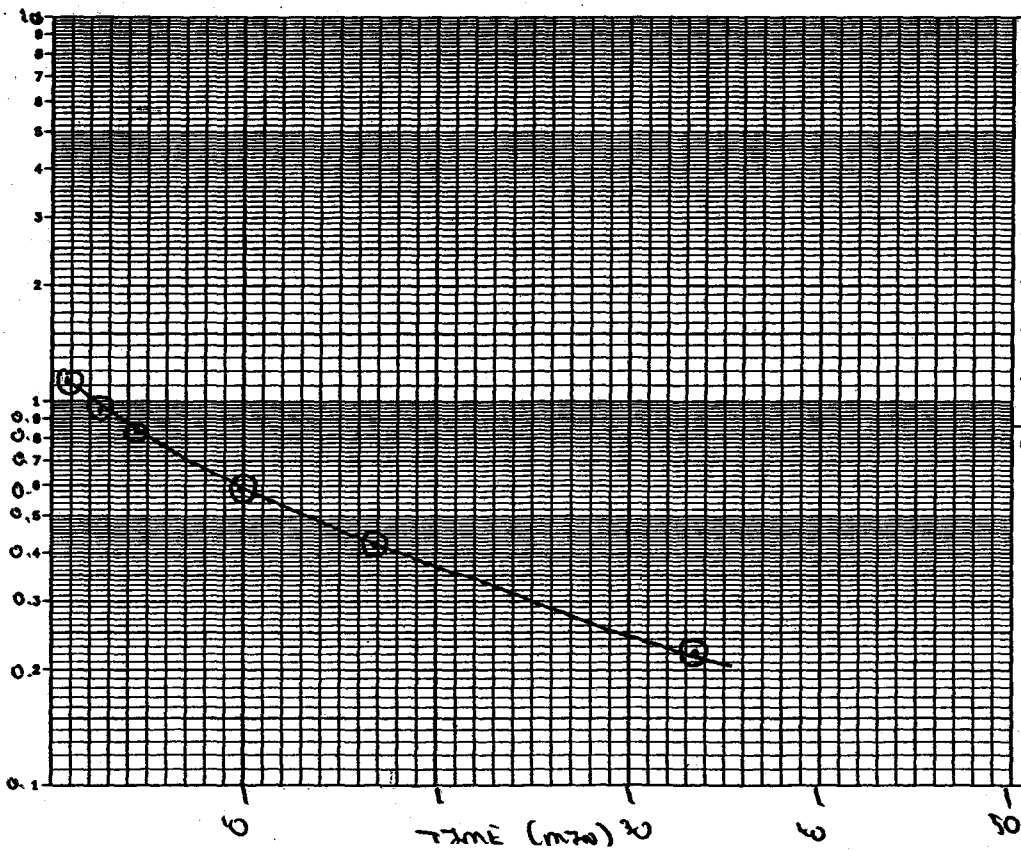
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	18.604	0	17.72	18.526	0.422
0.035	20.04	+1.936	23.65	19.444	0.34
0.085	19.546	+1.442	33.42	18.374	0.27
0.1	19.423	+1.319	59.49	18.284	0.18
0.21	19.365	+1.261			
0.28	19.347	+1.243			
0.42	19.316	+1.212			
1.04	19.232	+1.128			
2.63	19.082	0.978			
4.69	18.944	0.84			
7.45	18.807	0.703			
60.5	18.694	0.59			

WELL SCHEMATIC



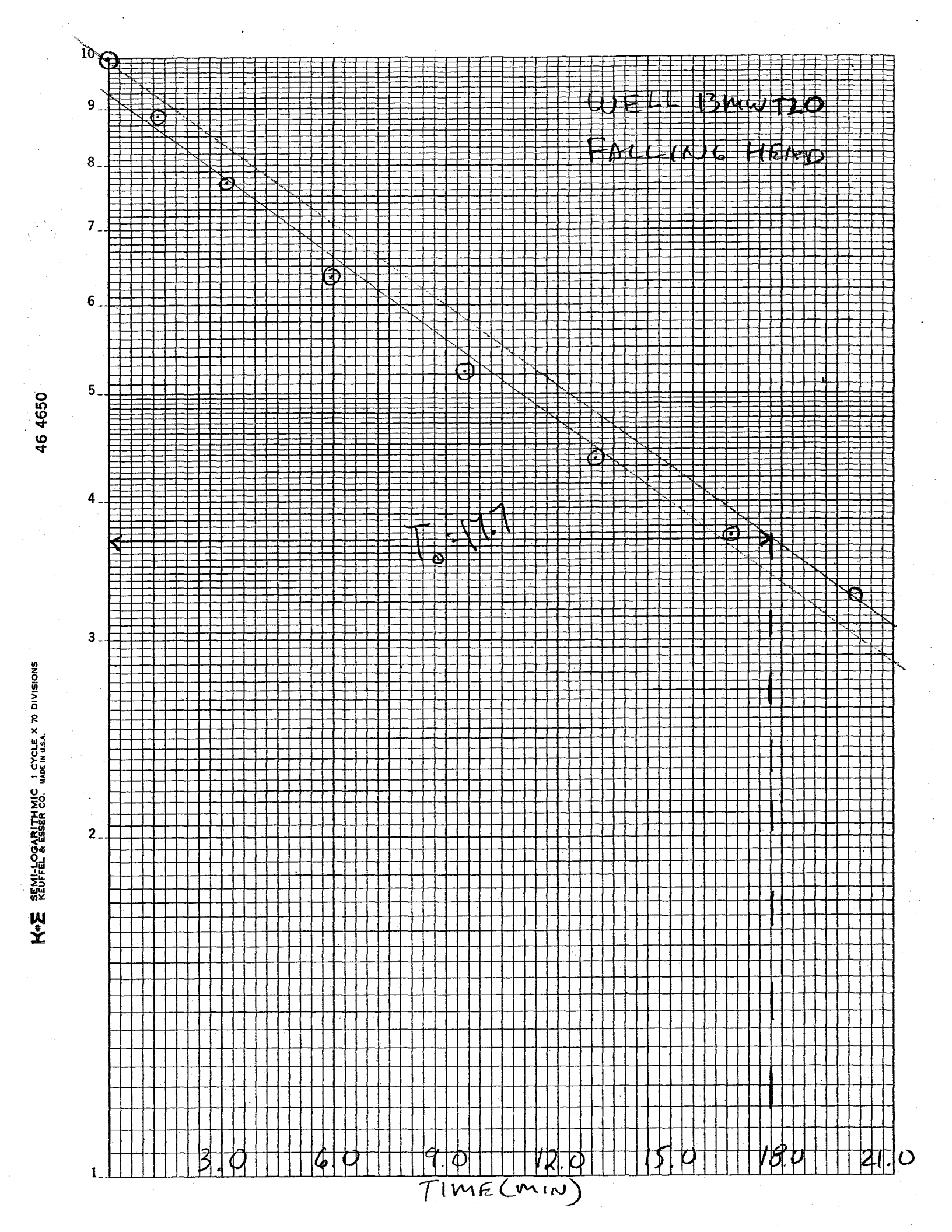
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 13MW12.0
FALLING HEAD
T₀=11.1
10
9
8
7
6
5
4
3
2
1
3.0
6.0
9.0
12.0
15.0
18.0
21.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 13:27:58
Report from file: ...\SN09015 2003-05-10 084709 13MWT20 Falling.bin
Win-Situ Version 4.41

Serial number: 9015
Firmware Version 3.04
Unit name: MW-14FW

Test name: 13MWT20 Falling

Test defined on: 5/10/2003 8:46:53
Test started on: 5/10/2003 8:47:09
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betwe Seconds.
Number of data sam 153

TOTAL DATA SAMPLI 153

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET ((min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	ho= 1.128 adjusted time	h/ho
5/10/2003	8:47:09	0	0	54.02	18.104	0		
5/10/2003	8:47:09	0.3	0.005	54.07	18.104	0		
5/10/2003	8:47:10	0.6	0.01	54.09	18.104	0		
5/10/2003	8:47:10	0.9	0.015	54.09	18.104	0		
5/10/2003	8:47:10	1.2	0.02	54.09	18.104	0		
5/10/2003	8:47:11	1.5	0.025	54.11	18.104	0		
5/10/2003	8:47:11	1.8	0.03	54.11	20.016	1.912		
5/10/2003	8:47:11	2.1	0.035	54.11	20.04	1.936		
5/10/2003	8:47:12	2.4	0.04	54.11	20.15	2.046		
5/10/2003	8:47:12	2.7	0.045	54.11	20.174	2.07		
5/10/2003	8:47:12	3	0.05	54.11	19.571	1.467		
5/10/2003	8:47:12	3.3	0.055	54.11	18.578	0.474		
5/10/2003	8:47:13	3.6	0.06	54.14	19.593	1.489		
5/10/2003	8:47:13	3.9	0.065	54.14	19.483	1.379		
5/10/2003	8:47:13	4.2	0.07	54.14	19.339	1.235		
5/10/2003	8:47:14	4.5	0.075	54.14	19.358	1.254		
5/10/2003	8:47:14	4.8	0.08	54.14	19.403	1.299		
5/10/2003	8:47:14	5.1	0.085	54.14	19.546	1.442		
5/10/2003	8:47:15	5.4	0.09	54.14	19.388	1.284		
5/10/2003	8:47:15	5.7	0.095	54.14	19.362	1.258		
5/10/2003	8:47:15	6	0.1	54.14	19.423	1.319		
5/10/2003	8:47:15	6.4	0.106667	54.14	19.405	1.301		
5/10/2003	8:47:16	6.7	0.111667	54.14	19.392	1.288		
5/10/2003	8:47:16	7.1	0.118333	54.14	19.403	1.299		
5/10/2003	8:47:17	7.5	0.125	54.14	19.407	1.303		
5/10/2003	8:47:17	8	0.133333	54.14	19.405	1.301		
5/10/2003	8:47:18	8.4	0.14	54.14	19.386	1.282		

5/10/2003	8:47:18	8.9	0.148333	54.14	19.393	1.289			
5/10/2003	8:47:19	9.5	0.158333	54.16	19.389	1.285			
5/10/2003	8:47:19	10	0.166667	54.11	19.376	1.272			
5/10/2003	8:47:20	10.6	0.176667	54.11	19.374	1.27			
5/10/2003	8:47:20	11.3	0.188333	54.11	19.37	1.266			
5/10/2003	8:47:21	11.9	0.198333	54.11	19.366	1.262			
5/10/2003	8:47:22	12.6	0.21	54.09	19.365	1.261			
5/10/2003	8:47:22	13.4	0.223333	54.09	19.361	1.257			
5/10/2003	8:47:23	14.2	0.236667	54.09	19.357	1.253			
5/10/2003	8:47:24	15	0.25	54.09	19.355	1.251			
5/10/2003	8:47:25	15.9	0.265	54.09	19.349	1.245			
5/10/2003	8:47:26	16.8	0.28	54.09	19.347	1.243			
5/10/2003	8:47:27	17.8	0.296667	54.09	19.341	1.237			
5/10/2003	8:47:28	18.9	0.315	54.09	19.339	1.235			
5/10/2003	8:47:29	20	0.333333	54.09	19.335	1.231			
5/10/2003	8:47:30	21.2	0.353333	54.09	19.331	1.227			
5/10/2003	8:47:32	22.4	0.373333	54.09	19.328	1.224			
5/10/2003	8:47:33	23.8	0.396667	54.09	19.331	1.227			
5/10/2003	8:47:34	25.2	0.42	54.09	19.316	1.212			
5/10/2003	8:47:36	26.7	0.445	54.09	19.324	1.22			
5/10/2003	8:47:37	28.2	0.47	54.09	19.328	1.224			
5/10/2003	8:47:39	29.8	0.496667	54.09	19.304	1.2			
5/10/2003	8:47:41	31.5	0.525	54.09	19.302	1.198			
5/10/2003	8:47:42	33.3	0.555	54.09	19.296	1.192			
5/10/2003	8:47:44	35.2	0.586667	54.09	19.292	1.188			
5/10/2003	8:47:46	37.3	0.621667	54.07	19.287	1.183			
5/10/2003	8:47:49	39.5	0.658333	54.07	19.283	1.179			
5/10/2003	8:47:51	41.8	0.696667	54.07	19.277	1.173			
5/10/2003	8:47:53	44.3	0.738333	54.07	19.271	1.167	Plotted shaded values.		
5/10/2003	8:47:56	46.9	0.781667	54.07	19.265	1.161			
5/10/2003	8:47:59	49.7	0.828333	54.07	19.257	1.153			
5/10/2003	8:48:02	52.6	0.876667	54.07	19.252	1.148			
5/10/2003	8:48:05	55.7	0.928333	54.07	19.246	1.142	adjusted time	h/ho	
5/10/2003	8:48:08	59	0.983333	54.07	19.238	1.134			
5/10/2003	8:48:12	62.5	1.041667	54.07	19.232	1.128	0.000	1.000	
5/10/2003	8:48:15	66.2	1.103333	54.2	19.207	1.103	0.062	0.978	
5/10/2003	8:48:19	70.1	1.168333	54.2	19.206	1.102	0.127	0.977	
5/10/2003	8:48:23	74.3	1.238333	54.2	19.206	1.102	0.197	0.977	
5/10/2003	8:48:28	78.7	1.311667	54.2	19.204	1.1	0.270	0.975	
5/10/2003	8:48:32	83.4	1.39	54.2	19.204	1.1	0.348	0.975	
5/10/2003	8:48:37	88.4	1.473333	54.2	19.204	1.1	0.432	0.975	
5/10/2003	8:48:43	93.7	1.561667	54.11	19.177	1.073	0.520	0.951	
5/10/2003	8:48:48	99.3	1.655	54.11	19.167	1.063	0.613	0.942	
5/10/2003	8:48:54	105.2	1.753333	54.09	19.158	1.054	0.712	0.934	
5/10/2003	8:49:01	111.5	1.858333	54.09	19.148	1.044	0.817	0.926	
5/10/2003	8:49:07	118.1	1.968333	54.09	19.136	1.032	0.927	0.915	
5/10/2003	8:49:14	125.1	2.085	54.09	19.127	1.023	1.043	0.907	
5/10/2003	8:49:22	132.6	2.21	54.09	19.115	1.011	1.168	0.896	
5/10/2003	8:49:30	140.5	2.341667	54.07	19.105	1.001	1.300	0.887	
5/10/2003	8:49:38	148.9	2.481667	54.07	19.096	0.992	1.440	0.879	
5/10/2003	8:49:47	157.8	2.63	54.07	19.082	0.978	1.588	0.867	
5/10/2003	8:49:56	167.2	2.786667	54.07	19.07	0.966	1.745	0.856	
5/10/2003	8:50:06	177.2	2.953333	54.07	19.058	0.954	1.912	0.846	
5/10/2003	8:50:17	187.8	3.13	54.07	19.047	0.943	2.088	0.836	
5/10/2003	8:50:28	199	3.316667	54.05	19.035	0.931	2.275	0.825	
5/10/2003	8:50:40	210.9	3.515	54.05	19.02	0.916	2.473	0.812	
5/10/2003	8:50:53	223.5	3.725	54.05	19.006	0.902	2.683	0.800	
5/10/2003	8:51:06	236.8	3.946667	54.05	18.992	0.888	2.905	0.787	
5/10/2003	8:51:20	250.9	4.181667	54.05	18.977	0.873	3.140	0.774	
5/10/2003	8:51:35	265.8	4.43	54.05	18.961	0.857	3.388	0.760	
5/10/2003	8:51:51	281.6	4.693333	54.02	18.944	0.84	3.652	0.745	
5/10/2003	8:52:07	298.4	4.973333	54.02	18.93	0.826	3.932	0.732	
5/10/2003	8:52:25	316.2	5.27	54.02	18.914	0.81	4.228	0.718	
5/10/2003	8:52:44	335	5.583333	54.02	18.895	0.791	4.542	0.701	
5/10/2003	8:53:04	354.9	5.915	54.02	18.879	0.775	4.873	0.687	

5/10/2003	8:53:25	376	6.266667	54.02	18.862	0.758	5.225	0.672
5/10/2003	8:53:47	398.4	6.64	54.02	18.844	0.74	5.598	0.656
5/10/2003	8:54:11	422.1	7.035	54.02	18.825	0.721	5.993	0.639
5/10/2003	8:54:36	447.2	7.453333	54.02	18.807	0.703	6.412	0.623
5/10/2003	8:55:03	473.8	7.896667	54	18.788	0.684	6.855	0.606
5/10/2003	8:55:31	502	8.366667	54	18.768	0.664	7.325	0.589
5/10/2003	8:56:01	531.9	8.865	54.02	18.75	0.646	7.823	0.573
5/10/2003	8:56:33	563.5	9.391667	54	18.731	0.627	8.350	0.556
5/10/2003	8:57:06	597	9.95	54	18.712	0.608	8.908	0.539
5/10/2003	8:57:42	632.5	10.54167	54	18.694	0.59	9.500	0.523
5/10/2003	8:58:19	670.1	11.16833	54	18.673	0.569	10.127	0.504
5/10/2003	8:58:59	709.9	11.83167	54	18.655	0.551	10.790	0.488
5/10/2003	8:59:41	752.1	12.535	54	18.636	0.532	11.493	0.472
5/10/2003	9:00:26	796.8	13.28	54	18.616	0.512	12.238	0.454
5/10/2003	9:01:13	844.2	14.07	54	18.597	0.493	13.028	0.437
5/10/2003	9:02:03	894.4	14.90667	54	18.579	0.475	13.865	0.421
5/10/2003	9:02:57	947.5	15.79167	54	18.561	0.457	14.750	0.405
5/10/2003	9:03:53	1003.8	16.73	54	18.542	0.438	15.688	0.388
5/10/2003	9:04:52	1063.4	17.72333	54	18.526	0.422	16.682	0.374
5/10/2003	9:05:56	1126.6	18.77667	54	18.507	0.403	17.735	0.357
5/10/2003	9:07:03	1193.5	19.89167	54	18.491	0.387	18.850	0.343
5/10/2003	9:08:13	1264.4	21.07333	54	18.476	0.372	20.032	0.330
5/10/2003	9:09:29	1339.5	22.325	54	18.46	0.356	21.283	0.316
5/10/2003	9:10:48	1419	23.65	54	18.444	0.34	22.608	0.301
5/10/2003	9:12:12	1503.3	25.055	54	18.431	0.327	24.013	0.290
5/10/2003	9:13:42	1592.6	26.54333	54	18.415	0.311	25.502	0.276
5/10/2003	9:15:16	1687.1	28.11833	54	18.403	0.299	27.077	0.265
5/10/2003	9:16:56	1787.2	29.78667	54	18.395	0.291	28.745	0.258
5/10/2003	9:18:42	1893.3	31.555	54	18.386	0.282	30.513	0.250
5/10/2003	9:20:35	2005.7	33.42833	54	18.374	0.27	32.387	0.239
5/10/2003	9:22:34	2124.7	35.41167	54	18.36	0.256	34.370	0.227
5/10/2003	9:24:40	2250.8	37.51333	54	18.347	0.243	36.472	0.215
5/10/2003	9:26:53	2384.4	39.74	54	18.337	0.233	38.698	0.207
5/10/2003	9:29:15	2525.9	42.09833	54	18.329	0.225	41.057	0.199
5/10/2003	9:31:45	2675.8	44.59667	54	18.321	0.217	43.555	0.192
5/10/2003	9:34:24	2834.6	47.24333	54	18.31	0.206	46.202	0.183
5/10/2003	9:37:12	3002.8	50.04667	54	18.306	0.202	49.005	0.179
5/10/2003	9:40:10	3180.9	53.015	54	18.298	0.194	51.973	0.172
5/10/2003	9:43:19	3369.6	56.16	54	18.292	0.188	55.118	0.167
5/10/2003	9:46:39	3569.5	59.49167	54	18.284	0.18	58.450	0.160
5/10/2003	9:50:10	3781.2	63.02	54	18.271	0.167	61.978	0.148
5/10/2003	9:53:55	4005.5	66.75833	54	18.267	0.163	65.717	0.145
5/10/2003	9:57:52	4243.1	70.71833	54	18.261	0.157	69.677	0.139
5/10/2003	10:02:04	4494.7	74.91167	54	18.257	0.153	73.870	0.136
5/10/2003	10:06:30	4761.3	79.355	54	18.255	0.151	78.313	0.134
5/10/2003	10:11:13	5043.7	84.06167	54	18.251	0.147	83.020	0.130
5/10/2003	10:16:12	5342.8	89.04667	54	18.247	0.143	88.005	0.127
5/10/2003	10:21:29	5659.6	94.32667	54	18.241	0.137	93.285	0.121
5/10/2003	10:27:04	5995.2	99.92	54	18.239	0.135	98.878	0.120
5/10/2003	10:33:00	6350.7	105.845	54	18.235	0.131	104.803	0.116
5/10/2003	10:39:16	6727.2	112.12	54	18.232	0.128	111.078	0.113
5/10/2003	10:45:55	7126.1	118.7683	54	18.228	0.124	117.727	0.110
5/10/2003	10:52:58	7548.6	125.81	54	18.228	0.124	124.768	0.110
5/10/2003	11:00:25	7996.1	133.2683	54	18.228	0.124	132.227	0.110
5/10/2003	11:08:19	8470.1	141.1683	54	18.232	0.128	140.127	0.113
5/10/2003	11:16:41	8972.2	149.5367	54	18.235	0.131	148.495	0.116
5/10/2003	11:25:33	9504.1	158.4017	54.02	18.235	0.131	157.360	0.116
5/10/2003	11:34:57	10067.5	167.7917	54	18.235	0.131	166.750	0.116
5/10/2003	11:44:53	10664.3	177.7383	54	18.237	0.133	176.697	0.118
5/10/2003	11:55:26	11296.5	188.275	54.02	18.247	0.143	187.233	0.127
5/10/2003	12:06:35	11966.1	199.435	54.02	18.253	0.149	198.393	0.132

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT20
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	10-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	18.30 = To

Hydraulic Conductivity (K) :

9.08E-05	ft./min.
1.51E-06	ft./sec.
1.31E-01	ft./day
4.61E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: CRANE WELL/BORING NO.: BMW120

PROJECT NO.: 9060 CTO 0279 GEOLOGIST: BOB BALCOVEC

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' 22.83' TD TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 4.17' DATE: 5/10/03

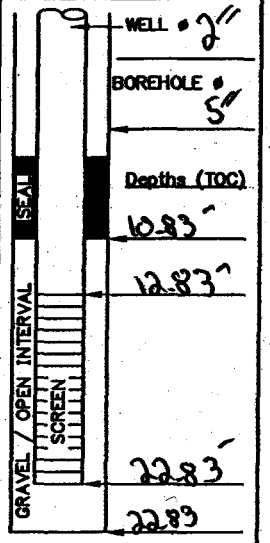
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 1.25" x 42" SOLID SLUG PAGE 1 OF 1

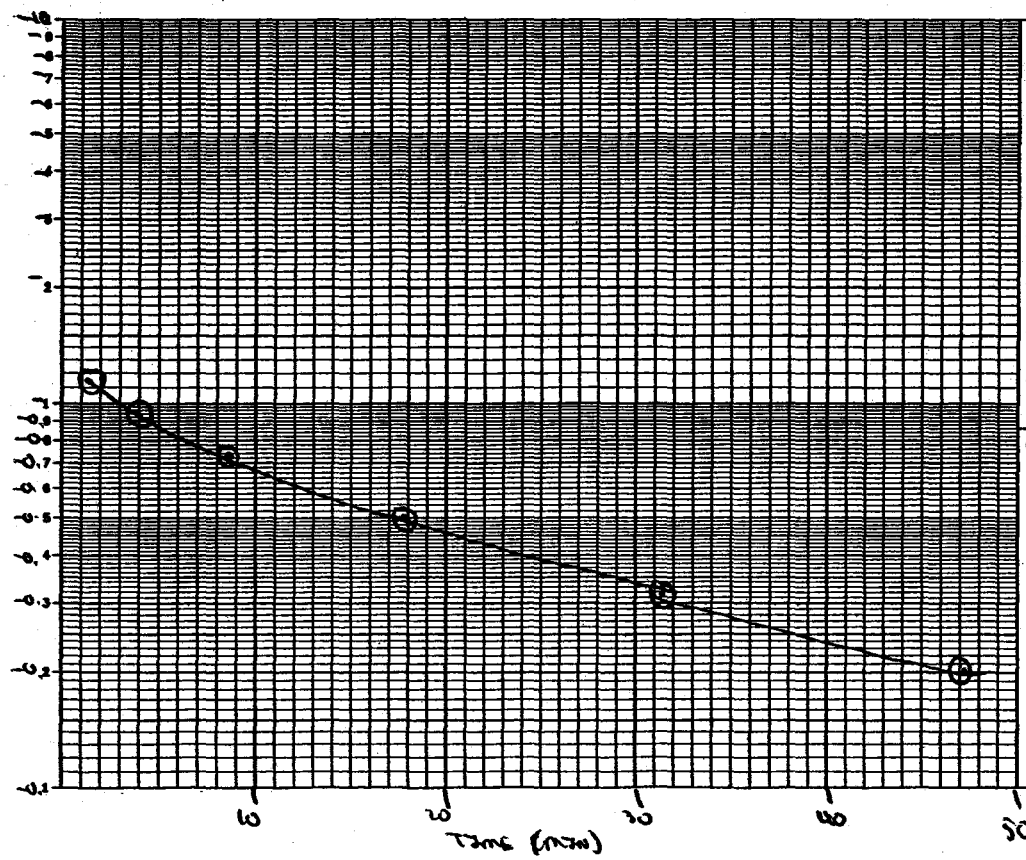
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	18.253	0			
0.03	16.111	-2.142			
0.075	16.913	-1.34			
0.265	16.952	-1.301			
0.62	17.003	-1.25			
1.56	17.103	-1.15			
4.18	17.293	-0.96			
8.8	17.513	-0.74			
17.72	17.753	-0.5			
31.55	17.939	-0.314			
47.24	18.044	-0.209			
63.02	18.083	-0.17			

WELL SCHEMATIC



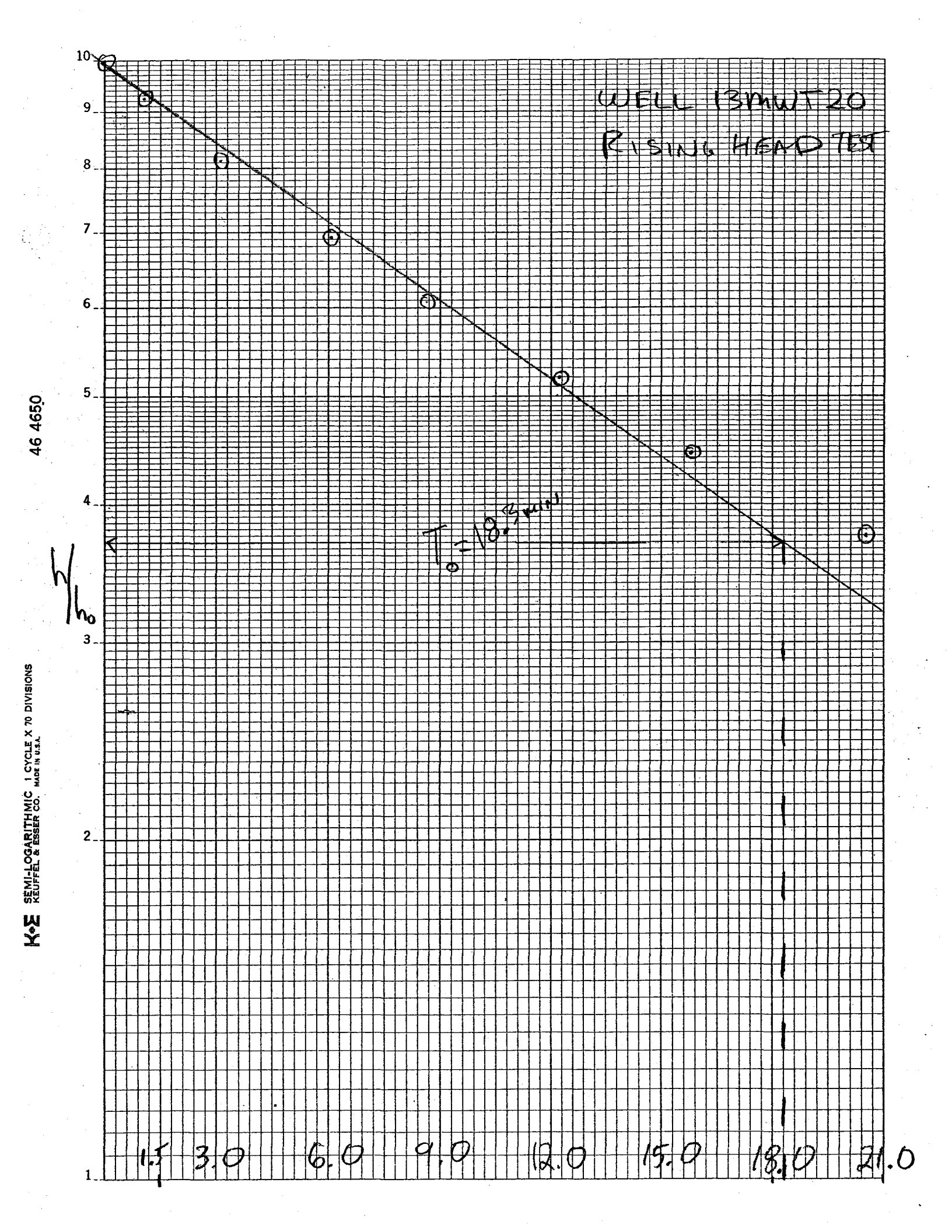
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


WELL 13MWT20
RISING HEAD TEST
10
9
8
7
6
5
4
3
2
1
1.5
3.0
6.0
9.0
12.0
15.0
18.0
21.0
46 4650
SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
K&E

In-Situ Inc. MiniTroll Pro

Report generated: 5/11/2003 13:28:54
Report from file: ...\SN09015 2003-05-10 121934 13MWT20 Rising.bin
Win-Situ Version 4.41

Serial number: 9015
Firmware Version 3.04
Unit name: MW-14FW

Test name: 13MWT20 Rising

Test defined on: 5/10/2003 12:19:15
Test started on: 5/10/2003 12:19:34
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time bet Seconds.
Number of data sa 149

TOTAL DATA SAMF 149

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	Displacement Feet	ho= -1.124 adjusted time	h/ho
5/10/2003	12:19:34	0	0	54.02	18.253	0		
5/10/2003	12:19:35	0.3	0.005	54.05	18.253	0		
5/10/2003	12:19:35	0.6	0.01	54.07	18.253	0		
5/10/2003	12:19:35	0.9	0.015	54.07	18.253	0		
5/10/2003	12:19:36	1.2	0.02	54.07	18.129	-0.124		
5/10/2003	12:19:36	1.5	0.025	54.09	16.925	-1.328		
5/10/2003	12:19:36	1.8	0.03	54.09	16.111	-2.142		
5/10/2003	12:19:37	2.1	0.035	54.09	16.423	-1.83		
5/10/2003	12:19:37	2.4	0.04	54.09	16.759	-1.494		
5/10/2003	12:19:37	2.7	0.045	54.09	16.74	-1.513		
5/10/2003	12:19:37	3	0.05	54.11	17.062	-1.191		
5/10/2003	12:19:38	3.3	0.055	54.11	16.818	-1.435		
5/10/2003	12:19:38	3.6	0.06	54.11	16.878	-1.375		
5/10/2003	12:19:38	3.9	0.065	54.11	16.954	-1.299		
5/10/2003	12:19:39	4.2	0.07	54.11	16.88	-1.373		
5/10/2003	12:19:39	4.5	0.075	54.11	16.913	-1.34		
5/10/2003	12:19:39	4.8	0.08	54.11	16.927	-1.326		
5/10/2003	12:19:40	5.1	0.085	54.11	16.905	-1.348		
5/10/2003	12:19:40	5.4	0.09	54.11	16.923	-1.33		
5/10/2003	12:19:40	5.7	0.095	54.11	16.923	-1.33		
5/10/2003	12:19:40	6	0.1	54.11	16.921	-1.332		
5/10/2003	12:19:41	6.4	0.106667	54.11	16.927	-1.326		
5/10/2003	12:19:41	6.7	0.111667	54.11	16.927	-1.326		
5/10/2003	12:19:42	7.1	0.118333	54.11	16.931	-1.322		
5/10/2003	12:19:42	7.5	0.125	54.11	16.933	-1.32		
5/10/2003	12:19:42	8	0.133333	54.11	16.935	-1.318		
5/10/2003	12:19:43	8.4	0.14	54.11	16.937	-1.316		

5/10/2003	12:19:43	8.9	0.148333	54.11	16.941	-1.312			
5/10/2003	12:19:44	9.5	0.158333	54.14	16.942	-1.311			
5/10/2003	12:19:44	10	0.166667	54.11	16.937	-1.316			
5/10/2003	12:19:45	10.6	0.176667	54.09	16.939	-1.314			
5/10/2003	12:19:46	11.3	0.188333	54.09	16.939	-1.314			
5/10/2003	12:19:46	11.9	0.198333	54.09	16.941	-1.312			
5/10/2003	12:19:47	12.6	0.21	54.09	16.943	-1.31			
5/10/2003	12:19:48	13.4	0.223333	54.09	16.945	-1.308			
5/10/2003	12:19:49	14.2	0.236667	54.09	16.949	-1.304			
5/10/2003	12:19:49	15	0.25	54.09	16.951	-1.302			
5/10/2003	12:19:50	15.9	0.265	54.09	16.952	-1.301			
5/10/2003	12:19:51	16.8	0.28	54.09	16.954	-1.299			
5/10/2003	12:19:52	17.8	0.296667	54.07	16.957	-1.296			
5/10/2003	12:19:53	18.9	0.315	54.07	16.96	-1.293			
5/10/2003	12:19:54	20	0.333333	54.07	16.962	-1.291			
5/10/2003	12:19:56	21.2	0.353333	54.07	16.966	-1.287			
5/10/2003	12:19:57	22.4	0.373333	54.07	16.97	-1.283			
5/10/2003	12:19:58	23.8	0.396667	54.07	16.972	-1.281			
5/10/2003	12:20:00	25.2	0.42	54.07	16.976	-1.277			
5/10/2003	12:20:01	26.7	0.445	54.07	16.98	-1.273			
5/10/2003	12:20:03	28.2	0.47	54.07	16.984	-1.269			
5/10/2003	12:20:04	29.8	0.496667	54.07	16.988	-1.265			
5/10/2003	12:20:06	31.5	0.525	54.07	16.992	-1.261			
5/10/2003	12:20:08	33.3	0.555	54.07	16.996	-1.257			
5/10/2003	12:20:10	35.2	0.586667	54.07	16.999	-1.254			
5/10/2003	12:20:12	37.3	0.621667	54.07	17.003	-1.25			
5/10/2003	12:20:14	39.5	0.658333	54.07	17.009	-1.244			
5/10/2003	12:20:16	41.8	0.696667	54.07	17.013	-1.24			
5/10/2003	12:20:19	44.3	0.738333	54.07	17.019	-1.234			
5/10/2003	12:20:21	46.9	0.781667	54.07	17.023	-1.23			
5/10/2003	12:20:24	49.7	0.828333	54.05	17.06	-1.193			
5/10/2003	12:20:27	52.6	0.876667	54.07	17.074	-1.179			
5/10/2003	12:20:30	55.7	0.928333	54.09	17.075	-1.178			
5/10/2003	12:20:33	59	0.983333	54.09	17.077	-1.176			
5/10/2003	12:20:37	62.5	1.041667	54.11	17.079	-1.174			
5/10/2003	12:20:41	66.2	1.103333	54.11	17.081	-1.172			
5/10/2003	12:20:44	70.1	1.168333	54.09	17.072	-1.181			
5/10/2003	12:20:49	74.3	1.238333	54.05	17.072	-1.181			
5/10/2003	12:20:53	78.7	1.311667	54.05	17.08	-1.173			
5/10/2003	12:20:58	83.4	1.39	54.05	17.088	-1.165			
5/10/2003	12:21:03	88.4	1.473333	54.05	17.095	-1.158	Plotted shaded values.		
5/10/2003	12:21:08	93.7	1.561667	54.05	17.103	-1.15			
5/10/2003	12:21:14	99.3	1.655	54.05	17.113	-1.14			
5/10/2003	12:21:20	105.2	1.753333	54.05	17.121	-1.132	adjusted time	h/ho	
5/10/2003	12:21:26	111.5	1.858333	54.05	17.129	-1.124	0.000	1.000	
5/10/2003	12:21:32	118.1	1.968333	54.05	17.138	-1.115	0.110	0.992	
5/10/2003	12:21:39	125.1	2.085	54.05	17.148	-1.105	0.227	0.983	
5/10/2003	12:21:47	132.6	2.21	54.05	17.158	-1.095	0.352	0.974	
5/10/2003	12:21:55	140.5	2.341667	54.05	17.169	-1.084	0.483	0.964	
5/10/2003	12:22:03	148.9	2.481667	54.05	17.179	-1.074	0.623	0.956	
5/10/2003	12:22:12	157.8	2.63	54.05	17.191	-1.062	0.772	0.945	
5/10/2003	12:22:22	167.2	2.786667	54.05	17.203	-1.05	0.928	0.934	
5/10/2003	12:22:32	177.2	2.953333	54.05	17.214	-1.039	1.095	0.924	
5/10/2003	12:22:42	187.8	3.13	54.05	17.226	-1.027	1.272	0.914	
5/10/2003	12:22:53	199	3.316667	54.05	17.238	-1.015	1.458	0.903	
5/10/2003	12:23:05	210.9	3.515	54.02	17.252	-1.001	1.657	0.891	
5/10/2003	12:23:18	223.5	3.725	54.02	17.265	-0.988	1.867	0.879	
5/10/2003	12:23:31	236.8	3.946667	54.02	17.279	-0.974	2.088	0.867	
5/10/2003	12:23:45	250.9	4.181667	54.02	17.293	-0.96	2.323	0.854	
5/10/2003	12:24:00	265.8	4.43	54.02	17.308	-0.945	2.572	0.841	
5/10/2003	12:24:16	281.6	4.693333	54.02	17.322	-0.931	2.835	0.828	
5/10/2003	12:24:33	298.4	4.973333	54.02	17.339	-0.914	3.115	0.813	
5/10/2003	12:24:51	316.2	5.27	54.02	17.355	-0.898	3.412	0.799	
5/10/2003	12:25:09	335	5.583333	54.02	17.371	-0.882	3.725	0.785	
5/10/2003	12:25:29	354.9	5.915	54.02	17.386	-0.867	4.057	0.771	

5/10/2003	12:25:50	376	6.266667	54.02	17.404	-0.849	4.408	0.755
5/10/2003	12:26:13	398.4	6.64	54.02	17.419	-0.834	4.782	0.742
5/10/2003	12:26:36	422.1	7.035	54.02	17.439	-0.814	5.177	0.724
5/10/2003	12:27:02	447.2	7.453333	54.02	17.457	-0.796	5.595	0.708
5/10/2003	12:27:28	473.8	7.896667	54.02	17.474	-0.779	6.038	0.693
5/10/2003	12:27:56	502	8.366667	54.02	17.494	-0.759	6.508	0.675
5/10/2003	12:28:26	531.9	8.865	54.02	17.513	-0.74	7.007	0.658
5/10/2003	12:28:58	563.5	9.391667	54.02	17.531	-0.722	7.533	0.642
5/10/2003	12:29:31	597	9.95	54.02	17.55	-0.703	8.092	0.625
5/10/2003	12:30:07	632.5	10.54167	54.02	17.57	-0.683	8.685	0.606
5/10/2003	12:30:44	670.1	11.16833	54.02	17.589	-0.664	9.310	0.591
5/10/2003	12:31:24	709.9	11.83167	54.02	17.609	-0.644	9.973	0.573
5/10/2003	12:32:06	752.1	12.535	54.02	17.63	-0.623	10.677	0.554
5/10/2003	12:32:51	796.8	13.28	54.02	17.65	-0.603	11.422	0.536
5/10/2003	12:33:39	844.2	14.07	54.02	17.669	-0.584	12.212	0.520
5/10/2003	12:34:29	894.4	14.90667	54.02	17.693	-0.56	13.048	0.498
5/10/2003	12:35:22	947.5	15.79167	54.02	17.712	-0.541	13.933	0.481
5/10/2003	12:36:18	1003.8	16.73	54.02	17.732	-0.521	14.872	0.464
5/10/2003	12:37:18	1063.4	17.72333	54.02	17.753	-0.5	15.865	0.445
5/10/2003	12:38:21	1126.6	18.77667	54.02	17.773	-0.48	16.918	0.427
5/10/2003	12:39:28	1193.5	19.89167	54.02	17.792	-0.461	18.033	0.410
5/10/2003	12:40:39	1264.4	21.07333	54.02	17.812	-0.441	19.215	0.392
5/10/2003	12:41:54	1339.5	22.325	54.02	17.831	-0.422	20.467	0.375
5/10/2003	12:43:13	1419	23.65	54.02	17.851	-0.402	21.792	0.358
5/10/2003	12:44:38	1503.3	25.055	54.02	17.868	-0.385	23.197	0.343
5/10/2003	12:46:07	1592.6	26.54333	54.02	17.884	-0.369	24.685	0.328
5/10/2003	12:47:41	1687.1	28.11833	54.02	17.902	-0.351	26.260	0.312
5/10/2003	12:49:22	1787.2	29.78667	54.02	17.921	-0.332	27.928	0.295
5/10/2003	12:51:08	1893.3	31.555	54.02	17.939	-0.314	29.697	0.279
5/10/2003	12:53:00	2005.7	33.42833	54.02	17.954	-0.299	31.570	0.266
5/10/2003	12:54:59	2124.7	35.41167	54.02	17.97	-0.283	33.553	0.252
5/10/2003	12:57:05	2250.8	37.51333	54.02	17.985	-0.268	35.655	0.238
5/10/2003	12:59:19	2384.4	39.74	54.02	18.001	-0.252	37.882	0.224
5/10/2003	13:01:40	2525.9	42.09833	54.02	18.017	-0.236	40.240	0.210
5/10/2003	13:04:10	2675.8	44.59667	54.02	18.032	-0.221	42.738	0.197
5/10/2003	13:06:49	2834.6	47.24333	54	18.044	-0.209	45.385	0.186
5/10/2003	13:09:37	3002.8	50.04667	54	18.056	-0.197	48.188	0.175
5/10/2003	13:12:35	3180.9	53.015	54	18.066	-0.187	51.157	0.166
5/10/2003	13:15:44	3369.6	56.16	54	18.07	-0.183	54.302	0.163
5/10/2003	13:19:04	3569.5	59.49167	54	18.077	-0.176	57.633	0.157
5/10/2003	13:22:36	3781.2	63.02	54	18.083	-0.17	61.162	0.151
5/10/2003	13:26:20	4005.5	66.75833	54	18.085	-0.168	64.900	0.149
5/10/2003	13:30:17	4243.1	70.71833	54.02	18.093	-0.16	68.860	0.142
5/10/2003	13:34:29	4494.7	74.91167	54.02	18.101	-0.152	73.053	0.135
5/10/2003	13:38:56	4761.3	79.355	54.02	18.108	-0.145	77.497	0.129
5/10/2003	13:43:38	5043.7	84.06167	54.02	18.116	-0.137	82.203	0.122
5/10/2003	13:48:37	5342.8	89.04667	54.02	18.124	-0.129	87.188	0.115
5/10/2003	13:53:54	5659.6	94.32667	54.02	18.134	-0.119	92.468	0.106
5/10/2003	13:59:30	5995.2	99.92	54.02	18.142	-0.111	98.062	0.099
5/10/2003	14:05:25	6350.7	105.845	54.02	18.145	-0.108	103.987	0.096
5/10/2003	14:11:42	6727.2	112.12	54.02	18.153	-0.1	110.262	0.089
5/10/2003	14:18:20	7126.1	118.7683	54.02	18.159	-0.094	116.910	0.084
5/10/2003	14:25:23	7548.6	125.81	54.02	18.165	-0.088	123.952	0.078
5/10/2003	14:32:50	7996.1	133.2683	54.02	18.173	-0.08	131.410	0.071
5/10/2003	14:40:44	8470.1	141.1683	54.02	18.181	-0.072	139.310	0.064
5/10/2003	14:49:07	8972.2	149.5367	54.02	18.188	-0.065	147.678	0.058
5/10/2003	14:57:58	9504.1	158.4017	54	18.196	-0.057	156.543	0.051

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT26
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Falling head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RWR 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	91.00 = To

Hydraulic Conductivity (K) :

1.29E-05	ft./min.
2.15E-07	ft./sec.
1.86E-02	ft./day
6.55E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MW726

PROJECT NO.: 9060 Geo 0279 GEOLOGIST: BOB BALKOVEC

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 22.24' TEST NO.: 3

STATIC WATER LEVEL (Depth/Elevation): 9.09' DATE: 5/9/03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

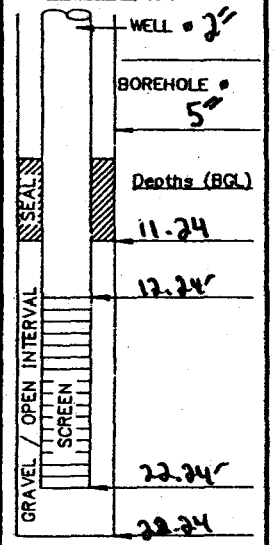
METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 56.5" LONG SLUG PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

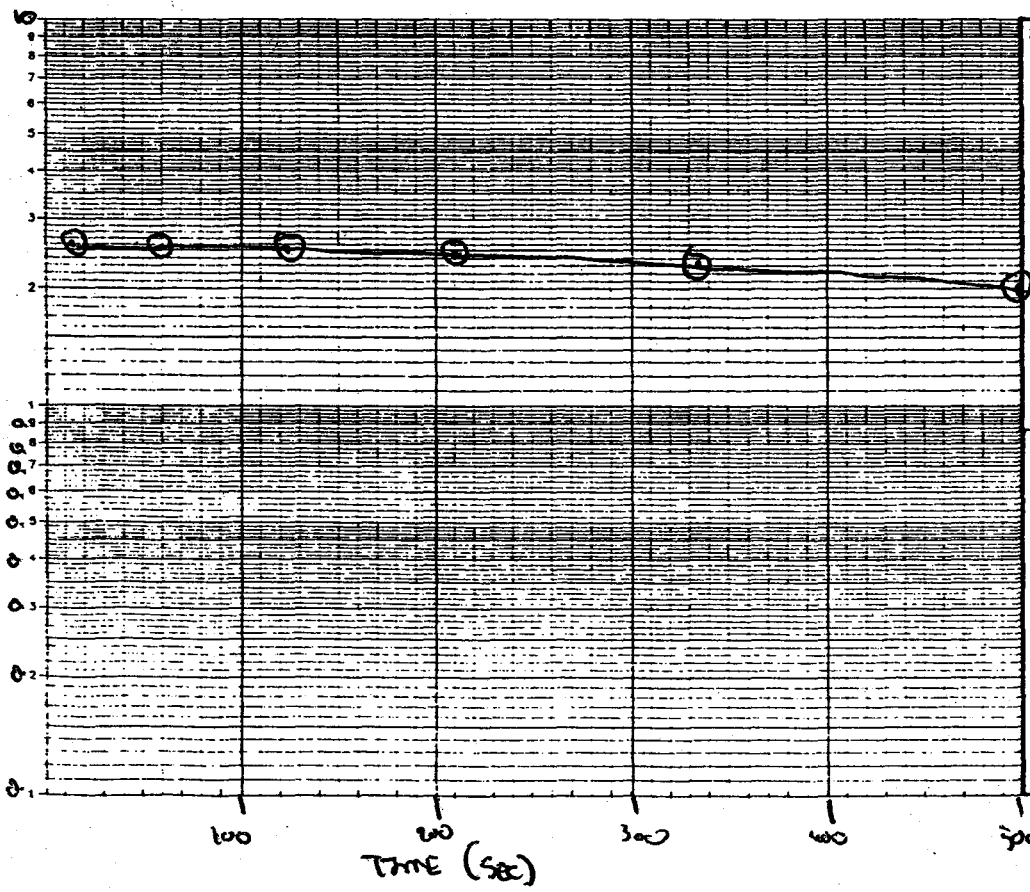
Static Start

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
8.0	12.530		709.9	14.603	+2.073
11.3	14.358	+2.228	1419	14.26	+1.73
15.0	15.216	+2.686	2525.9	13.882	+1.352
20.0	15.229	+2.699	3569.5	13.676	+1.146
29.8	15.204	+2.674	5043.7	13.382	+0.852
41.8	15.178	+2.648	7548.6	13.118	+0.588
59.0	15.150	+2.62	9504.1	12.986	+0.456
125.1	15.063	+2.533	11296.5	12.902	+0.372
210.9	14.978	+2.448			
335.0	14.868	2.338			
422.1	14.791	2.261			
502	14.738	2.208			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

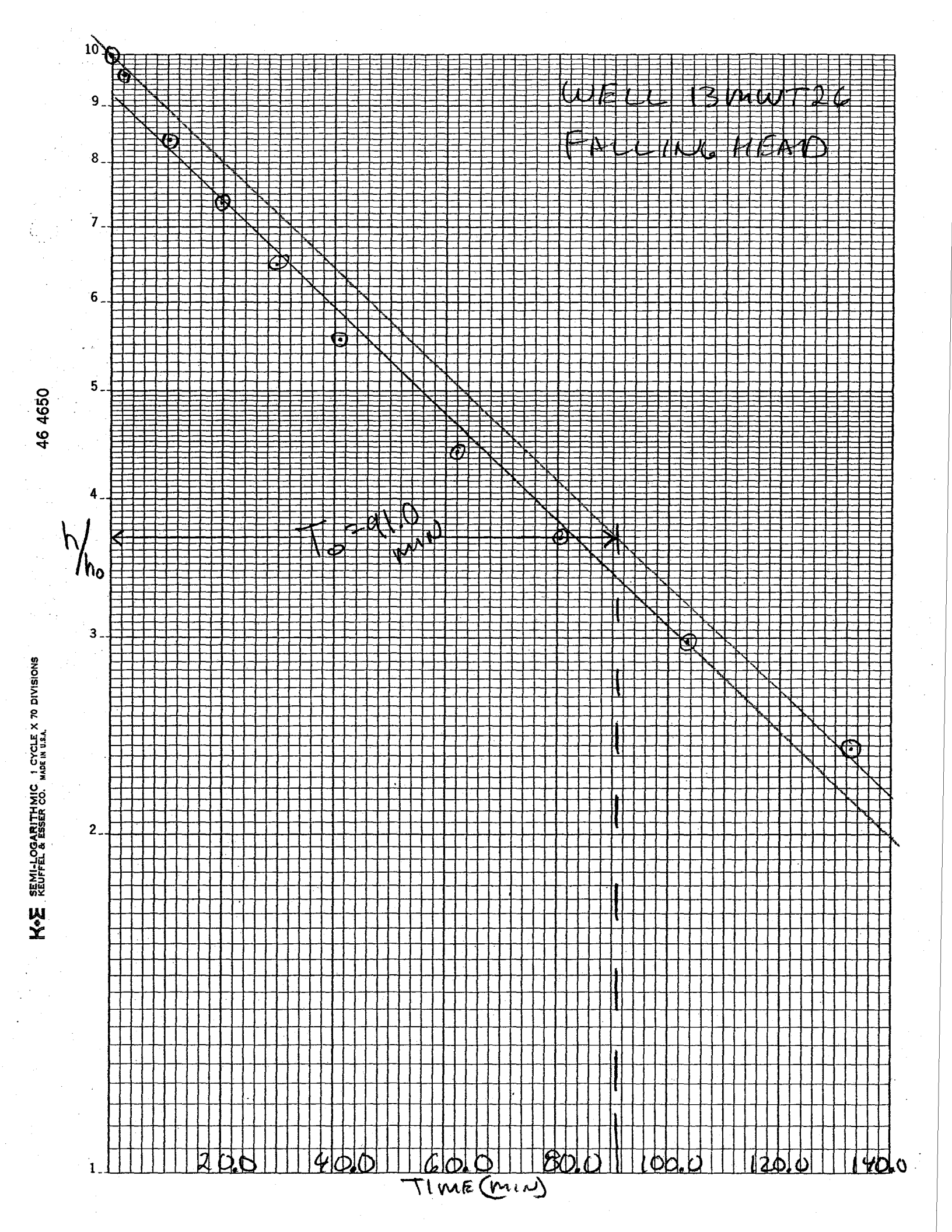


REMARKS:

WL = 9.09'

TD = 22.24'

CALCS, SKETCH MAPS, ETC.:


WELL 13MWT26
FALLING HEAD
T_o = 91.0 gpd
h/h0
TIME (MIN)
10
9
8
7
6
5
4
3
2
1
20.0
40.0
60.0
80.0
100.0
120.0
140.0
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/9/2003 16:52:07
Report from file: ...\SN00824 2003-05-09 120314 13MWT26 Falling.bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 13MWT26 Falling

Test defined on: 5/9/2003 12:01:49
Test started on: 5/9/2003 12:03:14
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betv Seconds.
Number of data sar 154

TOTAL DATA SAMPI 154

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenheit	Chan[2] Feet H2O	adjusted time Displacement	h/ho	ho= 2.208
5/9/2003	12:03:14	0	0	53.32	12.507	Feet		
5/9/2003	12:03:15	0.3	0.005	53.35	12.518			
5/9/2003	12:03:15	0.6	0.01	53.37	12.523			
5/9/2003	12:03:15	0.9	0.015	53.37	12.525			
5/9/2003	12:03:16	1.2	0.02	53.39	12.526			
5/9/2003	12:03:16	1.5	0.025	53.39	12.528			
5/9/2003	12:03:16	1.8	0.03	53.39	12.528			
5/9/2003	12:03:16	2.1	0.035	53.39	12.526	12.53 Static		
5/9/2003	12:03:17	2.4	0.04	53.39	12.53	0		
5/9/2003	12:03:17	2.7	0.045	53.39	12.53	0		
5/9/2003	12:03:17	3	0.05	53.39	12.53	0		
5/9/2003	12:03:18	3.3	0.055	53.39	12.53	0		
5/9/2003	12:03:18	3.6	0.06	53.39	12.53	0		
5/9/2003	12:03:18	3.9	0.065	53.39	12.53	0		
5/9/2003	12:03:19	4.2	0.07	53.39	12.53	0		
5/9/2003	12:03:19	4.5	0.075	53.39	12.53	0		
5/9/2003	12:03:19	4.8	0.08	53.39	12.53	0		
5/9/2003	12:03:19	5.1	0.085	53.39	12.53	0		
5/9/2003	12:03:20	5.4	0.09	53.41	12.532	0.002		
5/9/2003	12:03:20	5.7	0.095	53.41	12.532	0.002		
5/9/2003	12:03:20	6	0.1	53.41	12.532	0.002		
5/9/2003	12:03:21	6.4	0.106667	53.41	12.53	0		
5/9/2003	12:03:21	6.7	0.111667	53.41	12.53	0		
5/9/2003	12:03:21	7.1	0.118333	53.41	12.53	0		
5/9/2003	12:03:22	7.5	0.125	53.41	12.53	0		
5/9/2003	12:03:22	8	0.133333	53.41	12.532	0.002		
5/9/2003	12:03:23	8.4	0.14	53.41	12.532	0.002		

5/9/2003	12:03:23	8.9	0.148333	53.41	12.534	0.004
5/9/2003	12:03:24	9.5	0.158333	53.41	12.534	0.004
5/9/2003	12:03:24	10	0.166667	53.39	12.528	-0.002
5/9/2003	12:03:25	10.6	0.176667	53.39	12.622	0.092
5/9/2003	12:03:26	11.3	0.188333	53.37	14.758	2.228
5/9/2003	12:03:26	11.9	0.198333	53.37	16.502	3.972
5/9/2003	12:03:27	12.6	0.21	53.37	16.58	4.05
5/9/2003	12:03:28	13.4	0.223333	53.37	16.171	3.641
5/9/2003	12:03:28	14.2	0.236667	53.37	14.616	2.086
5/9/2003	12:03:29	15	0.25	53.37	15.216	2.686
5/9/2003	12:03:30	15.9	0.265	53.37	15.229	2.699
5/9/2003	12:03:31	16.8	0.28	53.37	15.236	2.706
5/9/2003	12:03:32	17.8	0.296667	53.37	15.236	2.706
5/9/2003	12:03:33	18.9	0.315	53.37	15.238	2.708
5/9/2003	12:03:34	20	0.333333	53.37	15.229	2.699
5/9/2003	12:03:36	21.2	0.353333	53.37	15.227	2.697
5/9/2003	12:03:37	22.4	0.373333	53.37	15.221	2.691
5/9/2003	12:03:38	23.8	0.396667	53.37	15.219	2.689
5/9/2003	12:03:40	25.2	0.42	53.37	15.214	2.684
5/9/2003	12:03:41	26.7	0.445	53.37	15.212	2.682
5/9/2003	12:03:43	28.2	0.47	53.35	15.21	2.68
5/9/2003	12:03:44	29.8	0.496667	53.37	15.204	2.674
5/9/2003	12:03:46	31.5	0.525	53.35	15.199	2.669
5/9/2003	12:03:48	33.3	0.555	53.35	15.195	2.665
5/9/2003	12:03:50	35.2	0.586667	53.35	15.192	2.662
5/9/2003	12:03:52	37.3	0.621667	53.35	15.188	2.658
5/9/2003	12:03:54	39.5	0.658333	53.35	15.184	2.654
5/9/2003	12:03:56	41.8	0.696667	53.35	15.178	2.648
5/9/2003	12:03:59	44.3	0.738333	53.35	15.175	2.645
5/9/2003	12:04:01	46.9	0.781667	53.35	15.171	2.641
5/9/2003	12:04:04	49.7	0.828333	53.35	15.165	2.635
5/9/2003	12:04:07	52.6	0.876667	53.35	15.162	2.632
5/9/2003	12:04:10	55.7	0.928333	53.35	15.158	2.628
5/9/2003	12:04:13	59	0.983333	53.35	15.15	2.62
5/9/2003	12:04:17	62.5	1.041667	53.32	15.145	2.615
5/9/2003	12:04:21	66.2	1.103333	53.32	15.141	2.611
5/9/2003	12:04:24	70.1	1.168333	53.32	15.136	2.606
5/9/2003	12:04:29	74.3	1.238333	53.32	15.136	2.606
5/9/2003	12:04:33	78.7	1.311667	53.32	15.125	2.595
5/9/2003	12:04:38	83.4	1.39	53.32	15.117	2.587
5/9/2003	12:04:43	88.4	1.473333	53.32	15.11	2.58
5/9/2003	12:04:48	93.7	1.561667	53.32	15.102	2.572
5/9/2003	12:04:54	99.3	1.655	53.32	15.095	2.565
5/9/2003	12:05:00	105.2	1.753333	53.32	15.089	2.559
5/9/2003	12:05:06	111.5	1.858333	53.3	15.082	2.552
5/9/2003	12:05:12	118.1	1.968333	53.3	15.073	2.543
5/9/2003	12:05:19	125.1	2.085	53.3	15.063	2.533
5/9/2003	12:05:27	132.6	2.21	53.3	15.056	2.526
5/9/2003	12:05:35	140.5	2.341667	53.3	15.046	2.516
5/9/2003	12:05:43	148.9	2.481667	53.3	15.039	2.509
5/9/2003	12:05:52	157.8	2.63	53.3	15.028	2.498
5/9/2003	12:06:02	167.2	2.786667	53.3	15.018	2.488
5/9/2003	12:06:12	177.2	2.953333	53.3	15.011	2.481
5/9/2003	12:06:22	187.8	3.13	53.28	15	2.47
5/9/2003	12:06:33	199	3.316667	53.28	14.987	2.457
5/9/2003	12:06:45	210.9	3.515	53.28	14.978	2.448
5/9/2003	12:06:58	223.5	3.725	53.28	14.963	2.433
5/9/2003	12:07:11	236.8	3.946667	53.28	14.951	2.421
5/9/2003	12:07:25	250.9	4.181667	53.28	14.94	2.41
5/9/2003	12:07:40	265.8	4.43	53.28	14.927	2.397
5/9/2003	12:07:56	281.6	4.693333	53.28	14.912	2.382
5/9/2003	12:08:13	298.4	4.973333	53.25	14.901	2.371
5/9/2003	12:08:31	316.2	5.27	53.25	14.886	2.356
5/9/2003	12:08:49	335	5.583333	53.25	14.868	2.338
5/9/2003	12:09:09	354.9	5.915	53.25	14.845	2.315

5/9/2003	12:09:30	376	6.266667	53.23	14.827	2.297		
5/9/2003	12:09:53	398.4	6.64	53.23	14.81	2.28	Plotted shaded values.	
5/9/2003	12:10:16	422.1	7.035	53.23	14.791	2.261		
5/9/2003	12:10:42	447.2	7.453333	53.23	14.775	2.245		
5/9/2003	12:11:08	473.8	7.896667	53.21	14.76	2.23	adjusted time	h/ho
5/9/2003	12:11:36	502	8.366667	53.21	14.738	2.208	0.0000	1.0000
5/9/2003	12:12:06	531.9	8.865	53.21	14.717	2.187	0.4983	0.9905
5/9/2003	12:12:38	563.5	9.391667	53.21	14.695	2.165	1.0250	0.9805
5/9/2003	12:13:11	597	9.95	53.21	14.674	2.144	1.5833	0.9710
5/9/2003	12:13:47	632.5	10.54167	53.21	14.657	2.127	2.1750	0.9633
5/9/2003	12:14:24	670.1	11.16833	53.21	14.627	2.097	2.8017	0.9497
5/9/2003	12:15:04	709.9	11.83167	53.21	14.603	2.073	3.4650	0.9389
5/9/2003	12:15:46	752.1	12.535	53.21	14.581	2.051	4.1683	0.9289
5/9/2003	12:16:31	796.8	13.28	53.21	14.555	2.025	4.9133	0.9171
5/9/2003	12:17:19	844.2	14.07	53.19	14.531	2.001	5.7033	0.9063
5/9/2003	12:18:09	894.4	14.90667	53.19	14.503	1.973	6.5400	0.8936
5/9/2003	12:19:02	947.5	15.79167	53.19	14.473	1.943	7.4250	0.8800
5/9/2003	12:19:58	1003.8	16.73	53.19	14.448	1.918	8.3633	0.8687
5/9/2003	12:20:58	1063.4	17.72333	53.19	14.415	1.885	9.3567	0.8537
5/9/2003	12:22:01	1126.6	18.77667	53.16	14.383	1.853	10.4100	0.8392
5/9/2003	12:23:08	1193.5	19.89167	53.16	14.352	1.822	11.5250	0.8252
5/9/2003	12:24:19	1264.4	21.07333	53.16	14.322	1.792	12.7067	0.8116
5/9/2003	12:25:34	1339.5	22.325	53.14	14.288	1.758	13.9583	0.7962
5/9/2003	12:26:53	1419	23.65	53.16	14.26	1.73	15.2833	0.7835
5/9/2003	12:28:18	1503.3	25.055	53.14	14.225	1.695	16.6883	0.7677
5/9/2003	12:29:47	1592.6	26.54333	53.14	14.189	1.659	18.1767	0.7514
5/9/2003	12:31:21	1687.1	28.11833	53.14	14.154	1.624	19.7517	0.7355
5/9/2003	12:33:02	1787.2	29.78667	53.14	14.115	1.585	21.4200	0.7178
5/9/2003	12:34:48	1893.3	31.555	53.14	14.079	1.549	23.1883	0.7015
5/9/2003	12:36:40	2005.7	33.42833	53.14	14.036	1.506	25.0617	0.6821
5/9/2003	12:38:39	2124.7	35.41167	53.12	14.003	1.473	27.0450	0.6671
5/9/2003	12:40:45	2250.8	37.51333	53.12	13.964	1.434	29.1467	0.6495
5/9/2003	12:42:59	2384.4	39.74	53.12	13.921	1.391	31.3733	0.6300
5/9/2003	12:45:20	2525.9	42.09833	53.12	13.882	1.352	33.7317	0.6123
5/9/2003	12:47:50	2675.8	44.59667	53.12	13.842	1.312	36.2300	0.5942
5/9/2003	12:50:29	2834.6	47.24333	53.12	13.799	1.269	38.8767	0.5747
5/9/2003	12:53:17	3002.8	50.04667	53.14	13.758	1.228	41.6800	0.5562
5/9/2003	12:56:15	3180.9	53.015	53.14	13.717	1.187	44.6483	0.5376
5/9/2003	12:59:24	3369.6	56.16	53.14	13.676	1.146	47.7933	0.5190
5/9/2003	13:02:44	3569.5	59.49167	53.14	13.637	1.107	51.1250	0.5014
5/9/2003	13:06:16	3781.2	63.02	53.14	13.592	1.062	54.6533	0.4810
5/9/2003	13:10:00	4005.5	66.75833	53.16	13.549	1.019	58.3917	0.4615
5/9/2003	13:13:57	4243.1	70.71833	53.16	13.508	0.978	62.3517	0.4429
5/9/2003	13:18:09	4494.7	74.91167	53.16	13.466	0.936	66.5450	0.4239
5/9/2003	13:22:36	4761.3	79.355	53.16	13.425	0.895	70.9883	0.4053
5/9/2003	13:27:18	5043.7	84.06167	53.16	13.382	0.852	75.6950	0.3859
5/9/2003	13:32:17	5342.8	89.04667	53.16	13.345	0.815	80.6800	0.3691
5/9/2003	13:37:34	5659.6	94.32667	53.16	13.304	0.774	85.9600	0.3505
5/9/2003	13:43:10	5995.2	99.92	53.16	13.267	0.737	91.5533	0.3338
5/9/2003	13:49:05	6350.7	105.845	53.19	13.227	0.697	97.4783	0.3157
5/9/2003	13:55:22	6727.2	112.12	53.19	13.19	0.66	103.7533	0.2989
5/9/2003	14:02:00	7126.1	118.7683	53.19	13.152	0.622	110.4017	0.2817
5/9/2003	14:09:03	7548.6	125.81	53.25	13.118	0.588	117.4433	0.2663
5/9/2003	14:16:30	7996.1	133.2683	53.21	13.083	0.553	124.9017	0.2505
5/9/2003	14:24:24	8470.1	141.1683	53.21	13.05	0.52	132.8017	0.2355
5/9/2003	14:32:47	8972.2	149.5367	53.23	13.006	0.476	141.1700	0.2156
5/9/2003	14:41:38	9504.1	158.4017	53.23	12.986	0.456	150.0350	0.2065
5/9/2003	14:51:02	10067.5	167.7917	53.23	12.956	0.426	159.4250	0.1929
5/9/2003	15:00:59	10664.3	177.7383	53.23	12.926	0.396	169.3717	0.1793
5/9/2003	15:11:31	11296.5	188.275	53.23	12.902	0.372	179.9083	0.1685
5/9/2003	15:22:40	11966.1	199.435	53.25	12.875	0.345	191.0683	0.1563
5/9/2003	15:34:30	12675.4	211.2567	53.25	12.851	0.321	202.8900	0.1454

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane IN	**Well/Boring No.:**	13MWT26
Project No.:	9060 CTO 0279	**Aquifer Type:**	confined
Test Type:	Rising Head	**Test Date:**	9-May-03

Done By: Fred W. Ramser
Checked By: RMB 6/23/03

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	128.25 = To

Hydraulic Conductivity (K) :

9.15E-06	ft./min.
1.52E-07	ft./sec.
1.32E-02	ft./day
4.65E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

ADJUSTED SLUG TEST DATA ATTACHED

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: CRANE WELL/BORING NO.: 13MW126

PROJECT NO.: 9060 CO 0279 GEOLOGIST: BOB BALLOUET

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 22.24' TEST NO.: 8

STATIC WATER LEVEL (Depth/Elevation): 8.67' DATE: 5/9/03

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

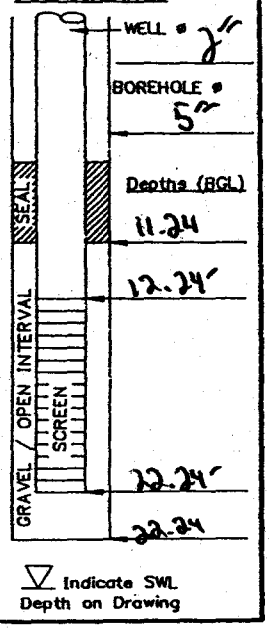
METHOD OF INDUCING WATER LEVEL CHANGE: 1.5" x 56.5" LONG SLUG PAGE ... OF ...

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TRANSDUCER 30 PSI

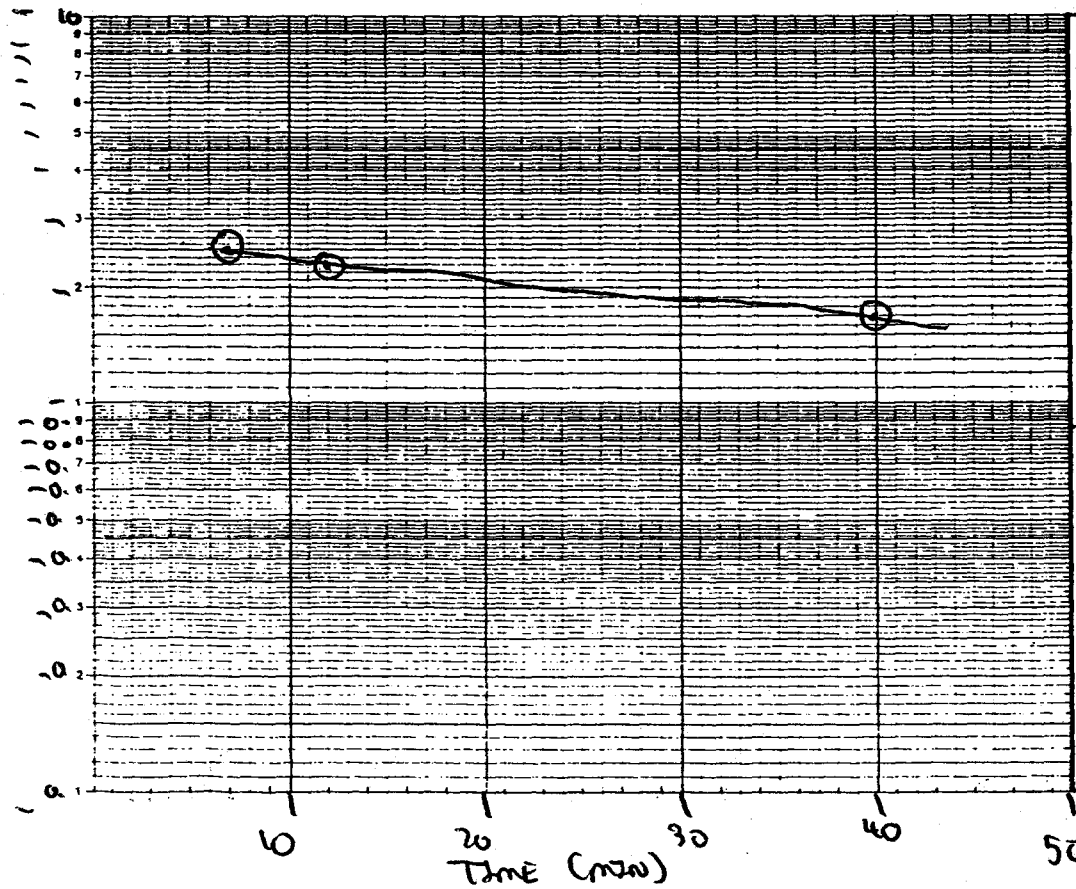
ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	12.863		12.535	10.548	-2.315
0.035	7.068	-5.795	39.74	11.183	-1.68
0.055	9.496	-3.367	53.015	11.38	-1.483
0.065	9.978	-2.885	79.355	11.658	-1.205
0.075	9.75	-3.113	89.046	11.736	-1.127
0.1	9.731	-3.132	99.92	11.813	-1.05
0.21	9.933	-2.924	112.12	11.891	-0.972
0.525	9.976	-2.887	138.82	12.023	-0.84
1.63	10.031	-2.832	146.39	12.057	-0.806
1.39	10.077	-2.786	165.48	12.126	-0.737
2.21	10.109	-2.754	177.213	12.16	-0.703
7.035	10.345	-2.518			

START

WELL SCHEMATIC

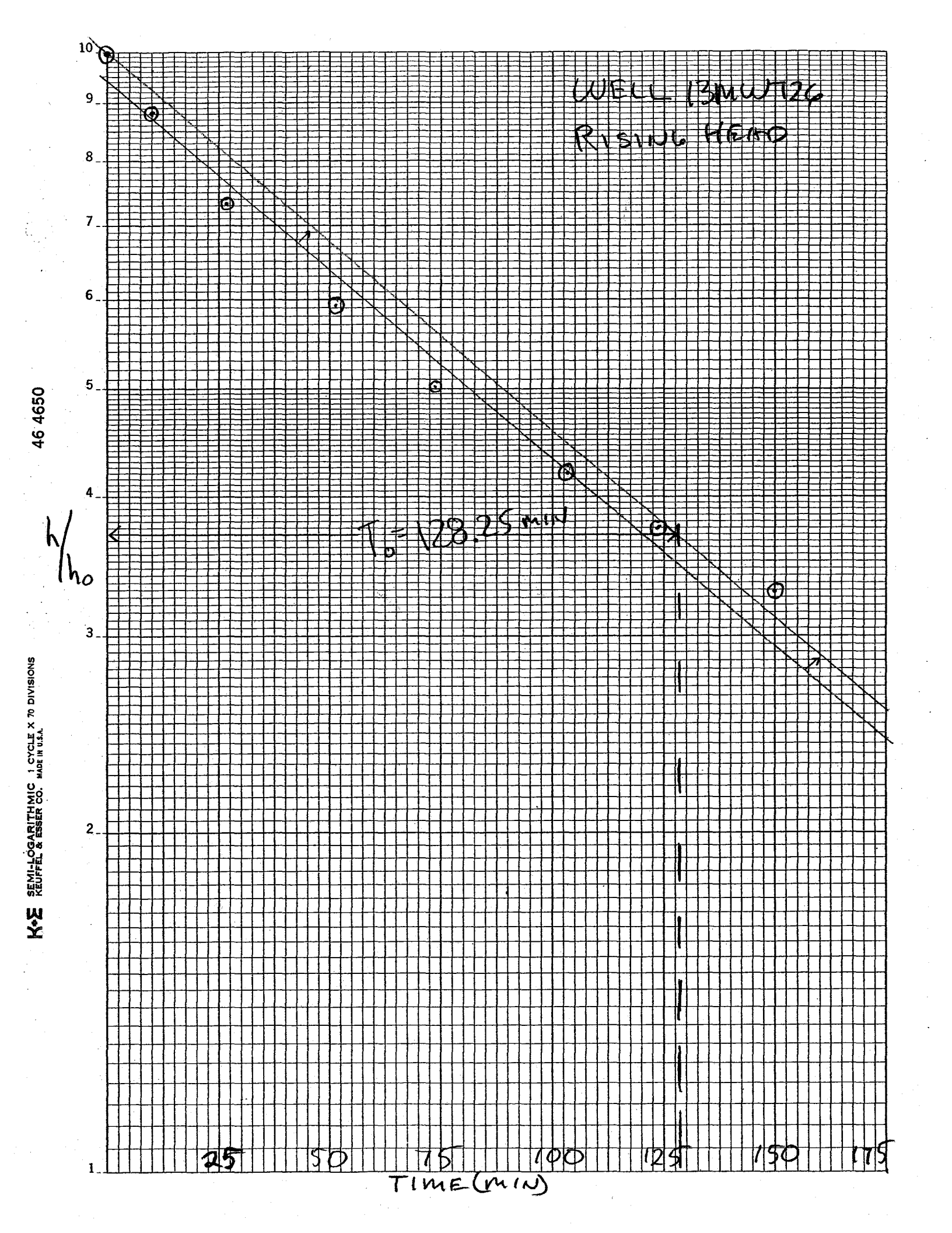


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


WELL 13MW126
RISING HEAD
T_o = 128.25 min
h/ho
10
9
8
7
6
5
4
3
2
1
25
50
75
100
125
150
175
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 5/9/2003 16:50:26
Report from file: ...\SN00824 2003-05-09 153832 13MWT26 Rising.bin
Win-Situ Version 4.41

Serial number: 824
Firmware Version 3.06
Unit name:

Test name: 13MWT26 Rising

Test defined on: 5/9/2003 15:36:43
Test started on: 5/9/2003 15:38:32
Test stopped on: N/A N/A
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betwee Seconds.
Number of data sampl 145

TOTAL DATA SAMPLES 145

Channel number [1]
Measurement type: Temperature
Channel name: Temperature

Channel number [2]
Measurement type: Pressure
Channel name: Depth
Sensor Range: 30 PSIG.
Specific gravity: 1

slug = 2.2 ft of H2O

Date	Time	ET (sec)	ET (min)	Chan[1] Fahrenhei	Chan[2] Feet H2O		Delta S	adjusted time	ho= -2.24 h/ho
5/9/2003	15:38:32	0	0	53.25	12.863		0		
5/9/2003	15:38:33	0.3	0.005	53.3	12.863		0		
5/9/2003	15:38:33	0.6	0.01	53.32	12.863		0		
5/9/2003	15:38:33	0.9	0.015	53.32	12.863		0		
5/9/2003	15:38:34	1.2	0.02	53.32	12.863		0		
5/9/2003	15:38:34	1.5	0.025	53.32	12.865		0.002		
5/9/2003	15:38:34	1.8	0.03	53.32	12.843	Time	-0.02		
5/9/2003	15:38:35	2.1	0.035	53.32	7.068	0	-5.795		
5/9/2003	15:38:35	2.4	0.04	53.32	9.509	0.005	-3.354		
5/9/2003	15:38:35	2.7	0.045	53.32	11.041	0.01	-1.822		
5/9/2003	15:38:35	3	0.05	53.32	10.241	0.015	-2.622		
5/9/2003	15:38:36	3.3	0.055	53.35	9.496	0.02	-3.367		
5/9/2003	15:38:36	3.6	0.06	53.35	9.651	0.025	-3.212		
5/9/2003	15:38:36	3.9	0.065	53.35	9.978	0.03	-2.885		
5/9/2003	15:38:37	4.2	0.07	53.35	9.927	0.035	-2.936		
5/9/2003	15:38:37	4.5	0.075	53.35	9.75	0.04	-3.113		
5/9/2003	15:38:37	4.8	0.08	53.35	9.8	0.045	-3.063		
5/9/2003	15:38:38	5.1	0.085	53.35	9.862	0.05	-3.001		
5/9/2003	15:38:38	5.4	0.09	53.35	9.759	0.055	-3.104		
5/9/2003	15:38:38	5.7	0.095	53.35	9.748	0.06	-3.115		
5/9/2003	15:38:38	6	0.1	53.35	9.731	0.065	-3.132		
5/9/2003	15:38:39	6.4	0.106666667	53.35	9.739	0.071667	-3.124		
5/9/2003	15:38:39	6.7	0.111666667	53.35	9.742	0.076667	-3.121		
5/9/2003	15:38:40	7.1	0.118333333	53.35	9.748	0.083333	-3.115		
5/9/2003	15:38:40	7.5	0.125	53.35	9.756	0.09	-3.107		
5/9/2003	15:38:40	8	0.133333333	53.35	9.761	0.098333	-3.102		
5/9/2003	15:38:41	8.4	0.14	53.35	9.765	0.105	-3.098		

5/9/2003	15:38:41	8.9	0.148333333	53.35	9.767	0.113333	-3.096
5/9/2003	15:38:42	9.5	0.158333333	53.35	9.834	0.123333	-3.029
5/9/2003	15:38:42	10	0.166666667	53.35	9.888	0.131667	-2.975
5/9/2003	15:38:43	10.6	0.176666667	53.32	9.944	0.141667	-2.919
5/9/2003	15:38:44	11.3	0.188333333	53.32	9.928	0.153333	-2.935
5/9/2003	15:38:44	11.9	0.198333333	53.32	9.931	0.163333	-2.932
5/9/2003	15:38:45	12.6	0.21	53.32	9.933	0.175	-2.93
5/9/2003	15:38:46	13.4	0.223333333	53.32	9.939	0.188333	-2.924
5/9/2003	15:38:47	14.2	0.236666667	53.32	9.939	0.201667	-2.924
5/9/2003	15:38:47	15	0.25	53.32	9.941	0.215	-2.922
5/9/2003	15:38:48	15.9	0.265	53.3	9.95	0.23	-2.913
5/9/2003	15:38:49	16.8	0.28	53.3	9.943	0.245	-2.92
5/9/2003	15:38:50	17.8	0.296666667	53.3	9.948	0.261667	-2.915
5/9/2003	15:38:51	18.9	0.315	53.3	9.948	0.28	-2.915
5/9/2003	15:38:52	20	0.333333333	53.3	9.954	0.298333	-2.909
5/9/2003	15:38:54	21.2	0.353333333	53.3	9.958	0.318333	-2.905
5/9/2003	15:38:55	22.4	0.373333333	53.3	9.96	0.338333	-2.903
5/9/2003	15:38:56	23.8	0.396666667	53.3	9.962	0.361667	-2.901
5/9/2003	15:38:58	25.2	0.42	53.3	9.965	0.385	-2.898
5/9/2003	15:38:59	26.7	0.445	53.3	9.967	0.41	-2.896
5/9/2003	15:39:01	28.2	0.47	53.3	9.969	0.435	-2.894
5/9/2003	15:39:02	29.8	0.496666667	53.3	9.973	0.461667	-2.89
5/9/2003	15:39:04	31.5	0.525	53.3	9.976	0.49	-2.887
5/9/2003	15:39:06	33.3	0.555	53.3	9.98	0.52	-2.883
5/9/2003	15:39:08	35.2	0.586666667	53.3	9.98	0.551667	-2.883
5/9/2003	15:39:10	37.3	0.621666667	53.3	9.986	0.586667	-2.877
5/9/2003	15:39:12	39.5	0.658333333	53.3	9.99	0.623333	-2.873
5/9/2003	15:39:14	41.8	0.696666667	53.3	9.991	0.661667	-2.872
5/9/2003	15:39:17	44.3	0.738333333	53.3	9.997	0.703333	-2.866
5/9/2003	15:39:19	46.9	0.781666667	53.3	10.001	0.746667	-2.862
5/9/2003	15:39:22	49.7	0.828333333	53.3	10.006	0.793333	-2.857
5/9/2003	15:39:25	52.6	0.876666667	53.3	10.008	0.841667	-2.855
5/9/2003	15:39:28	55.7	0.928333333	53.3	10.014	0.893333	-2.849
5/9/2003	15:39:31	59	0.983333333	53.28	10.018	0.948333	-2.845
5/9/2003	15:39:35	62.5	1.041666667	53.28	10.022	1.006667	-2.841
5/9/2003	15:39:39	66.2	1.103333333	53.28	10.031	1.068333	-2.832
5/9/2003	15:39:43	70.1	1.168333333	53.28	10.059	1.133333	-2.804
5/9/2003	15:39:47	74.3	1.238333333	53.3	10.072	1.203333	-2.791
5/9/2003	15:39:51	78.7	1.311666667	53.3	10.074	1.276667	-2.789
5/9/2003	15:39:56	83.4	1.39	53.32	10.077	1.355	-2.786
5/9/2003	15:40:01	88.4	1.473333333	53.32	10.077	1.438333	-2.786
5/9/2003	15:40:06	93.7	1.561666667	53.3	10.062	1.526667	-2.801
5/9/2003	15:40:12	99.3	1.655	53.28	10.07	1.62	-2.793
5/9/2003	15:40:18	105.2	1.753333333	53.28	10.076	1.718333	-2.787
5/9/2003	15:40:24	111.5	1.858333333	53.28	10.081	1.823333	-2.782
5/9/2003	15:40:31	118.1	1.968333333	53.28	10.089	1.933333	-2.774
5/9/2003	15:40:38	125.1	2.085	53.28	10.098	2.05	-2.765
5/9/2003	15:40:45	132.6	2.21	53.28	10.109	2.175	-2.754
5/9/2003	15:40:53	140.5	2.341666667	53.28	10.119	2.306667	-2.744
5/9/2003	15:41:01	148.9	2.481666667	53.28	10.126	2.446667	-2.737
5/9/2003	15:41:10	157.8	2.63	53.28	10.135	2.595	-2.728
5/9/2003	15:41:20	167.2	2.786666667	53.3	10.146	2.751667	-2.717
5/9/2003	15:41:30	177.2	2.953333333	53.28	10.154	2.918333	-2.709
5/9/2003	15:41:40	187.8	3.13	53.28	10.165	3.095	-2.698
5/9/2003	15:41:51	199	3.316666667	53.28	10.175	3.281667	-2.688
5/9/2003	15:42:03	210.9	3.515	53.28	10.184	3.48	-2.679
5/9/2003	15:42:16	223.5	3.725	53.28	10.193	3.69	-2.67
5/9/2003	15:42:29	236.8	3.946666667	53.28	10.208	3.911667	-2.655
5/9/2003	15:42:43	250.9	4.181666667	53.28	10.218	4.146667	-2.645
5/9/2003	15:42:58	265.8	4.43	53.28	10.229	4.395	-2.634
5/9/2003	15:43:14	281.6	4.693333333	53.28	10.242	4.658333	-2.621
5/9/2003	15:43:31	298.4	4.973333333	53.28	10.255	4.938333	-2.608
5/9/2003	15:43:49	316.2	5.27	53.28	10.27	5.235	-2.593
5/9/2003	15:44:07	335	5.583333333	53.25	10.283	5.548333	-2.58
5/9/2003	15:44:27	354.9	5.915	53.25	10.296	5.88	-2.567

5/9/2003	15:44:48	376	6.266666667	53.25	10.313	6.231667	-2.55			
5/9/2003	15:45:11	398.4	6.64	53.25	10.33	6.605	-2.533			
5/9/2003	15:45:35	422.1	7.035	53.25	10.345	7	-2.518			
5/9/2003	15:46:00	447.2	7.453333333	53.25	10.364	7.418333	-2.499			
5/9/2003	15:46:26	473.8	7.896666667	53.25	10.382	7.861667	-2.481			
5/9/2003	15:46:54	502	8.366666667	53.25	10.401	8.331667	-2.462			
5/9/2003	15:47:24	531.9	8.865	53.25	10.425	8.83	-2.438			
5/9/2003	15:47:56	563.5	9.391666667	53.25	10.44	9.356667	-2.423			
5/9/2003	15:48:29	597	9.95	53.25	10.459	9.915	-2.404			
5/9/2003	15:49:05	632.5	10.54166667	53.25	10.481	10.50667	-2.382			
5/9/2003	15:49:43	670.1	11.16833333	53.25	10.502	11.13333	-2.361			
5/9/2003	15:50:22	709.9	11.83166667	53.25	10.524	11.79667	-2.339			
5/9/2003	15:51:05	752.1	12.535	53.25	10.548	12.5	-2.315			
5/9/2003	15:51:49	796.8	13.28	53.25	10.573	13.245	-2.29	Plotted shaded values.		
5/9/2003	15:52:37	844.2	14.07	53.25	10.599	14.035	-2.264	adjusted time	h/ho	
5/9/2003	15:53:27	894.4	14.90666667	53.25	10.623	14.87167	-2.24	0.000	1.000	
5/9/2003	15:54:20	947.5	15.79166667	53.25	10.649	15.75667	-2.214	0.885	0.988	
5/9/2003	15:55:16	1003.8	16.73	53.25	10.675	16.695	-2.188	1.823	0.977	
5/9/2003	15:56:16	1063.4	17.72333333	53.25	10.705	17.68833	-2.158	2.817	0.963	
5/9/2003	15:57:19	1126.6	18.77666667	53.25	10.733	18.74167	-2.13	3.870	0.951	
5/9/2003	15:58:26	1193.5	19.89166667	53.25	10.763	19.85667	-2.1	4.985	0.938	
5/9/2003	15:59:37	1264.4	21.07333333	53.25	10.793	21.03833	-2.07	6.167	0.924	
5/9/2003	16:00:52	1339.5	22.325	53.25	10.827	22.29	-2.036	7.418	0.909	
5/9/2003	16:02:11	1419	23.65	53.25	10.858	23.615	-2.005	8.743	0.895	
5/9/2003	16:03:36	1503.3	25.055	53.25	10.892	25.02	-1.971	10.148	0.880	
5/9/2003	16:05:05	1592.6	26.54333333	53.25	10.926	26.50833	-1.937	11.637	0.865	
5/9/2003	16:06:40	1687.1	28.11833333	53.25	10.961	28.08333	-1.902	13.212	0.849	
5/9/2003	16:08:20	1787.2	29.78666667	53.28	10.996	29.75167	-1.867	14.880	0.833	
5/9/2003	16:10:06	1893.3	31.555	53.25	11.032	31.52	-1.831	16.648	0.817	
5/9/2003	16:11:58	2005.7	33.42833333	53.25	11.068	33.39333	-1.795	18.522	0.801	
5/9/2003	16:13:57	2124.7	35.41166667	53.25	11.105	35.37667	-1.758	20.505	0.785	
5/9/2003	16:16:03	2250.8	37.51333333	53.25	11.146	37.47833	-1.717	22.607	0.767	
5/9/2003	16:18:17	2384.4	39.74	53.25	11.183	39.705	-1.68	24.833	0.750	
5/9/2003	16:20:38	2525.9	42.09833333	53.25	11.223	42.06333	-1.64	27.192	0.732	
5/9/2003	16:23:08	2675.8	44.59666667	53.25	11.264	44.56167	-1.599	29.690	0.714	
5/9/2003	16:25:47	2834.6	47.24333333	53.25	11.299	47.20833	-1.564	32.337	0.698	
5/9/2003	16:28:35	3002.8	50.04666667	53.25	11.338	50.01167	-1.525	35.140	0.681	
5/9/2003	16:31:33	3180.9	53.015	53.25	11.38	52.98	-1.483	38.108	0.662	
5/9/2003	16:34:42	3369.6	56.16	53.25	11.419	56.125	-1.444	41.253	0.645	
5/9/2003	16:38:02	3569.5	59.49166667	53.25	11.46	59.45667	-1.403	44.585	0.626	
5/9/2003	16:41:34	3781.2	63.02	53.25	11.499	62.985	-1.364	48.113	0.609	
5/9/2003	16:45:18	4005.5	66.75833333	53.25	11.54	66.72333	-1.323	51.852	0.591	
5/9/2003	16:49:16	4243.1	70.71833333	53.25	11.576	70.68333	-1.287	55.812	0.575	
5/9/2003	16:53:27	4494.7	74.91166667	53.28	11.618	74.87667	-1.245	60.005	0.556	
5/9/2003	16:57:54	4761.3	79.355	53.25	11.658	79.32	-1.205	64.448	0.538	
5/9/2003	17:02:36	5043.7	84.06166667	53.25	11.697	84.02667	-1.166	69.155	0.521	
5/9/2003	17:07:35	5342.8	89.04666667	53.25	11.736	89.01167	-1.127	74.140	0.503	
5/9/2003	17:12:52	5659.6	94.32666667	53.25	11.774	94.29167	-1.089	79.420	0.486	
5/9/2003	17:18:28	5995.2	99.92	53.23	11.813	99.885	-1.05	85.013	0.469	
5/9/2003	17:24:23	6350.7	105.845	53.25	11.848	105.81	-1.015	90.938	0.453	
5/9/2003	17:30:40	6727.2	112.12	53.25	11.891	112.085	-0.972	97.213	0.434	
5/9/2003	17:37:19	7126.1	118.7683333	53.23	11.918	118.7333	-0.945	103.862	0.422	
5/9/2003	17:43:48	7548.6	125.81	53.25	11.953	125.775	-0.91	110.903	0.406	
5/9/2003	17:50:19	7939.7	132.3283333	53.23	11.988	132.2933	-0.875	117.422	0.391	
5/9/2003	17:56:49	8329.2	138.82	53.25	12.023	138.785	-0.84	123.913	0.375	
5/9/2003	18:03:23	8783.4	146.39	53.23	12.057	146.355	-0.806	131.483	0.360	
5/9/2003	18:12:28	9328.8	155.48	53.25	12.092	155.445	-0.771	140.573	0.344	
5/9/2003	18:22:40	9940.8	165.68	53.23	12.126	165.645	-0.737	150.773	0.329	
5/9/2003	18:34:12	10632.8	177.2133333	53.25	12.16	177.1783	-0.703	162.307	0.314	

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT30
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	13 = L
Time for 37% head change (min.) :	19.20 = To

Hydraulic Conductivity (K) :

6.06E-05	ft./min.
1.01E-06	ft./sec.
8.73E-02	ft./day
3.08E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT30

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 11.91 TOC DATE: 11-24-03

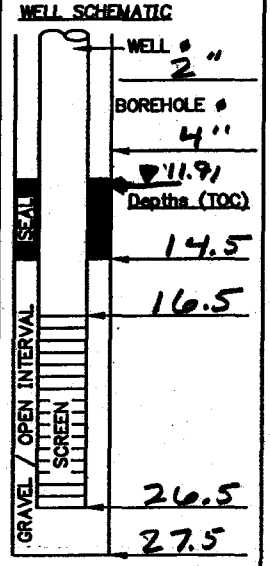
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

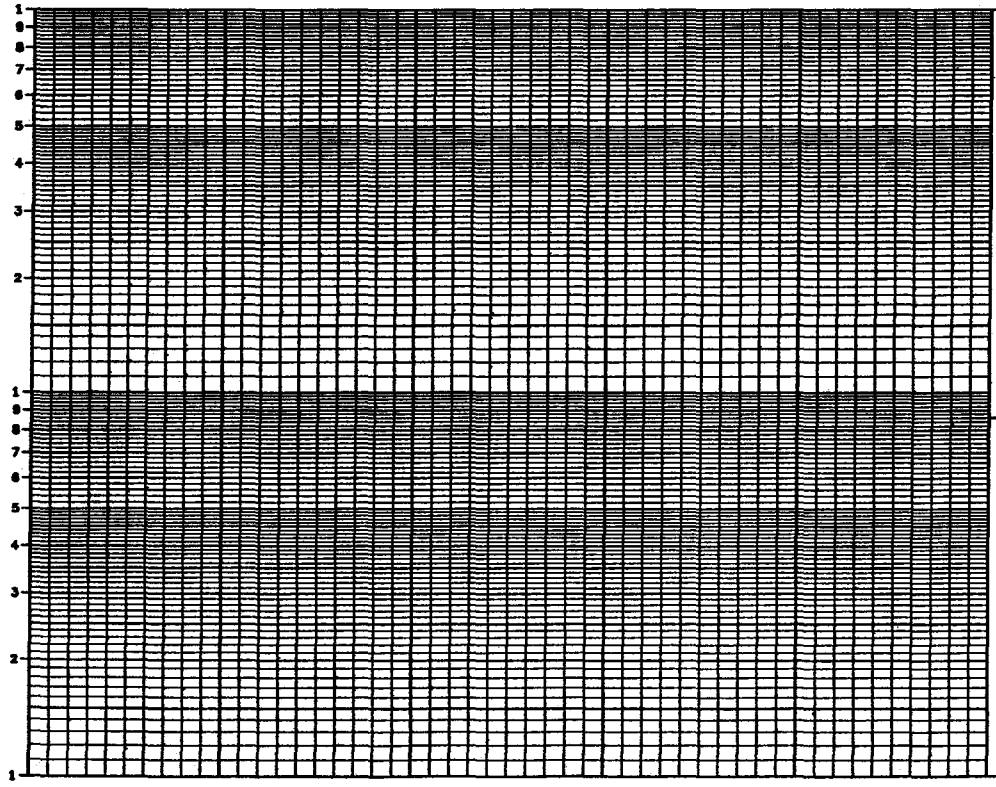
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3.0	1.631	
.1	2.726		4.0	1.522	
.2	2.480		5.0	1.435	
.3	2.410		8.0	1.211	
.4	2.348		10.0	1.106	
.5	2.291		15.0	.888	
.6	2.240		20.0	.719	
.7	2.186		25.0	.577	
.8	2.144		30.0	.461	
.9	2.104		35.0	.369	
1.0	2.062		40.0	.297	
2.0	1.773		45.0	.234	

WELL SCHEMATIC



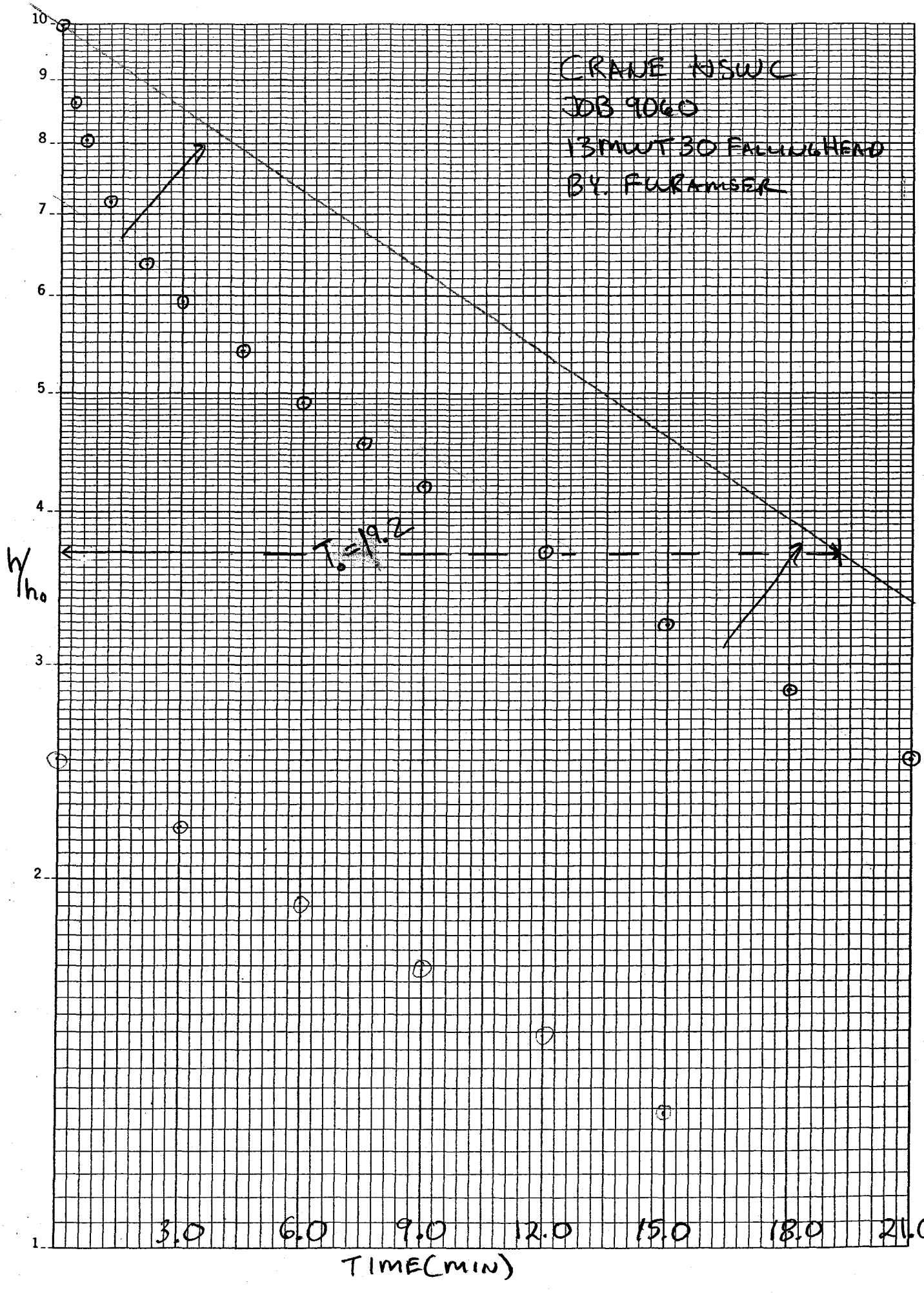
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL



46 4650

K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 9:54:57
Report from file: C:\Win-Situ\Data\SN00916 2003-11-24 105718 13MWT30falling#1.bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name: 13MWT30falling#1

Test defined on: 11/24/2003 10:54:07
Test started on: 11/24/2003 10:57:18
Test stopped on: 11/24/2003 11:43:48
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 465

TOTAL DATA SAMPLES 465

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 14.787 Feet H2O

• = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.726
11/24/2003	10:57	0	0			
11/24/2003	10:57	0.1	2.726	0	1.000	•
11/24/2003	10:57	0.2	2.48	0.1	0.910	
11/24/2003	10:57	0.3	2.41	0.2	0.884	
11/24/2003	10:57	0.4	2.348	0.3	0.861	•
11/24/2003	10:57	0.5	2.291	0.4	0.840	
11/24/2003	10:57	0.6	2.24	0.5	0.822	
11/24/2003	10:58	0.7	2.186	0.6	0.802	•
11/24/2003	10:58	0.8	2.144	0.7	0.787	
11/24/2003	10:58	0.9	2.104	0.8	0.772	
11/24/2003	10:58	1	2.062	0.9	0.756	
11/24/2003	10:58	1.1	2.022	1	0.742	
11/24/2003	10:58	1.2	1.988	1.1	0.729	
11/24/2003	10:58	1.3	1.955	1.2	0.717	•
11/24/2003	10:58	1.4	1.924	1.3	0.706	
11/24/2003	10:58	1.5	1.895	1.4	0.695	
11/24/2003	10:58	1.6	1.87	1.5	0.686	
11/24/2003	10:59	1.7	1.846	1.6	0.677	
11/24/2003	10:59	1.8	1.822	1.7	0.668	
11/24/2003	10:59	1.9	1.797	1.8	0.659	
11/24/2003	10:59	2	1.773	1.9	0.650	

11/24/2003 10:59	2.1	1.755	2	0.644
11/24/2003 10:59	2.2	1.739	2.1	0.638
11/24/2003 10:59	2.3	1.719	2.2	0.631
11/24/2003 10:59	2.4	1.708	2.3	0.627
11/24/2003 10:59	2.5	1.691	2.4	0.620
11/24/2003 10:59	2.6	1.677	2.5	0.615
11/24/2003 11:00	2.7	1.666	2.6	0.611
11/24/2003 11:00	2.8	1.653	2.7	0.606
11/24/2003 11:00	2.9	1.642	2.8	0.602
11/24/2003 11:00	3	1.631	2.9	0.598
11/24/2003 11:00	3.1	1.617	3	0.593
11/24/2003 11:00	3.2	1.606	3.1	0.589
11/24/2003 11:00	3.3	1.593	3.2	0.584
11/24/2003 11:00	3.4	1.582	3.3	0.580
11/24/2003 11:00	3.5	1.573	3.4	0.577
11/24/2003 11:00	3.6	1.562	3.5	0.573
11/24/2003 11:01	3.7	1.553	3.6	0.570
11/24/2003 11:01	3.8	1.542	3.7	0.566
11/24/2003 11:01	3.9	1.533	3.8	0.562
11/24/2003 11:01	4	1.522	3.9	0.558
11/24/2003 11:01	4.1	1.515	4	0.556
11/24/2003 11:01	4.2	1.506	4.1	0.552
11/24/2003 11:01	4.3	1.495	4.2	0.548
11/24/2003 11:01	4.4	1.486	4.3	0.545
11/24/2003 11:01	4.5	1.477	4.4	0.542
11/24/2003 11:01	4.6	1.471	4.5	0.540
11/24/2003 11:02	4.7	1.459	4.6	0.535
11/24/2003 11:02	4.8	1.448	4.7	0.531
11/24/2003 11:02	4.9	1.444	4.8	0.530
11/24/2003 11:02	5	1.435	4.9	0.526
11/24/2003 11:02	5.1	1.426	5	0.523
11/24/2003 11:02	5.2	1.417	5.1	0.520
11/24/2003 11:02	5.3	1.404	5.2	0.515
11/24/2003 11:02	5.4	1.399	5.3	0.513
11/24/2003 11:02	5.5	1.393	5.4	0.511
11/24/2003 11:02	5.6	1.382	5.5	0.507
11/24/2003 11:03	5.7	1.375	5.6	0.504
11/24/2003 11:03	5.8	1.366	5.7	0.501
11/24/2003 11:03	5.9	1.355	5.8	0.497
11/24/2003 11:03	6	1.348	5.9	0.494
11/24/2003 11:03	6.1	1.342	6	0.492
11/24/2003 11:03	6.2	1.333	6.1	0.489
11/24/2003 11:03	6.3	1.326	6.2	0.486
11/24/2003 11:03	6.4	1.319	6.3	0.484
11/24/2003 11:03	6.5	1.313	6.4	0.482
11/24/2003 11:03	6.6	1.306	6.5	0.479
11/24/2003 11:04	6.7	1.297	6.6	0.476
11/24/2003 11:04	6.8	1.293	6.7	0.474
11/24/2003 11:04	6.9	1.286	6.8	0.472
11/24/2003 11:04	7	1.277	6.9	0.468
11/24/2003 11:04	7.1	1.271	7	0.466
11/24/2003 11:04	7.2	1.264	7.1	0.464
11/24/2003 11:04	7.3	1.257	7.2	0.461
11/24/2003 11:04	7.4	1.253	7.3	0.460
11/24/2003 11:04	7.5	1.244	7.4	0.456
11/24/2003 11:04	7.6	1.239	7.5	0.455
11/24/2003 11:05	7.7	1.233	7.6	0.452
11/24/2003 11:05	7.8	1.224	7.7	0.449
11/24/2003 11:05	7.9	1.217	7.8	0.446
11/24/2003 11:05	8	1.211	7.9	0.444

11/24/2003 11:05	8.1	1.206	8	0.442
11/24/2003 11:05	8.2	1.202	8.1	0.441
11/24/2003 11:05	8.3	1.195	8.2	0.438
11/24/2003 11:05	8.4	1.184	8.3	0.434
11/24/2003 11:05	8.5	1.173	8.4	0.430
11/24/2003 11:05	8.6	1.175	8.5	0.431
11/24/2003 11:06	8.7	1.173	8.6	0.430
11/24/2003 11:06	8.8	1.168	8.7	0.428
11/24/2003 11:06	8.9	1.162	8.8	0.426
11/24/2003 11:06	9	1.157	8.9	0.424
11/24/2003 11:06	9.1	1.151	9	0.422
11/24/2003 11:06	9.2	1.146	9.1	0.420
11/24/2003 11:06	9.3	1.142	9.2	0.419
11/24/2003 11:06	9.4	1.135	9.3	0.416
11/24/2003 11:06	9.5	1.131	9.4	0.415
11/24/2003 11:06	9.6	1.126	9.5	0.413
11/24/2003 11:07	9.7	1.122	9.6	0.412
11/24/2003 11:07	9.8	1.115	9.7	0.409
11/24/2003 11:07	9.9	1.11	9.8	0.407
11/24/2003 11:07	10	1.106	9.9	0.406
11/24/2003 11:07	10.1	1.1	10	0.404
11/24/2003 11:08	11.1	1.055	11	0.387
11/24/2003 11:09	12.1	1.011	12	0.371
11/24/2003 11:10	13.1	0.966	13	0.354
11/24/2003 11:11	14.1	0.919	14	0.337
11/24/2003 11:12	15.1	0.881	15	0.323
11/24/2003 11:13	16.1	0.846	16	0.310
11/24/2003 11:14	17.1	0.808	17	0.296
11/24/2003 11:15	18.1	0.777	18	0.285
11/24/2003 11:16	19.1	0.746	19	0.274
11/24/2003 11:17	20.1	0.712	20	0.261
11/24/2003 11:18	21.1	0.681	21	0.250
11/24/2003 11:19	22.1	0.655	22	0.240
11/24/2003 11:20	23.1	0.626	23	0.230
11/24/2003 11:21	24.1	0.601	24	0.220
11/24/2003 11:22	25.1	0.575	25	0.211
11/24/2003 11:23	26.1	0.546	26	0.200
11/24/2003 11:24	27.1	0.521	27	0.191
11/24/2003 11:25	28.1	0.499	28	0.183
11/24/2003 11:26	29.1	0.481	29	0.176
11/24/2003 11:27	30.1	0.459	30	0.168
11/24/2003 11:28	31.1	0.439	31	0.161
11/24/2003 11:29	32.1	0.423	32	0.155
11/24/2003 11:30	33.1	0.406	33	0.149
11/24/2003 11:31	34.1	0.382	34	0.140
11/24/2003 11:32	35.1	0.369	35	0.135
11/24/2003 11:33	36.1	0.352	36	0.129
11/24/2003 11:34	37.1	0.338	37	0.124
11/24/2003 11:35	38.1	0.325	38	0.119
11/24/2003 11:36	39.1	0.312	39	0.114
11/24/2003 11:37	40.1	0.299	40	0.110
11/24/2003 11:38	41.1	0.285	41	0.105
11/24/2003 11:39	42.1	0.27	42	0.099
11/24/2003 11:40	43.1	0.254	43	0.093
11/24/2003 11:41	44.1	0.245	44	0.090
11/24/2003 11:42	45.1	0.234	45	0.086
11/24/2003 11:43	46.1	0.221	46	0.081

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT30
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166'	2 = R
Length of Well Screen (ft.) :		13 = L
Time for 37% head change (min.) :		19.20 = To

Hydraulic Conductivity (K) :

6.06E-05	ft./min.
1.01E-06	ft./sec.
8.73E-02	ft./day
3.08E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(13/.166)}{2 \times 13 \times 19.20} =$$

6.02 X 10-5 Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT30
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	13 = L
Time for 37% head change (min.) :	27.60 = To

Hydraulic Conductivity (K) :

4.22E-05	ft./min.
7.03E-07	ft./sec.
6.07E-02	ft./day
2.14E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT30

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 11.91 TOC DATE: 11-24-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

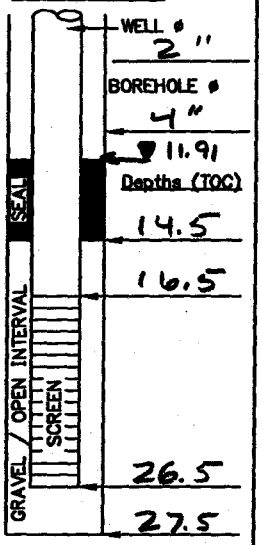
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

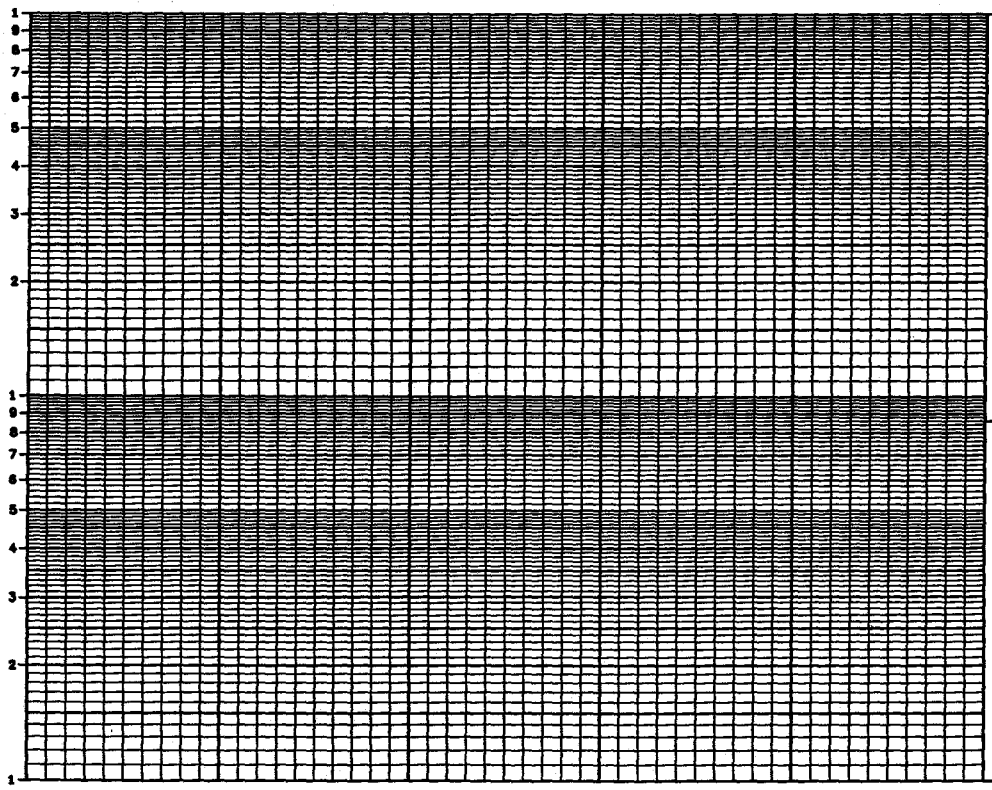
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3.0	-1.670	
.1	-2.633		4.0	-1.594	
.2	-2.509		5.0	-1.532	
.3	-2.418		8.0	-1.369	
.4	-2.345		10.0	-1.278	
.5	-2.282		20	-.980	
.6	-2.227		30	-.800	
.7	-2.171		40	-.672	
.8	-2.127		50	-.581	
.9	-2.082		60	-.521	
1.0	-2.049		70	-.470	
2.0	-1.799		72	-.464	

WELL SCHEMATIC

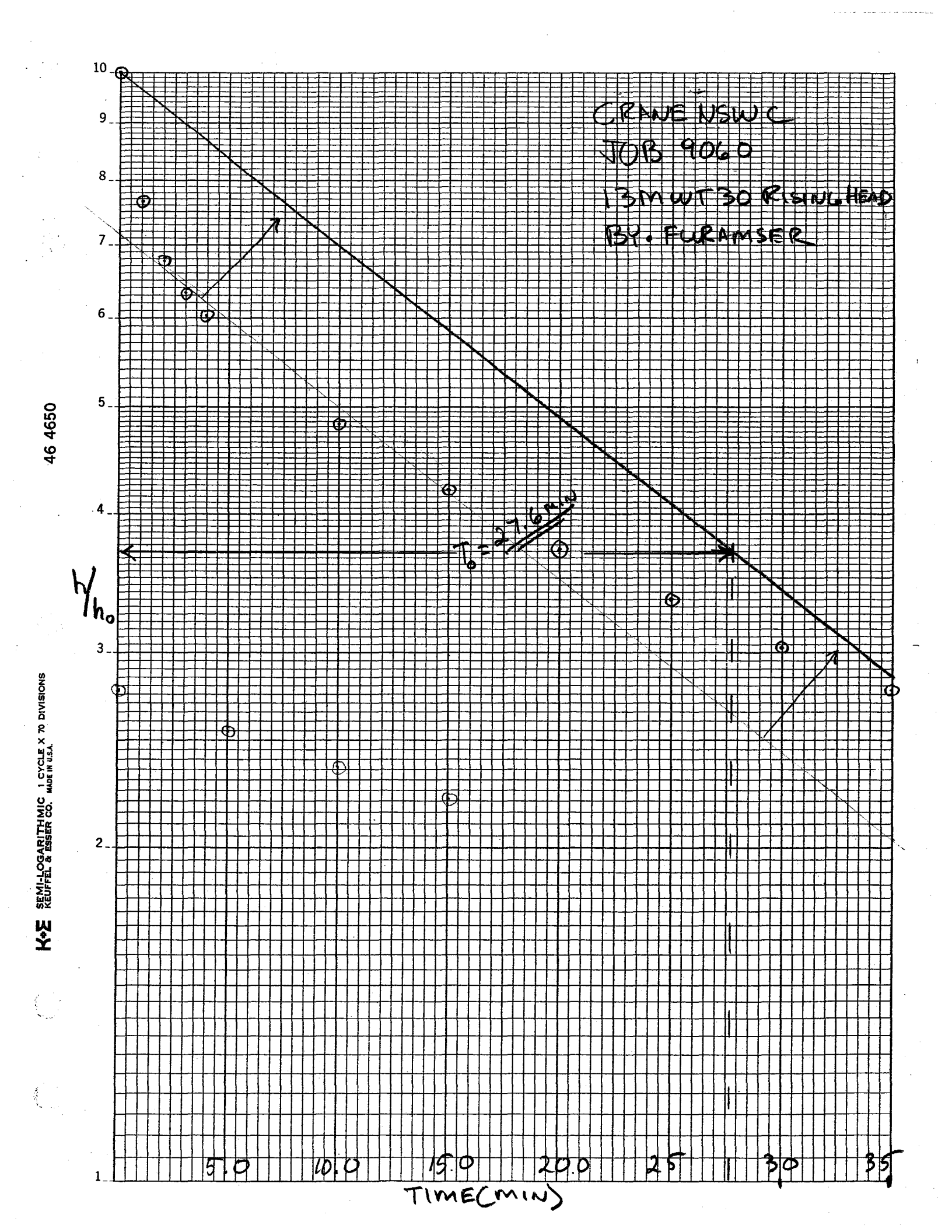


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB 9060
13MWT30 R.SINK HEAD
BY: FURAMSER
T_o = 27.6 min
h/h₀
TIME(MIN)
10
9
8
7
6
5
4
3
2
1
5.0
10.0
15.0
20.0
25
30
35
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 9:57:27
Report from file: C:\Win-Situ\Data\SN00916 2003-11-24 114516 13MWT30rising#1.bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name: 13MWT30rising#1

Test defined on: 11/24/2003 11:44:46
Test started on: 11/24/2003 11:45:16
Test stopped on: 11/24/2003 12:57:17
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: 0.10 Minutes.
Number of data samples: 721

TOTAL DATA SAMPLES 721

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 14.991 Feet H2O

● = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -2.633
11/24/2003	11:45	0	0			
11/24/2003	11:45	0.1	-2.633	0	1.000	●
11/24/2003	11:45	0.2	-2.509	0.1	0.953	
11/24/2003	11:45	0.3	-2.418	0.2	0.918	
11/24/2003	11:45	0.4	-2.345	0.3	0.891	
11/24/2003	11:45	0.5	-2.282	0.4	0.867	
11/24/2003	11:45	0.6	-2.227	0.5	0.846	
11/24/2003	11:45	0.7	-2.171	0.6	0.825	
11/24/2003	11:46	0.8	-2.127	0.7	0.808	
11/24/2003	11:46	0.9	-2.082	0.8	0.791	
11/24/2003	11:46	1	-2.049	0.9	0.778	
11/24/2003	11:46	1.1	-2.009	1	0.763	●
11/24/2003	11:46	1.2	-1.973	1.1	0.749	
11/24/2003	11:46	1.3	-1.945	1.2	0.739	
11/24/2003	11:46	1.4	-1.918	1.3	0.728	
11/24/2003	11:46	1.5	-1.813	1.4	0.689	
11/24/2003	11:46	1.6	-1.805	1.5	0.686	
11/24/2003	11:46	1.7	-1.803	1.6	0.685	
11/24/2003	11:47	1.8	-1.801	1.7	0.684	
11/24/2003	11:47	1.9	-1.801	1.8	0.684	
11/24/2003	11:47	2	-1.799	1.9	0.683	
11/24/2003	11:47	2.1	-1.787	2	0.679	●
11/24/2003	11:47	2.2	-1.769	2.1	0.672	
11/24/2003	11:47	2.3	-1.754	2.2	0.666	
11/24/2003	11:47	2.4	-1.743	2.3	0.662	
11/24/2003	11:47	2.5	-1.73	2.4	0.657	
11/24/2003	11:47	2.6	-1.721	2.5	0.654	
11/24/2003	11:47	2.7	-1.705	2.6	0.648	
11/24/2003	11:48	2.8	-1.694	2.7	0.643	

11/24/2003 11:48	2.9	-1.681	2.8	0.638
11/24/2003 11:48	3	-1.67	2.9	0.634
11/24/2003 11:48	3.1	-1.663	3	0.632
11/24/2003 11:48	3.2	-1.652	3.1	0.627
11/24/2003 11:48	3.3	-1.647	3.2	0.626
11/24/2003 11:48	3.4	-1.638	3.3	0.622
11/24/2003 11:48	3.5	-1.627	3.4	0.618
11/24/2003 11:48	3.6	-1.621	3.5	0.616
11/24/2003 11:48	3.7	-1.614	3.6	0.613
11/24/2003 11:49	3.8	-1.607	3.7	0.610
11/24/2003 11:49	3.9	-1.6	3.8	0.608
11/24/2003 11:49	4	-1.594	3.9	0.605
11/24/2003 11:49	4.1	-1.589	4	0.603
11/24/2003 11:49	4.2	-1.583	4.1	0.601
11/24/2003 11:49	4.3	-1.576	4.2	0.599
11/24/2003 11:49	4.4	-1.569	4.3	0.596
11/24/2003 11:49	4.5	-1.563	4.4	0.594
11/24/2003 11:49	4.6	-1.558	4.5	0.592
11/24/2003 11:49	4.7	-1.549	4.6	0.588
11/24/2003 11:50	4.8	-1.545	4.7	0.587
11/24/2003 11:50	4.9	-1.536	4.8	0.583
11/24/2003 11:50	5	-1.532	4.9	0.582
11/24/2003 11:50	5.1	-1.525	5	0.579
11/24/2003 11:50	5.2	-1.52	5.1	0.577
11/24/2003 11:50	5.3	-1.514	5.2	0.575
11/24/2003 11:50	5.4	-1.507	5.3	0.572
11/24/2003 11:50	5.5	-1.498	5.4	0.569
11/24/2003 11:50	5.6	-1.494	5.5	0.567
11/24/2003 11:50	5.7	-1.489	5.6	0.566
11/24/2003 11:51	5.8	-1.483	5.7	0.563
11/24/2003 11:51	5.9	-1.476	5.8	0.561
11/24/2003 11:51	6	-1.473	5.9	0.559
11/24/2003 11:51	6.1	-1.467	6	0.557
11/24/2003 11:51	6.2	-1.462	6.1	0.555
11/24/2003 11:51	6.3	-1.458	6.2	0.554
11/24/2003 11:51	6.4	-1.452	6.3	0.551
11/24/2003 11:51	6.5	-1.447	6.4	0.550
11/24/2003 11:51	6.6	-1.44	6.5	0.547
11/24/2003 11:51	6.7	-1.433	6.6	0.544
11/24/2003 11:52	6.8	-1.431	6.7	0.543
11/24/2003 11:52	6.9	-1.425	6.8	0.541
11/24/2003 11:52	7	-1.42	6.9	0.539
11/24/2003 11:52	7.1	-1.416	7	0.538
11/24/2003 11:52	7.2	-1.409	7.1	0.535
11/24/2003 11:52	7.3	-1.405	7.2	0.534
11/24/2003 11:52	7.4	-1.398	7.3	0.531
11/24/2003 11:52	7.5	-1.393	7.4	0.529
11/24/2003 11:52	7.6	-1.387	7.5	0.527
11/24/2003 11:52	7.7	-1.385	7.6	0.526
11/24/2003 11:53	7.8	-1.38	7.7	0.524
11/24/2003 11:53	7.9	-1.373	7.8	0.521
11/24/2003 11:53	8	-1.369	7.9	0.520
11/24/2003 11:53	8.1	-1.365	8	0.518
11/24/2003 11:53	8.2	-1.358	8.1	0.516
11/24/2003 11:53	8.3	-1.351	8.2	0.513
11/24/2003 11:53	8.4	-1.347	8.3	0.512
11/24/2003 11:53	8.5	-1.342	8.4	0.510
11/24/2003 11:53	8.6	-1.34	8.5	0.509
11/24/2003 11:53	8.7	-1.336	8.6	0.507
11/24/2003 11:54	8.8	-1.329	8.7	0.505
11/24/2003 11:54	8.9	-1.327	8.8	0.504
11/24/2003 11:54	9	-1.322	8.9	0.502
11/24/2003 11:54	9.1	-1.316	9	0.500
11/24/2003 11:54	9.2	-1.311	9.1	0.498
11/24/2003 11:54	9.3	-1.309	9.2	0.497
11/24/2003 11:54	9.4	-1.302	9.3	0.494
11/24/2003 11:54	9.5	-1.3	9.4	0.494
11/24/2003 11:54	9.6	-1.296	9.5	0.492

11/24/2003 11:54	9.7	-1.293	9.6	0.491
11/24/2003 11:55	9.8	-1.289	9.7	0.490
11/24/2003 11:55	9.9	-1.282	9.8	0.487
11/24/2003 11:55	10	-1.278	9.9	0.485
11/24/2003 11:55	10.1	-1.273	10	0.483
11/24/2003 11:56	11.1	-1.238	11	0.470
11/24/2003 11:57	12.1	-1.202	12	0.457
11/24/2003 11:58	13.1	-1.171	13	0.445
11/24/2003 11:59	14.1	-1.14	14	0.433
11/24/2003 12:00	15.1	-1.109	15	0.421
11/24/2003 12:01	16.1	-1.082	16	0.411
11/24/2003 12:02	17.1	-1.054	17	0.400
11/24/2003 12:03	18.1	-1.031	18	0.392
11/24/2003 12:04	19.1	-1	19	0.380
11/24/2003 12:05	20.1	-0.978	20	0.371
11/24/2003 12:06	21.1	-0.96	21	0.365
11/24/2003 12:07	22.1	-0.938	22	0.356
11/24/2003 12:08	23.1	-0.916	23	0.348
11/24/2003 12:09	24.1	-0.898	24	0.341
11/24/2003 12:10	25.1	-0.883	25	0.335
11/24/2003 12:11	26.1	-0.863	26	0.328
11/24/2003 12:12	27.1	-0.847	27	0.322
11/24/2003 12:13	28.1	-0.832	28	0.316
11/24/2003 12:14	29.1	-0.812	29	0.308
11/24/2003 12:15	30.1	-0.798	30	0.303
11/24/2003 12:16	31.1	-0.783	31	0.297
11/24/2003 12:17	32.1	-0.767	32	0.291
11/24/2003 12:18	33.1	-0.754	33	0.286
11/24/2003 12:19	34.1	-0.743	34	0.282
11/24/2003 12:20	35.1	-0.727	35	0.276
11/24/2003 12:21	36.1	-0.714	36	0.271
11/24/2003 12:22	37.1	-0.705	37	0.268
11/24/2003 12:23	38.1	-0.692	38	0.263
11/24/2003 12:24	39.1	-0.683	39	0.259
11/24/2003 12:25	40.1	-0.672	40	0.255
11/24/2003 12:26	41.1	-0.661	41	0.251
11/24/2003 12:27	42.1	-0.652	42	0.248
11/24/2003 12:28	43.1	-0.641	43	0.243
11/24/2003 12:29	44.1	-0.629	44	0.239
11/24/2003 12:30	45.1	-0.621	45	0.236
11/24/2003 12:31	46.1	-0.612	46	0.232
11/24/2003 12:32	47.1	-0.605	47	0.230
11/24/2003 12:33	48.1	-0.596	48	0.226
11/24/2003 12:34	49.1	-0.589	49	0.224
11/24/2003 12:35	50.1	-0.581	50	0.221
11/24/2003 12:36	51.1	-0.574	51	0.218
11/24/2003 12:37	52.1	-0.565	52	0.215
11/24/2003 12:38	53.1	-0.561	53	0.213
11/24/2003 12:39	54.1	-0.552	54	0.210
11/24/2003 12:40	55.1	-0.545	55	0.207
11/24/2003 12:41	56.1	-0.538	56	0.204
11/24/2003 12:42	57.1	-0.531	57	0.202
11/24/2003 12:43	58.1	-0.529	58	0.201
11/24/2003 12:44	59.1	-0.522	59	0.198
11/24/2003 12:45	60.1	-0.518	60	0.197
11/24/2003 12:46	61.1	-0.509	61	0.193
11/24/2003 12:47	62.1	-0.507	62	0.193
11/24/2003 12:48	63.1	-0.501	63	0.190
11/24/2003 12:49	64.1	-0.496	64	0.188
11/24/2003 12:50	65.1	-0.489	65	0.186
11/24/2003 12:51	66.1	-0.485	66	0.184
11/24/2003 12:52	67.1	-0.482	67	0.183
11/24/2003 12:53	68.1	-0.478	68	0.182
11/24/2003 12:54	69.1	-0.476	69	0.181
11/24/2003 12:55	70.1	-0.472	70	0.179
11/24/2003 12:56	71.1	-0.471	71	0.179

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT30
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166'	2 = R
Length of Well Screen (ft.) :		13 = L
Time for 37% head change (min.) :		27.60 = To

Hydraulic Conductivity (K) :

4.22E-05	ft./min.
7.03E-07	ft./sec.
6.07E-02	ft./day
2.14E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083 \times LN(13/.166)}{2 \times 13 \times 27.60} =$$

4.19×10^{-5} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT32
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12.62 = L
Time for 37% head change (min.) :	5.37 = To

Hydraulic Conductivity (K) :

2.10E-04	ft./min.
3.50E-06	ft./sec.
3.03E-01	ft./day
1.07E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT32

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 9.88 TOC DATE: 11-24-03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

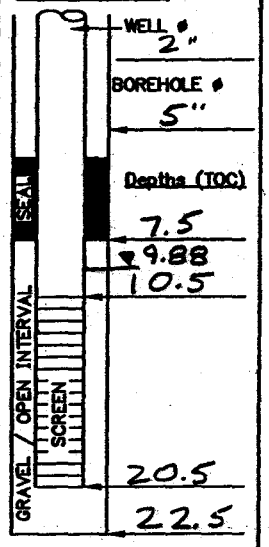
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

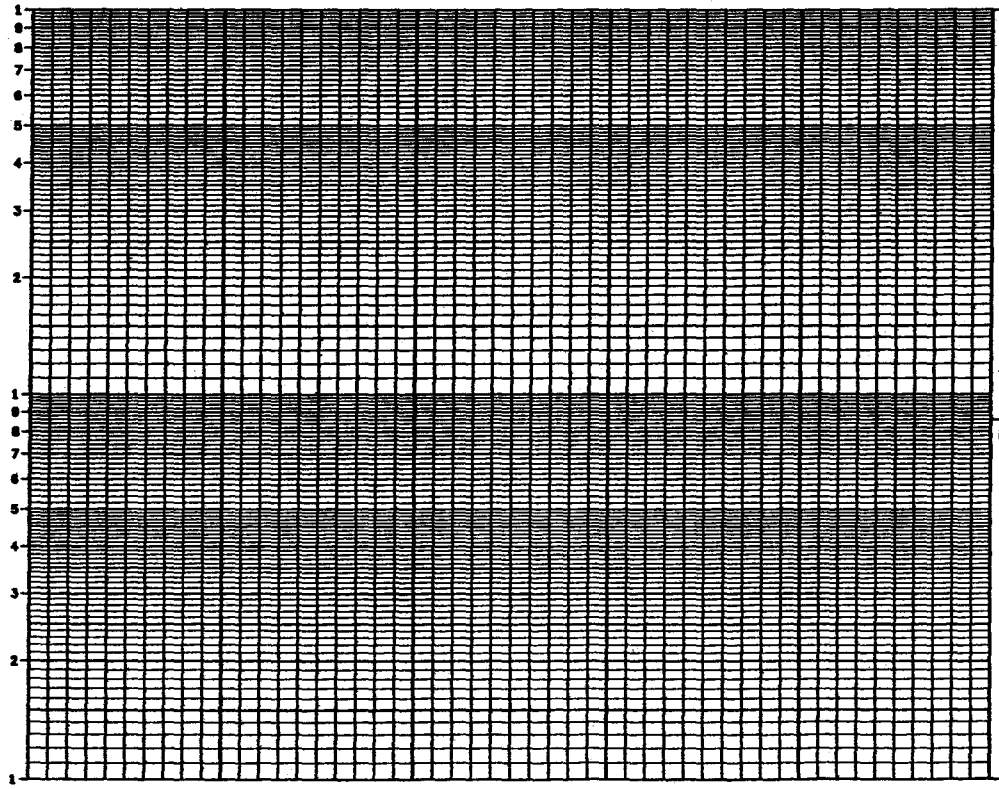
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	1.390	
.1	5.271		4	1.152	
.2	2.422		6	.797	
.3	2.364		7	.664	
.4	2.307		8	.551	
.5	2.249		10	.381	
.6	2.211		12	.269	
.7	2.162		13	.222	
.8	2.120		15	.158	
.9	2.077		18	.094	
1.0	2.039				
2.0	1.678				

WELL SCHEMATIC

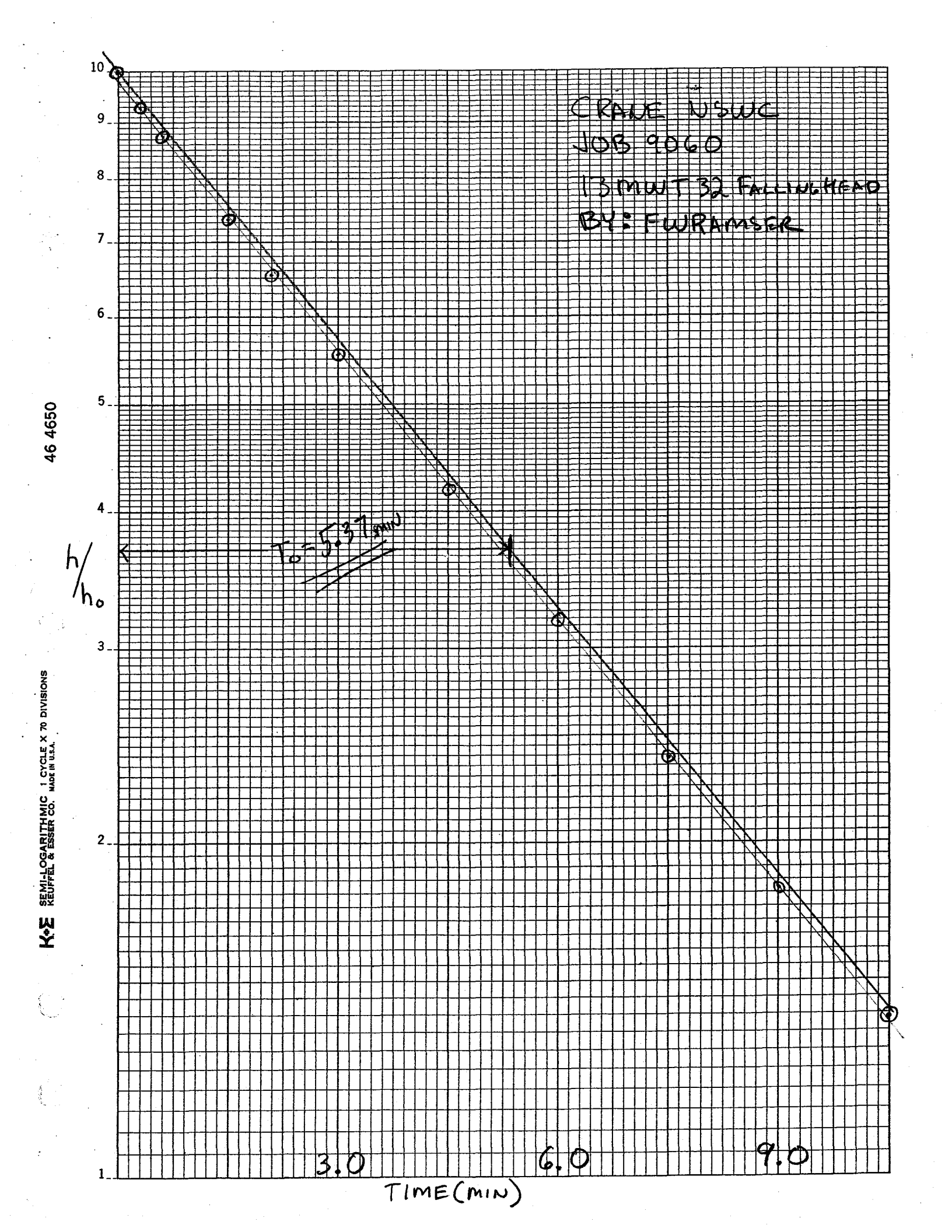


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB 9060
13MWT32 FALLING HEAD
BY: FWRAMSER
$T_0 = 5.37$ min
h/h₀
TIME (MIN)
3.0
6.0
9.0
10
9
8
7
6
5
4
3
2
1
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 12:17:38
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-24 134546
DataMgr Version 3.68 13MWT32falling#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT32falling#1

Test defined on: 11/24/2003 13:43:21
Test started on: 11/24/2003 13:45:46
Test stopped on: 11/24/2003 14:04:40
Test extracted on: N/A

Data gathered using Linear testing
Time between da Minutes.
Number of data s 189

TOTAL DATA SAM 189

Channel number [2]
Measurement typ Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined refe 0 Feet H2O
Referenced on: test start
Pressure head at 10.808 Feet H2O

• = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.422
11/24/2003	13:45	0	0			
11/24/2003	13:45	0.1	5.271			
11/24/2003	13:45	0.2	2.422	0	1.000	•
11/24/2003	13:46	0.3	2.364	0.1	0.976	
11/24/2003	13:46	0.4	2.307	0.2	0.953	
11/24/2003	13:46	0.5	2.249	0.3	0.929	•
11/24/2003	13:46	0.6	2.211	0.4	0.913	
11/24/2003	13:46	0.7	2.162	0.5	0.893	
11/24/2003	13:46	0.8	2.12	0.6	0.875	•
11/24/2003	13:46	0.9	2.077	0.7	0.858	
11/24/2003	13:46	1	2.039	0.8	0.842	
11/24/2003	13:46	1.1	1.997	0.9	0.825	
11/24/2003	13:46	1.2	1.953	1	0.806	
11/24/2003	13:47	1.3	1.92	1.1	0.793	
11/24/2003	13:47	1.4	1.88	1.2	0.776	
11/24/2003	13:47	1.5	1.846	1.3	0.762	
11/24/2003	13:47	1.6	1.805	1.4	0.745	
11/24/2003	13:47	1.7	1.775	1.5	0.733	•
11/24/2003	13:47	1.8	1.741	1.6	0.719	
11/24/2003	13:47	1.9	1.713	1.7	0.707	
11/24/2003	13:47	2	1.678	1.8	0.693	

11/24/2003 13:47	2.1	1.644	1.9	0.679
11/24/2003 13:47	2.2	1.614	2	0.666
11/24/2003 13:48	2.3	1.586	2.1	0.655
11/24/2003 13:48	2.4	1.559	2.2	0.644
11/24/2003 13:48	2.5	1.527	2.3	0.630
11/24/2003 13:48	2.6	1.495	2.4	0.617
11/24/2003 13:48	2.7	1.466	2.5	0.605
11/24/2003 13:48	2.8	1.44	2.6	0.595
11/24/2003 13:48	2.9	1.416	2.7	0.585
11/24/2003 13:48	3	1.39	2.8	0.574
11/24/2003 13:48	3.1	1.363	2.9	0.563
11/24/2003 13:48	3.2	1.339	3	0.553
11/24/2003 13:49	3.3	1.313	3.1	0.542
11/24/2003 13:49	3.4	1.289	3.2	0.532
11/24/2003 13:49	3.5	1.265	3.3	0.522
11/24/2003 13:49	3.6	1.243	3.4	0.513
11/24/2003 13:49	3.7	1.218	3.5	0.503
11/24/2003 13:49	3.8	1.196	3.6	0.494
11/24/2003 13:49	3.9	1.174	3.7	0.485
11/24/2003 13:49	4	1.152	3.8	0.476
11/24/2003 13:49	4.1	1.136	3.9	0.469
11/24/2003 13:49	4.2	1.112	4	0.459
11/24/2003 13:50	4.3	1.091	4.1	0.450
11/24/2003 13:50	4.4	1.071	4.2	0.442
11/24/2003 13:50	4.5	1.053	4.3	0.435
11/24/2003 13:50	4.6	1.033	4.4	0.427
11/24/2003 13:50	4.7	1.013	4.5	0.418
11/24/2003 13:50	4.8	0.994	4.6	0.410
11/24/2003 13:50	4.9	0.976	4.7	0.403
11/24/2003 13:50	5	0.958	4.8	0.396
11/24/2003 13:50	5.1	0.938	4.9	0.387
11/24/2003 13:50	5.2	0.922	5	0.381
11/24/2003 13:51	5.3	0.908	5.1	0.375
11/24/2003 13:51	5.4	0.892	5.2	0.368
11/24/2003 13:51	5.5	0.876	5.3	0.362
11/24/2003 13:51	5.6	0.861	5.4	0.355
11/24/2003 13:51	5.7	0.839	5.5	0.346
11/24/2003 13:51	5.8	0.831	5.6	0.343
11/24/2003 13:51	5.9	0.813	5.7	0.336
11/24/2003 13:51	6	0.797	5.8	0.329
11/24/2003 13:51	6.1	0.783	5.9	0.323
11/24/2003 13:51	6.2	0.771	6	0.318
11/24/2003 13:52	6.3	0.754	6.1	0.311
11/24/2003 13:52	6.4	0.742	6.2	0.306
11/24/2003 13:52	6.5	0.726	6.3	0.300
11/24/2003 13:52	6.6	0.714	6.4	0.295
11/24/2003 13:52	6.7	0.702	6.5	0.290
11/24/2003 13:52	6.8	0.686	6.6	0.283
11/24/2003 13:52	6.9	0.678	6.7	0.280
11/24/2003 13:52	7	0.664	6.8	0.274
11/24/2003 13:52	7.1	0.652	6.9	0.269
11/24/2003 13:52	7.2	0.638	7	0.263
11/24/2003 13:53	7.3	0.627	7.1	0.259
11/24/2003 13:53	7.4	0.617	7.2	0.255
11/24/2003 13:53	7.5	0.605	7.3	0.250
11/24/2003 13:53	7.6	0.593	7.4	0.245
11/24/2003 13:53	7.7	0.579	7.5	0.239
11/24/2003 13:53	7.8	0.571	7.6	0.236
11/24/2003 13:53	7.9	0.561	7.7	0.232
11/24/2003 13:53	8	0.551	7.8	0.227

11/24/2003 13:53	8.1	0.541	7.9	0.223
11/24/2003 13:53	8.2	0.531	8	0.219
11/24/2003 13:54	8.3	0.522	8.1	0.216
11/24/2003 13:54	8.4	0.51	8.2	0.211
11/24/2003 13:54	8.5	0.502	8.3	0.207
11/24/2003 13:54	8.6	0.494	8.4	0.204
11/24/2003 13:54	8.7	0.486	8.5	0.201
11/24/2003 13:54	8.8	0.476	8.6	0.197
11/24/2003 13:54	8.9	0.468	8.7	0.193
11/24/2003 13:54	9	0.46	8.8	0.190
11/24/2003 13:54	9.1	0.452	8.9	0.187
11/24/2003 13:54	9.2	0.442	9	0.182
11/24/2003 13:55	9.3	0.434	9.1	0.179
11/24/2003 13:55	9.4	0.426	9.2	0.176
11/24/2003 13:55	9.5	0.416	9.3	0.172
11/24/2003 13:55	9.6	0.412	9.4	0.170
11/24/2003 13:55	9.7	0.4	9.5	0.165
11/24/2003 13:55	9.8	0.397	9.6	0.164
11/24/2003 13:55	9.9	0.386	9.7	0.159
11/24/2003 13:55	10	0.381	9.8	0.157
11/24/2003 13:55	10.1	0.373	9.9	0.154
11/24/2003 13:55	10.2	0.367	10	0.152
11/24/2003 13:56	10.3	0.363	10.1	0.150
11/24/2003 13:56	10.4	0.355	10.2	0.147
11/24/2003 13:56	10.5	0.349	10.3	0.144
11/24/2003 13:56	10.6	0.341	10.4	0.141
11/24/2003 13:56	10.7	0.337	10.5	0.139
11/24/2003 13:56	10.8	0.329	10.6	0.136
11/24/2003 13:56	10.9	0.325	10.7	0.134
11/24/2003 13:56	11	0.317	10.8	0.131
11/24/2003 13:56	11.1	0.311	10.9	0.128
11/24/2003 13:56	11.2	0.307	11	0.127
11/24/2003 13:57	11.3	0.301	11.1	0.124
11/24/2003 13:57	11.4	0.295	11.2	0.122
11/24/2003 13:57	11.5	0.291	11.3	0.120
11/24/2003 13:57	11.6	0.285	11.4	0.118
11/24/2003 13:57	11.7	0.281	11.5	0.116
11/24/2003 13:57	11.8	0.275	11.6	0.114
11/24/2003 13:57	11.9	0.271	11.7	0.112
11/24/2003 13:57	12	0.269	11.8	0.111
11/24/2003 13:57	12.1	0.263	11.9	0.109
11/24/2003 13:57	12.2	0.259	12	0.107
11/24/2003 13:58	12.3	0.251	12.1	0.104
11/24/2003 13:58	12.4	0.247	12.2	0.102
11/24/2003 13:58	12.5	0.242	12.3	0.100
11/24/2003 13:58	12.6	0.24	12.4	0.099
11/24/2003 13:58	12.7	0.236	12.5	0.097
11/24/2003 13:58	12.8	0.23	12.6	0.095
11/24/2003 13:58	12.9	0.226	12.7	0.093
11/24/2003 13:58	13	0.222	12.8	0.092
11/24/2003 13:58	13.1	0.218	12.9	0.090
11/24/2003 13:58	13.2	0.216	13	0.089
11/24/2003 13:59	13.3	0.21	13.1	0.087
11/24/2003 13:59	13.4	0.208	13.2	0.086
11/24/2003 13:59	13.5	0.206	13.3	0.085
11/24/2003 13:59	13.6	0.2	13.4	0.083
11/24/2003 13:59	13.7	0.196	13.5	0.081
11/24/2003 13:59	13.8	0.194	13.6	0.080
11/24/2003 13:59	13.9	0.192	13.7	0.079
11/24/2003 13:59	14	0.186	13.8	0.077

11/24/2003 13:59	14.1	0.178	13.9	0.073
11/24/2003 13:59	14.2	0.182	14	0.075
11/24/2003 14:00	14.3	0.18	14.1	0.074
11/24/2003 14:00	14.4	0.174	14.2	0.072
11/24/2003 14:00	14.5	0.176	14.3	0.073
11/24/2003 14:00	14.6	0.168	14.4	0.069
11/24/2003 14:00	14.7	0.168	14.5	0.069
11/24/2003 14:00	14.8	0.162	14.6	0.067
11/24/2003 14:00	14.9	0.16	14.7	0.066
11/24/2003 14:00	15	0.158	14.8	0.065
11/24/2003 14:00	15.1	0.154	14.9	0.064
11/24/2003 14:00	15.2	0.152	15	0.063
11/24/2003 14:01	15.3	0.15	15.1	0.062
11/24/2003 14:01	15.4	0.148	15.2	0.061
11/24/2003 14:01	15.5	0.144	15.3	0.059
11/24/2003 14:01	15.6	0.142	15.4	0.059
11/24/2003 14:01	15.7	0.138	15.5	0.057
11/24/2003 14:01	15.8	0.14	15.6	0.058
11/24/2003 14:01	15.9	0.134	15.7	0.055
11/24/2003 14:01	16	0.132	15.8	0.055
11/24/2003 14:01	16.1	0.132	15.9	0.055
11/24/2003 14:01	16.2	0.128	16	0.053
11/24/2003 14:02	16.3	0.126	16.1	0.052
11/24/2003 14:02	16.4	0.124	16.2	0.051
11/24/2003 14:02	16.5	0.122	16.3	0.050
11/24/2003 14:02	16.6	0.116	16.4	0.048
11/24/2003 14:02	16.7	0.118	16.5	0.049
11/24/2003 14:02	16.8	0.114	16.6	0.047
11/24/2003 14:02	16.9	0.114	16.7	0.047
11/24/2003 14:02	17	0.112	16.8	0.046
11/24/2003 14:02	17.1	0.11	16.9	0.045
11/24/2003 14:02	17.2	0.108	17	0.045
11/24/2003 14:03	17.3	0.108	17.1	0.045
11/24/2003 14:03	17.4	0.104	17.2	0.043
11/24/2003 14:03	17.5	0.102	17.3	0.042
11/24/2003 14:03	17.6	0.1	17.4	0.041
11/24/2003 14:03	17.7	0.098	17.5	0.040
11/24/2003 14:03	17.8	0.098	17.6	0.040
11/24/2003 14:03	17.9	0.096	17.7	0.040
11/24/2003 14:03	18	0.094	17.8	0.039
11/24/2003 14:03	18.1	0.092	17.9	0.038
11/24/2003 14:03	18.2	0.09	18	0.037
11/24/2003 14:04	18.3	0.085	18.1	0.035
11/24/2003 14:04	18.4	0.087	18.2	0.036
11/24/2003 14:04	18.5	0.083	18.3	0.034
11/24/2003 14:04	18.6	0.085	18.4	0.035
11/24/2003 14:04	18.7	0.083	18.5	0.034
11/24/2003 14:04	18.8	0.083	18.6	0.034

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT32
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		12.62 = L
Time for 37% head change (min.) :		5.37 = To

Hydraulic Conductivity (K) :

2.10E-04	ft./min.
3.50E-06	ft./sec.
3.03E-01	ft./day
1.07E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.62/.208)}{2 \times 12.62 \times 5.37} =$$

2.09×10^{-4} Ft/Min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT32
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12.62 = L
Time for 37% head change (min.) :	7.05 = To

Hydraulic Conductivity (K) :

1.60E-04	ft./min.
2.67E-06	ft./sec.
2.31E-01	ft./day
8.14E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT32

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 9.88' TOC DATE: 11-24-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

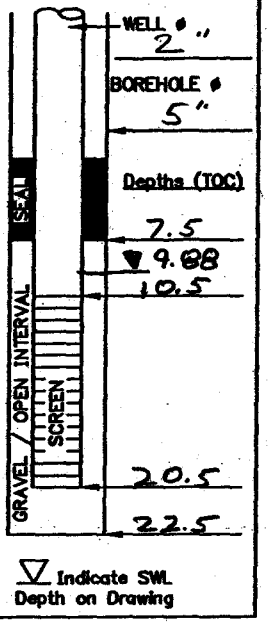
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

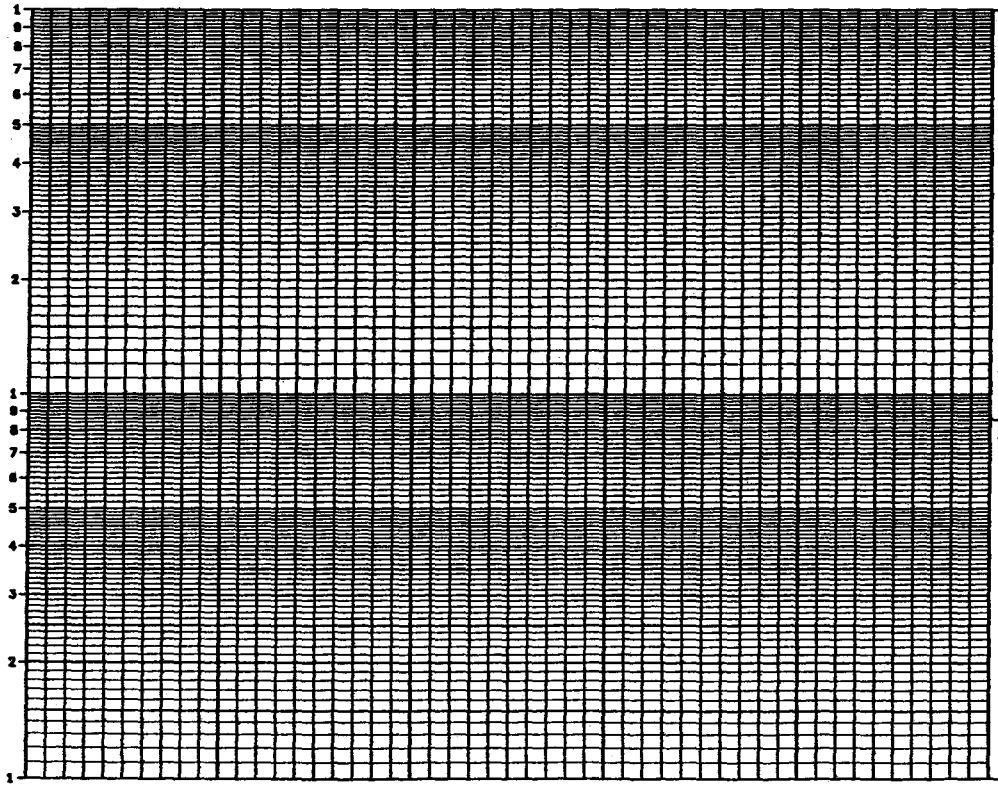
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	-1.259	
.1	-2.597		4	-1.163	
.2	-2.115		5	-1.080	
.3	-1.877		6	-.961	
.4	-1.756		7	-.836	
.5	-1.685		8	-.730	
.6	-1.643		10	-.566	
.7	-1.606		11	-.502	
.8	-1.578		12	-.441	
.9	-1.558		15	-.308	
1.0	-1.536		18	-.232	
2.0	-1.374		25	-.133	

WELL SCHEMATIC

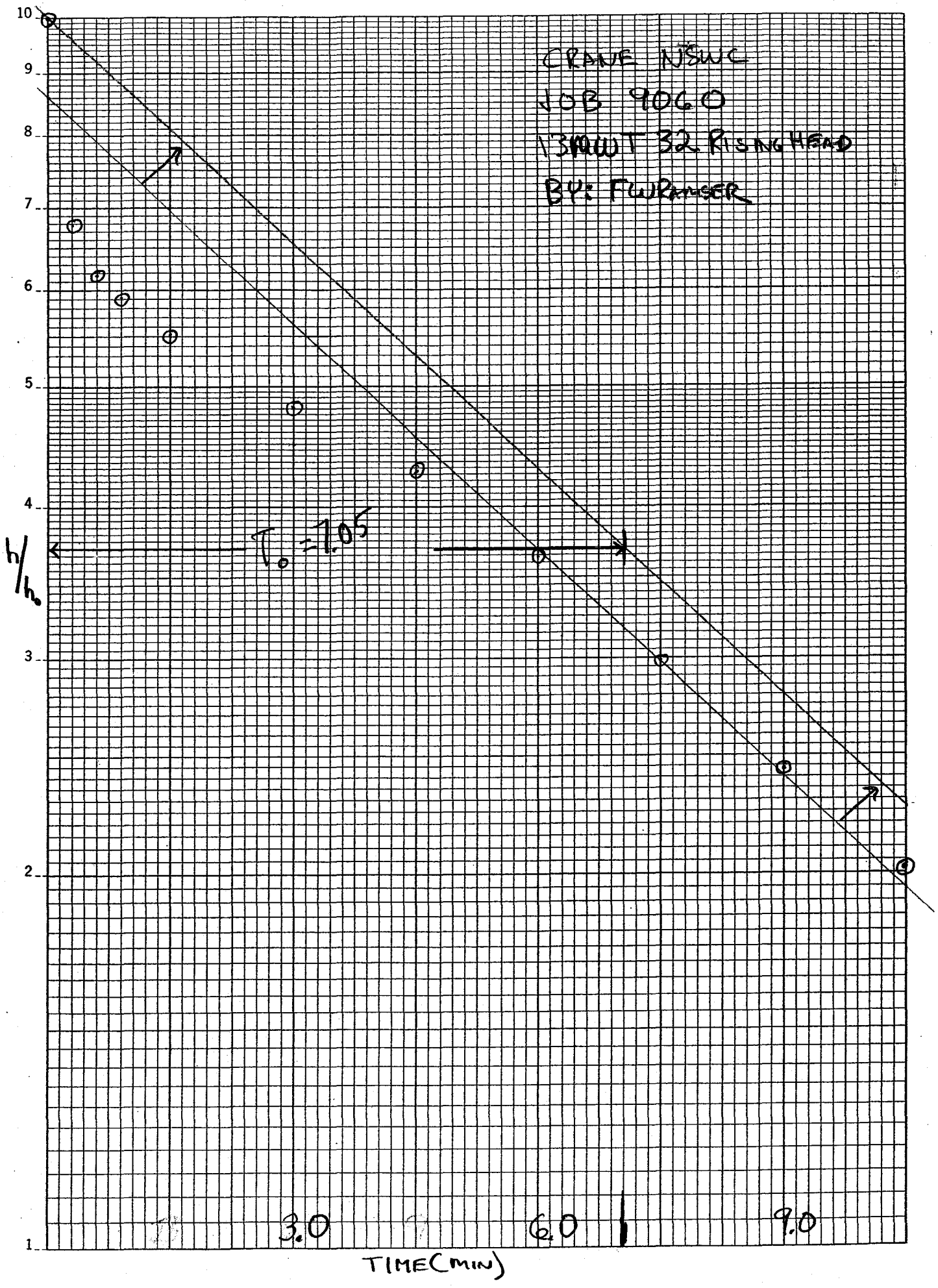


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 12:31:41
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-24 141208
DataMgr Version 3.68 13MWT32rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT32rising#1

Test defined on: 11/24/2003 14:11:36
Test started on: 11/24/2003 14:12:08
Test stopped on: 11/24/2003 14:38:08
Test extracted on: N/A

Data gathered using Linear testing
Time between data poin Minutes.
Number of data samples 260

TOTAL DATA SAMPLES 260

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referen 10.836 Feet H2O

● = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -2.597
	11/24/2003 14:12	0	0			
	11/24/2003 14:12	0.1	-2.597	0	1.000	●
	11/24/2003 14:12	0.2	-2.115	0.1	0.814	
	11/24/2003 14:12	0.3	-1.877	0.2	0.723	
	11/24/2003 14:12	0.4	-1.756	0.3	0.676	●
	11/24/2003 14:12	0.5	-1.685	0.4	0.649	
	11/24/2003 14:12	0.6	-1.643	0.5	0.633	
	11/24/2003 14:12	0.7	-1.606	0.6	0.618	●
	11/24/2003 14:12	0.8	-1.578	0.7	0.608	
	11/24/2003 14:13	0.9	-1.558	0.8	0.600	
	11/24/2003 14:13	1	-1.536	0.9	0.591	●
	11/24/2003 14:13	1.1	-1.514	1	0.583	
	11/24/2003 14:13	1.2	-1.496	1.1	0.576	
	11/24/2003 14:13	1.3	-1.479	1.2	0.570	
	11/24/2003 14:13	1.4	-1.463	1.3	0.563	
	11/24/2003 14:13	1.5	-1.445	1.4	0.556	
	11/24/2003 14:13	1.6	-1.431	1.5	0.551	●
	11/24/2003 14:13	1.7	-1.415	1.6	0.545	
	11/24/2003 14:13	1.8	-1.401	1.7	0.539	
	11/24/2003 14:14	1.9	-1.389	1.8	0.535	
	11/24/2003 14:14	2	-1.374	1.9	0.529	
	11/24/2003 14:14	2.1	-1.362	2	0.524	
	11/24/2003 14:14	2.2	-1.35	2.1	0.520	
	11/24/2003 14:14	2.3	-1.338	2.2	0.515	
	11/24/2003 14:14	2.4	-1.326	2.3	0.511	
	11/24/2003 14:14	2.5	-1.314	2.4	0.506	
	11/24/2003 14:14	2.6	-1.304	2.5	0.502	
	11/24/2003 14:14	2.7	-1.292	2.6	0.497	
	11/24/2003 14:14	2.8	-1.282	2.7	0.494	
	11/24/2003 14:15	2.9	-1.27	2.8	0.489	
	11/24/2003 14:15	3	-1.259	2.9	0.485	
	11/24/2003 14:15	3.1	-1.249	3	0.481	●
	11/24/2003 14:15	3.2	-1.239	3.1	0.477	
	11/24/2003 14:15	3.3	-1.229	3.2	0.473	
	11/24/2003 14:15	3.4	-1.217	3.3	0.469	
	11/24/2003 14:15	3.5	-1.209	3.4	0.466	
	11/24/2003 14:15	3.6	-1.199	3.5	0.462	
	11/24/2003 14:15	3.7	-1.191	3.6	0.459	
	11/24/2003 14:15	3.8	-1.181	3.7	0.455	
	11/24/2003 14:16	3.9	-1.171	3.8	0.451	

11/24/2003 14:16	4	-1.163	3.9	0.448
11/24/2003 14:16	4.1	-1.155	4	0.445
11/24/2003 14:16	4.2	-1.145	4.1	0.441
11/24/2003 14:16	4.3	-1.139	4.2	0.439
11/24/2003 14:16	4.4	-1.126	4.3	0.434
11/24/2003 14:16	4.5	-1.12	4.4	0.431
11/24/2003 14:16	4.6	-1.112	4.5	0.428
11/24/2003 14:16	4.7	-1.104	4.6	0.425
11/24/2003 14:16	4.8	-1.092	4.7	0.420
11/24/2003 14:17	4.9	-1.088	4.8	0.419
11/24/2003 14:17	5	-1.08	4.9	0.416
11/24/2003 14:17	5.1	-1.07	5	0.412
11/24/2003 14:17	5.2	-1.062	5.1	0.409
11/24/2003 14:17	5.3	-1.056	5.2	0.407
11/24/2003 14:17	5.4	-1.044	5.3	0.402
11/24/2003 14:17	5.5	-1.03	5.4	0.397
11/24/2003 14:17	5.6	-1.016	5.5	0.391
11/24/2003 14:17	5.7	-1.001	5.6	0.385
11/24/2003 14:17	5.8	-0.987	5.7	0.380
11/24/2003 14:18	5.9	-0.973	5.8	0.375
11/24/2003 14:18	6	-0.961	5.9	0.370
11/24/2003 14:18	6.1	-0.945	6	0.364
11/24/2003 14:18	6.2	-0.935	6.1	0.360
11/24/2003 14:18	6.3	-0.925	6.2	0.356
11/24/2003 14:18	6.4	-0.911	6.3	0.351
11/24/2003 14:18	6.5	-0.897	6.4	0.345
11/24/2003 14:18	6.6	-0.885	6.5	0.341
11/24/2003 14:18	6.7	-0.872	6.6	0.336
11/24/2003 14:18	6.8	-0.862	6.7	0.332
11/24/2003 14:19	6.9	-0.848	6.8	0.327
11/24/2003 14:19	7	-0.836	6.9	0.322
11/24/2003 14:19	7.1	-0.828	7	0.319
11/24/2003 14:19	7.2	-0.814	7.1	0.313
11/24/2003 14:19	7.3	-0.806	7.2	0.310
11/24/2003 14:19	7.4	-0.794	7.3	0.306
11/24/2003 14:19	7.5	-0.782	7.4	0.301
11/24/2003 14:19	7.6	-0.776	7.5	0.299
11/24/2003 14:19	7.7	-0.762	7.6	0.293
11/24/2003 14:19	7.8	-0.75	7.7	0.289
11/24/2003 14:20	7.9	-0.742	7.8	0.286
11/24/2003 14:20	8	-0.729	7.9	0.281
11/24/2003 14:20	8.1	-0.721	8	0.278
11/24/2003 14:20	8.2	-0.713	8.1	0.275
11/24/2003 14:20	8.3	-0.705	8.2	0.271
11/24/2003 14:20	8.4	-0.693	8.3	0.267
11/24/2003 14:20	8.5	-0.685	8.4	0.264
11/24/2003 14:20	8.6	-0.675	8.5	0.260
11/24/2003 14:20	8.7	-0.667	8.6	0.257
11/24/2003 14:20	8.8	-0.657	8.7	0.253
11/24/2003 14:21	8.9	-0.651	8.8	0.251
11/24/2003 14:21	9	-0.641	8.9	0.247
11/24/2003 14:21	9.1	-0.633	9	0.244
11/24/2003 14:21	9.2	-0.625	9.1	0.241
11/24/2003 14:21	9.3	-0.619	9.2	0.238
11/24/2003 14:21	9.4	-0.611	9.3	0.235
11/24/2003 14:21	9.5	-0.605	9.4	0.233
11/24/2003 14:21	9.6	-0.596	9.5	0.229
11/24/2003 14:21	9.7	-0.586	9.6	0.226
11/24/2003 14:21	9.8	-0.58	9.7	0.223
11/24/2003 14:22	9.9	-0.572	9.8	0.220
11/24/2003 14:22	10	-0.566	9.9	0.218
11/24/2003 14:22	10.1	-0.558	10	0.215
11/24/2003 14:22	10.2	-0.55	10.1	0.212
11/24/2003 14:22	10.3	-0.544	10.2	0.209
11/24/2003 14:22	10.4	-0.538	10.3	0.207
11/24/2003 14:22	10.5	-0.53	10.4	0.204
11/24/2003 14:22	10.6	-0.524	10.5	0.202
11/24/2003 14:22	10.7	-0.518	10.6	0.199
11/24/2003 14:22	10.8	-0.51	10.7	0.196
11/24/2003 14:23	10.9	-0.504	10.8	0.194
11/24/2003 14:23	11	-0.502	10.9	0.193
11/24/2003 14:23	11.1	-0.496	11	0.191
11/24/2003 14:23	11.2	-0.49	11.1	0.189
11/24/2003 14:23	11.3	-0.482	11.2	0.186
11/24/2003 14:23	11.4	-0.48	11.3	0.185
11/24/2003 14:23	11.5	-0.471	11.4	0.181
11/24/2003 14:23	11.6	-0.461	11.5	0.178
11/24/2003 14:23	11.7	-0.455	11.6	0.175
11/24/2003 14:23	11.8	-0.453	11.7	0.174

11/24/2003 14:24	11.9	-0.445	11.8	0.171
11/24/2003 14:24	12	-0.441	11.9	0.170
11/24/2003 14:24	12.1	-0.435	12	0.168
11/24/2003 14:24	12.2	-0.431	12.1	0.166
11/24/2003 14:24	12.3	-0.427	12.2	0.164
11/24/2003 14:24	12.4	-0.423	12.3	0.163
11/24/2003 14:24	12.5	-0.419	12.4	0.161
11/24/2003 14:24	12.6	-0.411	12.5	0.158
11/24/2003 14:24	12.7	-0.409	12.6	0.157
11/24/2003 14:24	12.8	-0.401	12.7	0.154
11/24/2003 14:25	12.9	-0.395	12.8	0.152
11/24/2003 14:25	13	-0.395	12.9	0.152
11/24/2003 14:25	13.1	-0.395	13	0.152
11/24/2003 14:25	13.2	-0.385	13.1	0.148
11/24/2003 14:25	13.3	-0.381	13.2	0.147
11/24/2003 14:25	13.4	-0.373	13.3	0.144
11/24/2003 14:25	13.5	-0.367	13.4	0.141
11/24/2003 14:25	13.6	-0.367	13.5	0.141
11/24/2003 14:25	13.7	-0.361	13.6	0.139
11/24/2003 14:25	13.8	-0.355	13.7	0.137
11/24/2003 14:26	13.9	-0.353	13.8	0.136
11/24/2003 14:26	14	-0.347	13.9	0.134
11/24/2003 14:26	14.1	-0.341	14	0.131
11/24/2003 14:26	14.2	-0.345	14.1	0.133
11/24/2003 14:26	14.3	-0.339	14.2	0.131
11/24/2003 14:26	14.4	-0.333	14.3	0.128
11/24/2003 14:26	14.5	-0.327	14.4	0.126
11/24/2003 14:26	14.6	-0.323	14.5	0.124
11/24/2003 14:26	14.7	-0.323	14.6	0.124
11/24/2003 14:26	14.8	-0.318	14.7	0.122
11/24/2003 14:27	14.9	-0.316	14.8	0.122
11/24/2003 14:27	15	-0.308	14.9	0.119
11/24/2003 14:27	15.1	-0.31	15	0.119
11/24/2003 14:27	15.2	-0.304	15.1	0.117
11/24/2003 14:27	15.3	-0.296	15.2	0.114
11/24/2003 14:27	15.4	-0.294	15.3	0.113
11/24/2003 14:27	15.5	-0.292	15.4	0.112
11/24/2003 14:27	15.6	-0.292	15.5	0.112
11/24/2003 14:27	15.7	-0.288	15.6	0.111
11/24/2003 14:27	15.8	-0.288	15.7	0.111
11/24/2003 14:28	15.9	-0.284	15.8	0.109
11/24/2003 14:28	16	-0.282	15.9	0.109
11/24/2003 14:28	16.1	-0.272	16	0.105
11/24/2003 14:28	16.2	-0.274	16.1	0.106
11/24/2003 14:28	16.3	-0.274	16.2	0.106
11/24/2003 14:28	16.4	-0.268	16.3	0.103
11/24/2003 14:28	16.5	-0.262	16.4	0.101
11/24/2003 14:28	16.6	-0.262	16.5	0.101
11/24/2003 14:28	16.7	-0.262	16.6	0.101
11/24/2003 14:28	16.8	-0.256	16.7	0.099
11/24/2003 14:29	16.9	-0.258	16.8	0.099
11/24/2003 14:29	17	-0.252	16.9	0.097
11/24/2003 14:29	17.1	-0.252	17	0.097
11/24/2003 14:29	17.2	-0.248	17.1	0.095
11/24/2003 14:29	17.3	-0.246	17.2	0.095
11/24/2003 14:29	17.4	-0.244	17.3	0.094
11/24/2003 14:29	17.5	-0.24	17.4	0.092
11/24/2003 14:29	17.6	-0.238	17.5	0.092
11/24/2003 14:29	17.7	-0.238	17.6	0.092
11/24/2003 14:29	17.8	-0.234	17.7	0.090
11/24/2003 14:30	17.9	-0.232	17.8	0.089
11/24/2003 14:30	18	-0.232	17.9	0.089
11/24/2003 14:30	18.1	-0.226	18	0.087
11/24/2003 14:30	18.2	-0.224	18.1	0.086
11/24/2003 14:30	18.3	-0.224	18.2	0.086
11/24/2003 14:30	18.4	-0.222	18.3	0.085
11/24/2003 14:30	18.5	-0.224	18.4	0.086
11/24/2003 14:30	18.6	-0.216	18.5	0.083
11/24/2003 14:30	18.7	-0.216	18.6	0.083
11/24/2003 14:30	18.8	-0.214	18.7	0.082
11/24/2003 14:31	18.9	-0.212	18.8	0.082
11/24/2003 14:31	19	-0.21	18.9	0.081
11/24/2003 14:31	19.1	-0.208	19	0.080
11/24/2003 14:31	19.2	-0.208	19.1	0.080
11/24/2003 14:31	19.3	-0.204	19.2	0.079
11/24/2003 14:31	19.4	-0.206	19.3	0.079
11/24/2003 14:31	19.5	-0.206	19.4	0.079
11/24/2003 14:31	19.6	-0.2	19.5	0.077
11/24/2003 14:31	19.7	-0.2	19.6	0.077

11/24/2003 14:31	19.8	-0.194	19.7	0.075
11/24/2003 14:32	19.9	-0.196	19.8	0.075
11/24/2003 14:32	20	-0.196	19.9	0.075
11/24/2003 14:32	20.1	-0.192	20	0.074
11/24/2003 14:32	20.2	-0.19	20.1	0.073
11/24/2003 14:32	20.3	-0.188	20.2	0.072
11/24/2003 14:32	20.4	-0.186	20.3	0.072
11/24/2003 14:32	20.5	-0.188	20.4	0.072
11/24/2003 14:32	20.6	-0.186	20.5	0.072
11/24/2003 14:32	20.7	-0.182	20.6	0.070
11/24/2003 14:32	20.8	-0.18	20.7	0.069
11/24/2003 14:33	20.9	-0.182	20.8	0.070
11/24/2003 14:33	21	-0.178	20.9	0.069
11/24/2003 14:33	21.1	-0.176	21	0.068
11/24/2003 14:33	21.2	-0.176	21.1	0.068
11/24/2003 14:33	21.3	-0.172	21.2	0.066
11/24/2003 14:33	21.4	-0.168	21.3	0.065
11/24/2003 14:33	21.5	-0.17	21.4	0.065
11/24/2003 14:33	21.6	-0.17	21.5	0.065
11/24/2003 14:33	21.7	-0.17	21.6	0.065
11/24/2003 14:33	21.8	-0.17	21.7	0.065
11/24/2003 14:34	21.9	-0.17	21.8	0.065
11/24/2003 14:34	22	-0.17	21.9	0.065
11/24/2003 14:34	22.1	-0.165	22	0.064
11/24/2003 14:34	22.2	-0.163	22.1	0.063
11/24/2003 14:34	22.3	-0.163	22.2	0.063
11/24/2003 14:34	22.4	-0.161	22.3	0.062
11/24/2003 14:34	22.5	-0.157	22.4	0.060
11/24/2003 14:34	22.6	-0.159	22.5	0.061
11/24/2003 14:34	22.7	-0.157	22.6	0.060
11/24/2003 14:34	22.8	-0.157	22.7	0.060
11/24/2003 14:35	22.9	-0.155	22.8	0.060
11/24/2003 14:35	23	-0.155	22.9	0.060
11/24/2003 14:35	23.1	-0.153	23	0.059
11/24/2003 14:35	23.2	-0.153	23.1	0.059
11/24/2003 14:35	23.3	-0.152	23.2	0.059
11/24/2003 14:35	23.4	-0.151	23.3	0.058
11/24/2003 14:35	23.5	-0.153	23.4	0.059
11/24/2003 14:35	23.6	-0.149	23.5	0.057
11/24/2003 14:35	23.7	-0.149	23.6	0.057
11/24/2003 14:35	23.8	-0.149	23.7	0.057
11/24/2003 14:36	23.9	-0.147	23.8	0.057
11/24/2003 14:36	24	-0.149	23.9	0.057
11/24/2003 14:36	24.1	-0.143	24	0.055
11/24/2003 14:36	24.2	-0.143	24.1	0.055
11/24/2003 14:36	24.3	-0.139	24.2	0.054
11/24/2003 14:36	24.4	-0.141	24.3	0.054
11/24/2003 14:36	24.5	-0.139	24.4	0.054
11/24/2003 14:36	24.6	-0.139	24.5	0.054
11/24/2003 14:36	24.7	-0.141	24.6	0.054
11/24/2003 14:36	24.8	-0.139	24.7	0.054
11/24/2003 14:37	24.9	-0.139	24.8	0.054
11/24/2003 14:37	25	-0.135	24.9	0.052
11/24/2003 14:37	25.1	-0.133	25	0.051
11/24/2003 14:37	25.2	-0.135	25.1	0.052
11/24/2003 14:37	25.3	-0.137	25.2	0.053
11/24/2003 14:37	25.4	-0.135	25.3	0.052
11/24/2003 14:37	25.5	-0.133	25.4	0.051
11/24/2003 14:37	25.6	-0.133	25.5	0.051
11/24/2003 14:37	25.7	-0.131	25.6	0.050
11/24/2003 14:37	25.8	-0.131	25.7	0.050
11/24/2003 14:38	25.9	-0.129	25.8	0.050

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT32
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		12.62 = L
Time for 37% head change (min.) :		7.05 = To

Hydraulic Conductivity (K) :

1.60E-04	ft./min.
2.67E-06	ft./sec.
2.31E-01	ft./day
8.14E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.62/.208)}{2 \times 12.62 \times 7.05}$$

1.59×10^{-4} Ft/min

CHECKED

2-18-04

L
OK
PR

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT33
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	9.09 = L
Time for 37% head change (min.) :	149.25 = To

Hydraulic Conductivity (K) :

1.02E-05	ft./min.
1.71E-07	ft./sec.
1.47E-02	ft./day
5.20E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT33

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 13.41 TOC DATE: 11-24-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

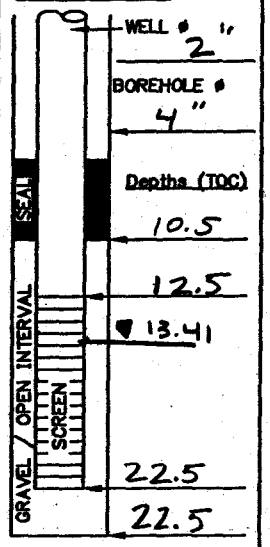
METHOD OF INDUCING WATER LEVEL CHANGE: BAILER PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

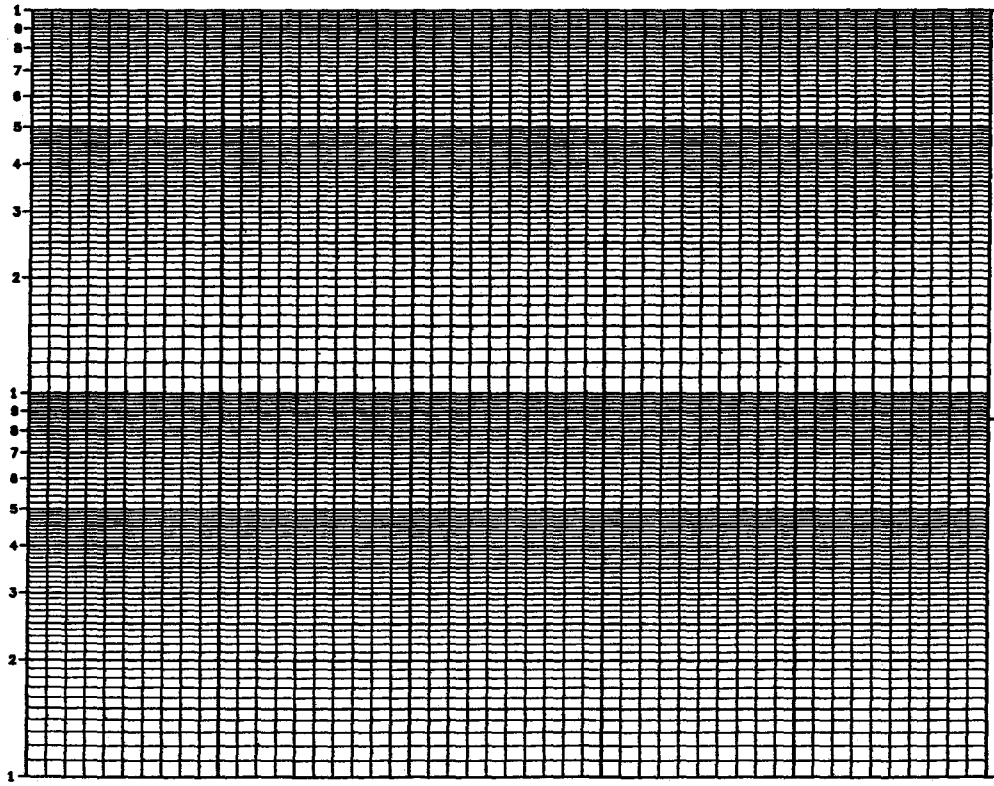
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		90	-.456	
.1	-1.194		100	-.440	
.5	-.998		110	-.428	
1	-.916		120	-.416	
10	-.756		130	-.406	
20	-.690		140	-.394	
30	-.626		150	-.392	
40	-.580		160	-.386	
50	-.549		170	-.378	
60	-.519		180	-.372	
70	-.495		190	-.366	
80	-.473		200	-.345	

WELL SCHEMATIC

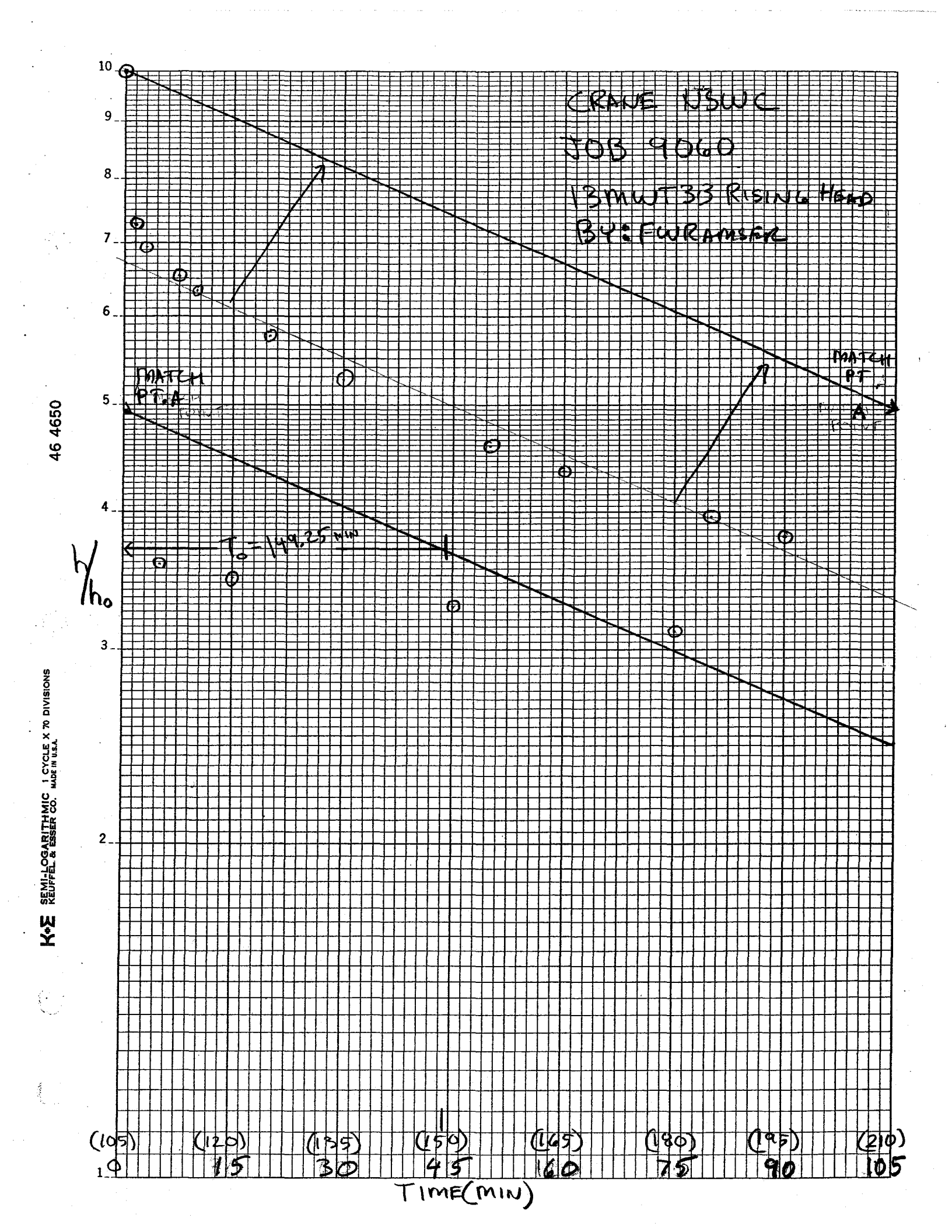


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE USWC
JOB 9060
13MWT33 RISING HEAD
BY: FWRAMSER
MATCH PT. A
MATCH PT. A
T_o = 149.25 MIN
h/h₀
TIME(MIN)
10
9
8
7
6
5
4
3
2
1
(105)
(120)
(135)
(150)
(165)
(180)
(195)
(210)
15
30
45
60
75
90
105
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 11:26:23
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-24 095156
DataMgr Version 3.68 13MWT33rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT33rising#1

Test defined on: 11/24/2003 9:20:18
Test started on: 11/24/2003 9:51:56
Test stopped on: 11/24/2003 13:17:31
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 2056

TOTAL DATA SAMPLES 2056

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 8.519 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -1.194
	11/24/2003 9:51	0	0			
	11/24/2003 9:52	0.1	-1.194	0	1.000	
	11/24/2003 9:52	0.2	-1.115	0.1	0.934	
	11/24/2003 9:52	0.3	-1.065	0.2	0.892	
	11/24/2003 9:52	0.4	-1.026	0.3	0.859	
	11/24/2003 9:52	0.5	-0.998	0.4	0.836	
	11/24/2003 9:52	0.6	-0.974	0.5	0.816	
	11/24/2003 9:52	0.7	-0.954	0.6	0.799	
	11/24/2003 9:52	0.8	-0.94	0.7	0.787	
	11/24/2003 9:52	0.9	-0.926	0.8	0.776	
	11/24/2003 9:52	1	-0.916	0.9	0.767	
	11/24/2003 9:53	1.1	-0.905	1	0.758	
	11/24/2003 9:53	1.2	-0.897	1.1	0.751	
	11/24/2003 9:53	1.3	-0.887	1.2	0.743	
	11/24/2003 9:53	1.4	-0.881	1.3	0.738	
	11/24/2003 9:53	1.5	-0.875	1.4	0.733	
	11/24/2003 9:53	1.6	-0.871	1.5	0.729	
	11/24/2003 9:53	1.7	-0.865	1.6	0.724	
	11/24/2003 9:53	1.8	-0.863	1.7	0.723	
	11/24/2003 9:53	1.9	-0.857	1.8	0.718	
	11/24/2003 9:53	2	-0.853	1.9	0.714	
	11/24/2003 9:54	2.1	-0.851	2	0.713	
	11/24/2003 9:54	2.2	-0.849	2.1	0.711	
	11/24/2003 9:54	2.3	-0.847	2.2	0.709	
	11/24/2003 9:54	2.4	-0.843	2.3	0.706	
	11/24/2003 9:54	2.5	-0.841	2.4	0.704	
	11/24/2003 9:54	2.6	-0.839	2.5	0.703	
	11/24/2003 9:54	2.7	-0.837	2.6	0.701	
	11/24/2003 9:54	2.8	-0.835	2.7	0.699	
	11/24/2003 9:54	2.9	-0.833	2.8	0.698	
	11/24/2003 9:54	3	-0.833	2.9	0.698	
	11/24/2003 9:55	3.1	-0.829	3	0.694	
	11/24/2003 9:55	3.2	-0.829	3.1	0.694	
	11/24/2003 9:55	3.3	-0.827	3.2	0.693	
	11/24/2003 9:55	3.4	-0.825	3.3	0.691	

11/24/2003 9:55	3.5	-0.823	3.4	0.689
11/24/2003 9:55	3.6	-0.821	3.5	0.688
11/24/2003 9:55	3.7	-0.819	3.6	0.686
11/24/2003 9:55	3.8	-0.819	3.7	0.686
11/24/2003 9:55	3.9	-0.819	3.8	0.686
11/24/2003 9:55	4	-0.817	3.9	0.684
11/24/2003 9:56	4.1	-0.817	4	0.684
11/24/2003 9:56	4.2	-0.809	4.1	0.678
11/24/2003 9:56	4.3	-0.795	4.2	0.666
11/24/2003 9:56	4.4	-0.793	4.3	0.664
11/24/2003 9:56	4.5	-0.789	4.4	0.661
11/24/2003 9:56	4.6	-0.787	4.5	0.659
11/24/2003 9:56	4.7	-0.789	4.6	0.661
11/24/2003 9:56	4.8	-0.805	4.7	0.674
11/24/2003 9:56	4.9	-0.805	4.8	0.674
11/24/2003 9:56	5	-0.805	4.9	0.674
11/24/2003 9:57	5.1	-0.805	5	0.674
11/24/2003 9:57	5.2	-0.803	5.1	0.673
11/24/2003 9:57	5.3	-0.803	5.2	0.673
11/24/2003 9:57	5.4	-0.801	5.3	0.671
11/24/2003 9:57	5.5	-0.803	5.4	0.673
11/24/2003 9:57	5.6	-0.801	5.5	0.671
11/24/2003 9:57	5.7	-0.797	5.6	0.668
11/24/2003 9:57	5.8	-0.797	5.7	0.668
11/24/2003 9:57	5.9	-0.795	5.8	0.666
11/24/2003 9:57	6	-0.795	5.9	0.666
11/24/2003 9:58	6.1	-0.795	6	0.666
11/24/2003 9:58	6.2	-0.793	6.1	0.664
11/24/2003 9:58	6.3	-0.791	6.2	0.662
11/24/2003 9:58	6.4	-0.791	6.3	0.662
11/24/2003 9:58	6.5	-0.791	6.4	0.662
11/24/2003 9:58	6.6	-0.789	6.5	0.661
11/24/2003 9:58	6.7	-0.787	6.6	0.659
11/24/2003 9:58	6.8	-0.787	6.7	0.659
11/24/2003 9:58	6.9	-0.785	6.8	0.657
11/24/2003 9:58	7	-0.785	6.9	0.657
11/24/2003 9:59	7.1	-0.783	7	0.656
11/24/2003 9:59	7.2	-0.783	7.1	0.656
11/24/2003 9:59	7.3	-0.785	7.2	0.657
11/24/2003 9:59	7.4	-0.783	7.3	0.656
11/24/2003 9:59	7.5	-0.781	7.4	0.654
11/24/2003 9:59	7.6	-0.779	7.5	0.652
11/24/2003 9:59	7.7	-0.779	7.6	0.652
11/24/2003 9:59	7.8	-0.779	7.7	0.652
11/24/2003 9:59	7.9	-0.777	7.8	0.651
11/24/2003 9:59	8	-0.777	7.9	0.651
11/24/2003 10:00	8.1	-0.777	8	0.651
11/24/2003 10:00	8.2	-0.775	8.1	0.649
11/24/2003 10:00	8.3	-0.773	8.2	0.647
11/24/2003 10:00	8.4	-0.771	8.3	0.646
11/24/2003 10:00	8.5	-0.773	8.4	0.647
11/24/2003 10:00	8.6	-0.773	8.5	0.647
11/24/2003 10:00	8.7	-0.771	8.6	0.646
11/24/2003 10:00	8.8	-0.771	8.7	0.646
11/24/2003 10:00	8.9	-0.771	8.8	0.646
11/24/2003 10:00	9	-0.766	8.9	0.642
11/24/2003 10:01	9.1	-0.766	9	0.642
11/24/2003 10:01	9.2	-0.764	9.1	0.640
11/24/2003 10:01	9.3	-0.766	9.2	0.642
11/24/2003 10:01	9.4	-0.762	9.3	0.638
11/24/2003 10:01	9.5	-0.762	9.4	0.638
11/24/2003 10:01	9.6	-0.762	9.5	0.638
11/24/2003 10:01	9.7	-0.76	9.6	0.637
11/24/2003 10:01	9.8	-0.758	9.7	0.635
11/24/2003 10:01	9.9	-0.758	9.8	0.635
11/24/2003 10:01	10	-0.756	9.9	0.633
11/24/2003 10:02	10.1	-0.756	10	0.633
11/24/2003 10:12	20.1	-0.688	20	0.576
11/24/2003 10:22	30.1	-0.626	30	0.524
11/24/2003 10:32	40.1	-0.578	40	0.484
11/24/2003 10:42	50.1	-0.549	50	0.460
11/24/2003 10:52	60.1	-0.519	60	0.435
11/24/2003 11:02	70.1	-0.495	70	0.415
11/24/2003 11:12	80.1	-0.473	80	0.396

11/24/2003 11:22	90.1	-0.454	90	0.380
11/24/2003 11:32	100.1	-0.44	100	0.369
11/24/2003 11:42	110.1	-0.428	110	0.358
11/24/2003 11:52	120.1	-0.416	120	0.348
11/24/2003 12:02	130.1	-0.406	130	0.340
11/24/2003 12:12	140.1	-0.4	140	0.335
11/24/2003 12:22	150.1	-0.392	150	0.328
11/24/2003 12:32	160.1	-0.386	160	0.323
11/24/2003 12:42	170.1	-0.38	170	0.318
11/24/2003 12:52	180.1	-0.374	180	0.313
11/24/2003 13:02	190.1	-0.362	190	0.303
11/24/2003 13:12	200.1	-0.347	200	0.291

L
OK
PMR

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT33
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	24-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166	2 = R
Length of Well Screen (ft.) :	9.09	= L
Time for 37% head change (min.) :	149.25	= To

Hydraulic Conductivity (K) :

1.02E-05	ft./min.
1.71E-07	ft./sec.
1.47E-02	ft./day
5.20E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(9.09/.166)}{2 \times 9.09 \times 149.25} =$$

1.02×10^{-5} Ft/min

CHECKED
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT34
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	12.5 = L
Time for 37% head change (min.) :	8.70 = To

Hydraulic Conductivity (K) :

1.38E-04	ft./min.
2.30E-06	ft./sec.
1.99E-01	ft./day
7.00E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT34

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.11 TOC DATE: 11-25-03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

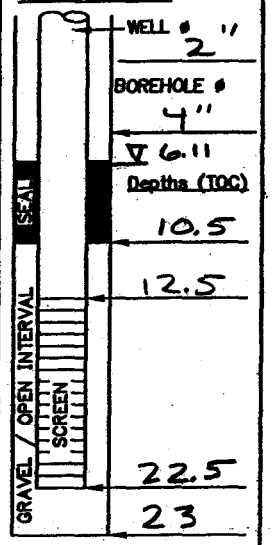
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT STATIC+START

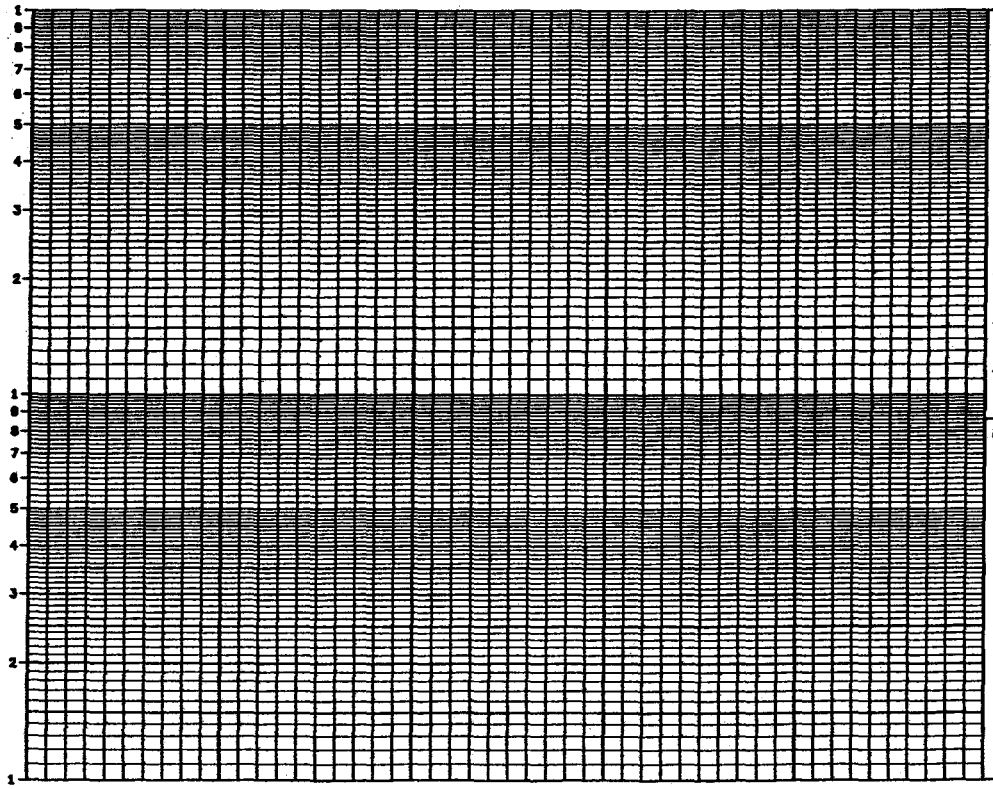
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		2.0	2.020	
.1	.800		3.0	1.792	
.2	2.588		4.0	1.593	
.3	2.537		5.0	1.421	
.4	2.497		6.0	1.270	
.5	2.459		8.0	1.016	
.6	2.423		10.0	.816	
.7	2.388		12.0	.659	
.8	2.356		14.0	.538	
.9	2.324		18.0	.361	
1.0	2.292		20.0	.298	
1.5	2.151		25	.186	

WELL SCHEMATIC

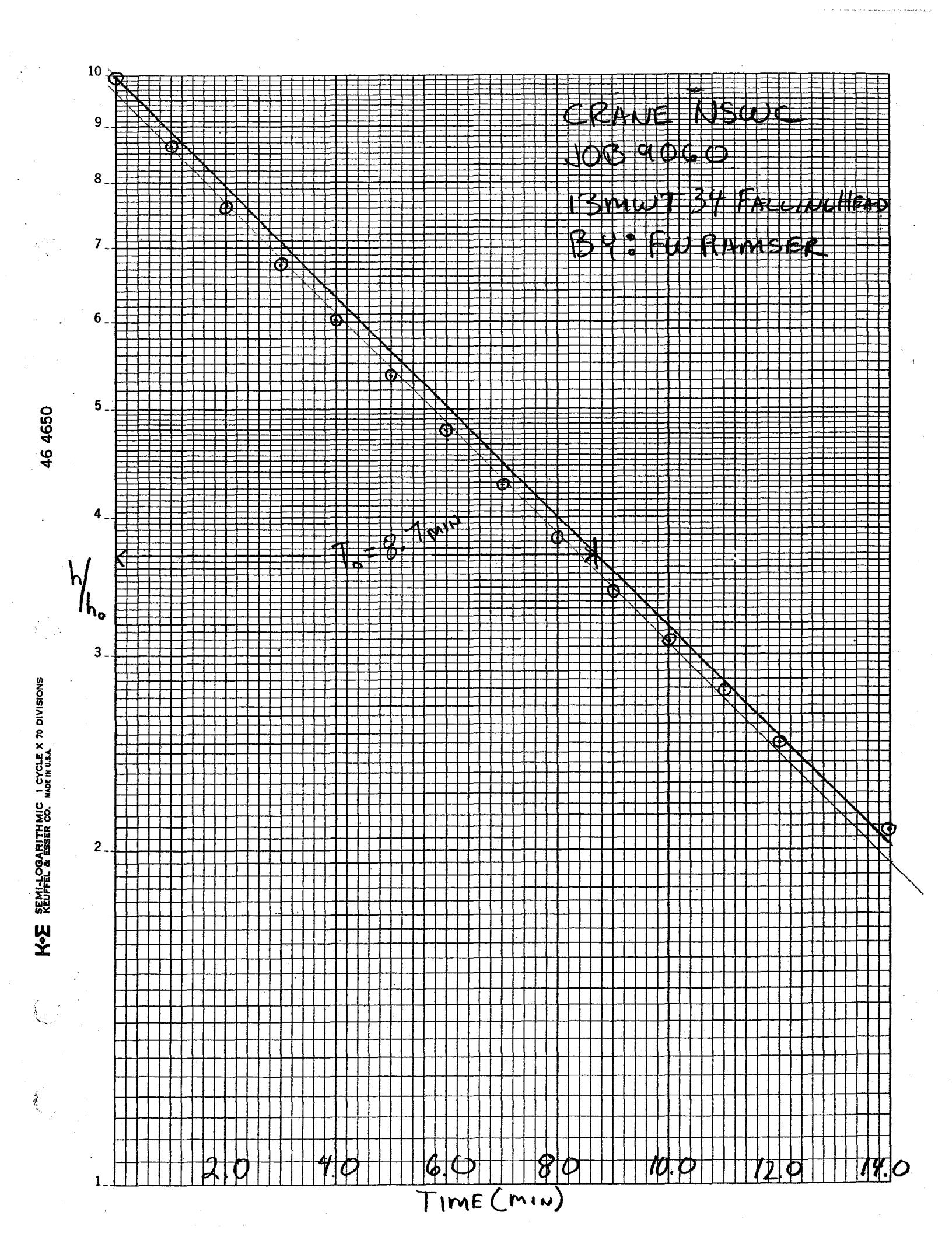


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB 9006
13MWT 3/4 FALLINGHEAD
BY: FW RAMSER
$T_o = 8.1$ min
h/h₀
TIME (min)
10
9
8
7
6
5
4
3
2
1
2.0
4.0
6.0
8.0
10.0
12.0
14.0
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 12:48:45
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-25 094711
DataMgr Version 3.68 13MWT34falling#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT34falling#1

Test defined on: 11/25/2003 9:19:41
Test started on: 11/25/2003 9:47:11
Test stopped on: 11/25/2003 10:14:09
Test extracted on: N/A

Data gathered using Linear testing
Time between data poi Minutes.
Number of data sampl 270

TOTAL DATA SAMPLES 270

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference 0 Feet H2O
Referenced on: test start
Pressure head at refere 16.902 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.588
	11/25/2003 9:47	0	0			
	11/25/2003 9:47	0.1	0.8			
	11/25/2003 9:47	0.2	2.588	0	1.000	●
	11/25/2003 9:47	0.3	2.537	0.1	0.980	
	11/25/2003 9:47	0.4	2.497	0.2	0.965	
	11/25/2003 9:47	0.5	2.459	0.3	0.950	
	11/25/2003 9:47	0.6	2.423	0.4	0.936	
	11/25/2003 9:47	0.7	2.388	0.5	0.923	
	11/25/2003 9:47	0.8	2.356	0.6	0.910	
	11/25/2003 9:48	0.9	2.324	0.7	0.898	
	11/25/2003 9:48	1	2.292	0.8	0.886	
	11/25/2003 9:48	1.1	2.262	0.9	0.874	
	11/25/2003 9:48	1.2	2.233	1	0.863	●
	11/25/2003 9:48	1.3	2.205	1.1	0.852	
	11/25/2003 9:48	1.4	2.177	1.2	0.841	
	11/25/2003 9:48	1.5	2.151	1.3	0.831	
	11/25/2003 9:48	1.6	2.123	1.4	0.820	
	11/25/2003 9:48	1.7	2.096	1.5	0.810	
	11/25/2003 9:48	1.8	2.07	1.6	0.800	
	11/25/2003 9:49	1.9	2.046	1.7	0.791	
	11/25/2003 9:49	2	2.02	1.8	0.781	
	11/25/2003 9:49	2.1	1.996	1.9	0.771	
	11/25/2003 9:49	2.2	1.971	2	0.762	●
	11/25/2003 9:49	2.3	1.947	2.1	0.752	
	11/25/2003 9:49	2.4	1.923	2.2	0.743	
	11/25/2003 9:49	2.5	1.901	2.3	0.735	
	11/25/2003 9:49	2.6	1.879	2.4	0.726	
	11/25/2003 9:49	2.7	1.857	2.5	0.718	
	11/25/2003 9:49	2.8	1.834	2.6	0.709	
	11/25/2003 9:50	2.9	1.812	2.7	0.700	
	11/25/2003 9:50	3	1.792	2.8	0.692	
	11/25/2003 9:50	3.1	1.772	2.9	0.685	
	11/25/2003 9:50	3.2	1.75	3	0.676	●
	11/25/2003 9:50	3.3	1.728	3.1	0.668	
	11/25/2003 9:50	3.4	1.71	3.2	0.661	
	11/25/2003 9:50	3.5	1.689	3.3	0.653	
	11/25/2003 9:50	3.6	1.669	3.4	0.645	
	11/25/2003 9:50	3.7	1.651	3.5	0.638	
	11/25/2003 9:50	3.8	1.631	3.6	0.630	
	11/25/2003 9:51	3.9	1.613	3.7	0.623	

11/25/2003 9:51	4	1.593	3.8	0.616
11/25/2003 9:51	4.1	1.575	3.9	0.609
11/25/2003 9:51	4.2	1.556	4	0.601
11/25/2003 9:51	4.3	1.54	4.1	0.595
11/25/2003 9:51	4.4	1.522	4.2	0.588
11/25/2003 9:51	4.5	1.504	4.3	0.581
11/25/2003 9:51	4.6	1.488	4.4	0.575
11/25/2003 9:51	4.7	1.472	4.5	0.569
11/25/2003 9:51	4.8	1.454	4.6	0.562
11/25/2003 9:52	4.9	1.435	4.7	0.554
11/25/2003 9:52	5	1.421	4.8	0.549
11/25/2003 9:52	5.1	1.405	4.9	0.543
11/25/2003 9:52	5.2	1.389	5	0.537
11/25/2003 9:52	5.3	1.373	5.1	0.531
11/25/2003 9:52	5.4	1.359	5.2	0.525
11/25/2003 9:52	5.5	1.343	5.3	0.519
11/25/2003 9:52	5.6	1.328	5.4	0.513
11/25/2003 9:52	5.7	1.312	5.5	0.507
11/25/2003 9:52	5.8	1.298	5.6	0.502
11/25/2003 9:53	5.9	1.284	5.7	0.496
11/25/2003 9:53	6	1.27	5.8	0.491
11/25/2003 9:53	6.1	1.256	5.9	0.485
11/25/2003 9:53	6.2	1.24	6	0.479
11/25/2003 9:53	6.3	1.228	6.1	0.474
11/25/2003 9:53	6.4	1.213	6.2	0.469
11/25/2003 9:53	6.5	1.199	6.3	0.463
11/25/2003 9:53	6.6	1.187	6.4	0.459
11/25/2003 9:53	6.7	1.171	6.5	0.452
11/25/2003 9:53	6.8	1.159	6.6	0.448
11/25/2003 9:54	6.9	1.149	6.7	0.444
11/25/2003 9:54	7	1.135	6.8	0.439
11/25/2003 9:54	7.1	1.123	6.9	0.434
11/25/2003 9:54	7.2	1.111	7	0.429
11/25/2003 9:54	7.3	1.098	7.1	0.424
11/25/2003 9:54	7.4	1.086	7.2	0.420
11/25/2003 9:54	7.5	1.074	7.3	0.415
11/25/2003 9:54	7.6	1.062	7.4	0.410
11/25/2003 9:54	7.7	1.05	7.5	0.406
11/25/2003 9:54	7.8	1.038	7.6	0.401
11/25/2003 9:55	7.9	1.028	7.7	0.397
11/25/2003 9:55	8	1.016	7.8	0.393
11/25/2003 9:55	8.1	1.004	7.9	0.388
11/25/2003 9:55	8.2	0.992	8	0.383
11/25/2003 9:55	8.3	0.981	8.1	0.379
11/25/2003 9:55	8.4	0.973	8.2	0.376
11/25/2003 9:55	8.5	0.961	8.3	0.371
11/25/2003 9:55	8.6	0.951	8.4	0.367
11/25/2003 9:55	8.7	0.941	8.5	0.364
11/25/2003 9:55	8.8	0.931	8.6	0.360
11/25/2003 9:56	8.9	0.921	8.7	0.356
11/25/2003 9:56	9	0.911	8.8	0.352
11/25/2003 9:56	9.1	0.901	8.9	0.348
11/25/2003 9:56	9.2	0.891	9	0.344
11/25/2003 9:56	9.3	0.883	9.1	0.341
11/25/2003 9:56	9.4	0.873	9.2	0.337
11/25/2003 9:56	9.5	0.865	9.3	0.334
11/25/2003 9:56	9.6	0.855	9.4	0.330
11/25/2003 9:56	9.7	0.845	9.5	0.327
11/25/2003 9:56	9.8	0.836	9.6	0.323
11/25/2003 9:57	9.9	0.826	9.7	0.319
11/25/2003 9:57	10	0.818	9.8	0.316
11/25/2003 9:57	10.1	0.808	9.9	0.312
11/25/2003 9:57	10.2	0.8	10	0.309
11/25/2003 9:57	10.3	0.792	10.1	0.306
11/25/2003 9:57	10.4	0.782	10.2	0.302
11/25/2003 9:57	10.5	0.776	10.3	0.300
11/25/2003 9:57	10.6	0.766	10.4	0.296
11/25/2003 9:57	10.7	0.758	10.5	0.293
11/25/2003 9:57	10.8	0.75	10.6	0.290
11/25/2003 9:58	10.9	0.742	10.7	0.287
11/25/2003 9:58	11	0.734	10.8	0.284
11/25/2003 9:58	11.1	0.728	10.9	0.281
11/25/2003 9:58	11.2	0.72	11	0.278
11/25/2003 9:58	11.3	0.712	11.1	0.275
11/25/2003 9:58	11.4	0.704	11.2	0.272
11/25/2003 9:58	11.5	0.697	11.3	0.269
11/25/2003 9:58	11.6	0.689	11.4	0.266
11/25/2003 9:58	11.7	0.681	11.5	0.263
11/25/2003 9:58	11.8	0.673	11.6	0.260

11/25/2003 9:59	11.9	0.667	11.7	0.258
11/25/2003 9:59	12	0.659	11.8	0.255
11/25/2003 9:59	12.1	0.655	11.9	0.253
11/25/2003 9:59	12.2	0.647	12	0.250
11/25/2003 9:59	12.3	0.641	12.1	0.248
11/25/2003 9:59	12.4	0.635	12.2	0.245
11/25/2003 9:59	12.5	0.627	12.3	0.242
11/25/2003 9:59	12.6	0.621	12.4	0.240
11/25/2003 9:59	12.7	0.615	12.5	0.238
11/25/2003 9:59	12.8	0.609	12.6	0.235
11/25/2003 10:00	12.9	0.603	12.7	0.233
11/25/2003 10:00	13	0.597	12.8	0.231
11/25/2003 10:00	13.1	0.591	12.9	0.228
11/25/2003 10:00	13.2	0.584	13	0.226
11/25/2003 10:00	13.3	0.578	13.1	0.223
11/25/2003 10:00	13.4	0.572	13.2	0.221
11/25/2003 10:00	13.5	0.566	13.3	0.219
11/25/2003 10:00	13.6	0.558	13.4	0.216
11/25/2003 10:00	13.7	0.554	13.5	0.214
11/25/2003 10:00	13.8	0.548	13.6	0.212
11/25/2003 10:01	13.9	0.544	13.7	0.210
11/25/2003 10:01	14	0.538	13.8	0.208
11/25/2003 10:01	14.1	0.532	13.9	0.206
11/25/2003 10:01	14.2	0.528	14	0.204
11/25/2003 10:01	14.3	0.522	14.1	0.202
11/25/2003 10:01	14.4	0.516	14.2	0.199
11/25/2003 10:01	14.5	0.512	14.3	0.198
11/25/2003 10:01	14.6	0.506	14.4	0.196
11/25/2003 10:01	14.7	0.502	14.5	0.194
11/25/2003 10:01	14.8	0.496	14.6	0.192
11/25/2003 10:02	14.9	0.492	14.7	0.190
11/25/2003 10:02	15	0.486	14.8	0.188
11/25/2003 10:02	15.1	0.482	14.9	0.186
11/25/2003 10:02	15.2	0.476	15	0.184
11/25/2003 10:02	15.3	0.472	15.1	0.182
11/25/2003 10:02	15.4	0.466	15.2	0.180
11/25/2003 10:02	15.5	0.462	15.3	0.179
11/25/2003 10:02	15.6	0.458	15.4	0.177
11/25/2003 10:02	15.7	0.454	15.5	0.175
11/25/2003 10:02	15.8	0.45	15.6	0.174
11/25/2003 10:03	15.9	0.444	15.7	0.172
11/25/2003 10:03	16	0.439	15.8	0.170
11/25/2003 10:03	16.1	0.435	15.9	0.168
11/25/2003 10:03	16.2	0.431	16	0.167
11/25/2003 10:03	16.3	0.429	16.1	0.166
11/25/2003 10:03	16.4	0.421	16.2	0.163
11/25/2003 10:03	16.5	0.417	16.3	0.161
11/25/2003 10:03	16.6	0.413	16.4	0.160
11/25/2003 10:03	16.7	0.409	16.5	0.158
11/25/2003 10:03	16.8	0.405	16.6	0.156
11/25/2003 10:04	16.9	0.401	16.7	0.155
11/25/2003 10:04	17	0.397	16.8	0.153
11/25/2003 10:04	17.1	0.395	16.9	0.153
11/25/2003 10:04	17.2	0.391	17	0.151
11/25/2003 10:04	17.3	0.387	17.1	0.150
11/25/2003 10:04	17.4	0.383	17.2	0.148
11/25/2003 10:04	17.5	0.379	17.3	0.146
11/25/2003 10:04	17.6	0.375	17.4	0.145
11/25/2003 10:04	17.7	0.371	17.5	0.143
11/25/2003 10:04	17.8	0.369	17.6	0.143
11/25/2003 10:05	17.9	0.363	17.7	0.140
11/25/2003 10:05	18	0.361	17.8	0.139
11/25/2003 10:05	18.1	0.357	17.9	0.138
11/25/2003 10:05	18.2	0.353	18	0.136
11/25/2003 10:05	18.3	0.351	18.1	0.136
11/25/2003 10:05	18.4	0.347	18.2	0.134
11/25/2003 10:05	18.5	0.343	18.3	0.133
11/25/2003 10:05	18.6	0.341	18.4	0.132
11/25/2003 10:05	18.7	0.337	18.5	0.130
11/25/2003 10:05	18.8	0.333	18.6	0.129
11/25/2003 10:06	18.9	0.331	18.7	0.128
11/25/2003 10:06	19	0.327	18.8	0.126
11/25/2003 10:06	19.1	0.325	18.9	0.126
11/25/2003 10:06	19.2	0.321	19	0.124
11/25/2003 10:06	19.3	0.317	19.1	0.122
11/25/2003 10:06	19.4	0.315	19.2	0.122
11/25/2003 10:06	19.5	0.311	19.3	0.120
11/25/2003 10:06	19.6	0.309	19.4	0.119
11/25/2003 10:06	19.7	0.307	19.5	0.119

11/25/2003 10:06	19.8	0.303	19.6	0.117
11/25/2003 10:07	19.9	0.301	19.7	0.116
11/25/2003 10:07	20	0.298	19.8	0.115
11/25/2003 10:07	20.1	0.294	19.9	0.114
11/25/2003 10:07	20.2	0.29	20	0.112
11/25/2003 10:07	20.3	0.288	20.1	0.111
11/25/2003 10:07	20.4	0.284	20.2	0.110
11/25/2003 10:07	20.5	0.282	20.3	0.109
11/25/2003 10:07	20.6	0.28	20.4	0.108
11/25/2003 10:07	20.7	0.278	20.5	0.107
11/25/2003 10:07	20.8	0.274	20.6	0.106
11/25/2003 10:08	20.9	0.272	20.7	0.105
11/25/2003 10:08	21	0.27	20.8	0.104
11/25/2003 10:08	21.1	0.266	20.9	0.103
11/25/2003 10:08	21.2	0.264	21	0.102
11/25/2003 10:08	21.3	0.262	21.1	0.101
11/25/2003 10:08	21.4	0.26	21.2	0.100
11/25/2003 10:08	21.5	0.258	21.3	0.100
11/25/2003 10:08	21.6	0.256	21.4	0.099
11/25/2003 10:08	21.7	0.252	21.5	0.097
11/25/2003 10:08	21.8	0.25	21.6	0.097
11/25/2003 10:09	21.9	0.248	21.7	0.096
11/25/2003 10:09	22	0.246	21.8	0.095
11/25/2003 10:09	22.1	0.244	21.9	0.094
11/25/2003 10:09	22.2	0.24	22	0.093
11/25/2003 10:09	22.3	0.24	22.1	0.093
11/25/2003 10:09	22.4	0.238	22.2	0.092
11/25/2003 10:09	22.5	0.236	22.3	0.091
11/25/2003 10:09	22.6	0.234	22.4	0.090
11/25/2003 10:09	22.7	0.23	22.5	0.089
11/25/2003 10:09	22.8	0.228	22.6	0.088
11/25/2003 10:10	22.9	0.228	22.7	0.088
11/25/2003 10:10	23	0.224	22.8	0.087
11/25/2003 10:10	23.1	0.222	22.9	0.086
11/25/2003 10:10	23.2	0.22	23	0.085
11/25/2003 10:10	23.3	0.218	23.1	0.084
11/25/2003 10:10	23.4	0.216	23.2	0.083
11/25/2003 10:10	23.5	0.214	23.3	0.083
11/25/2003 10:10	23.6	0.212	23.4	0.082
11/25/2003 10:10	23.7	0.212	23.5	0.082
11/25/2003 10:10	23.8	0.21	23.6	0.081
11/25/2003 10:11	23.9	0.206	23.7	0.080
11/25/2003 10:11	24	0.204	23.8	0.079
11/25/2003 10:11	24.1	0.202	23.9	0.078
11/25/2003 10:11	24.2	0.2	24	0.077
11/25/2003 10:11	24.3	0.198	24.1	0.077
11/25/2003 10:11	24.4	0.198	24.2	0.077
11/25/2003 10:11	24.5	0.196	24.3	0.076
11/25/2003 10:11	24.6	0.194	24.4	0.075
11/25/2003 10:11	24.7	0.19	24.5	0.073
11/25/2003 10:11	24.8	0.19	24.6	0.073
11/25/2003 10:12	24.9	0.186	24.7	0.072
11/25/2003 10:12	25	0.186	24.8	0.072
11/25/2003 10:12	25.1	0.184	24.9	0.071
11/25/2003 10:12	25.2	0.182	25	0.070
11/25/2003 10:12	25.3	0.182	25.1	0.070
11/25/2003 10:12	25.4	0.18	25.2	0.070
11/25/2003 10:12	25.5	0.178	25.3	0.069
11/25/2003 10:12	25.6	0.176	25.4	0.068
11/25/2003 10:12	25.7	0.176	25.5	0.068
11/25/2003 10:12	25.8	0.172	25.6	0.066
11/25/2003 10:13	25.9	0.17	25.7	0.066
11/25/2003 10:13	26	0.17	25.8	0.066
11/25/2003 10:13	26.1	0.168	25.9	0.065
11/25/2003 10:13	26.2	0.168	26	0.065
11/25/2003 10:13	26.3	0.166	26.1	0.064
11/25/2003 10:13	26.4	0.164	26.2	0.063
11/25/2003 10:13	26.5	0.162	26.3	0.063
11/25/2003 10:13	26.6	0.16	26.4	0.062
11/25/2003 10:13	26.7	0.157	26.5	0.061
11/25/2003 10:13	26.8	0.155	26.6	0.060
11/25/2003 10:14	26.9	0.155	26.7	0.060

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT34
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083	1 = r
Effective Radius of Well Screen (in.) :	.166	2 = R
Length of Well Screen (ft.) :	12.5	= L
Time for 37% head change (min.) :	8.70	= To

Hydraulic Conductivity (K) :

1.38E-04	ft./min.
2.30E-06	ft./sec.
1.99E-01	ft./day
7.00E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.5/.166)}{2 \times 12.5 \times 8.70} =$$

$$1.37 \times 10^{-4} \text{ Ft/Min}$$

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT34
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	12.5 = L
Time for 37% head change (min.) :	10.60 = To

Hydraulic Conductivity (K) :

1.13E-04	ft./min.
1.89E-06	ft./sec.
1.63E-01	ft./day
5.75E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT34

PROJECT NO.: 9060 GEOLOGIST: MG COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.11 TOC DATE: 11-25-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

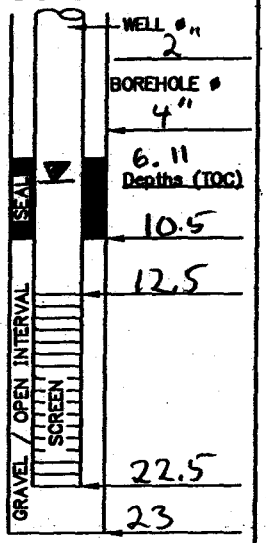
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT STATIC+START

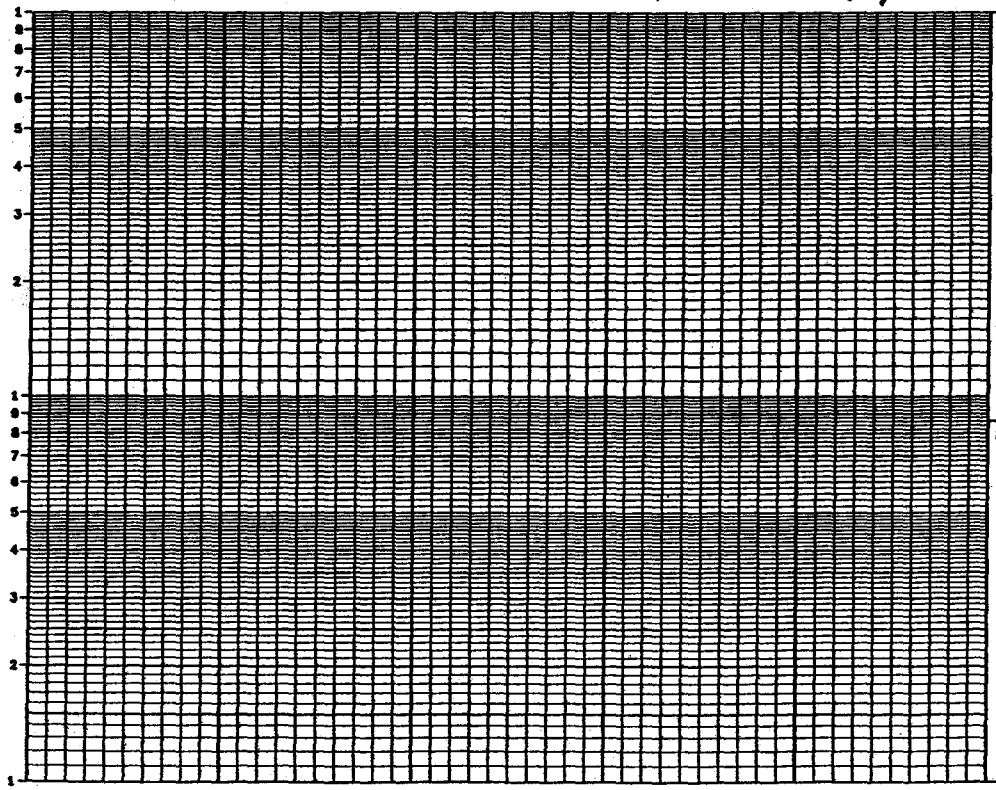
ACAD:FORM_HYDCONTST.dwg 07/08/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		2.0	-2.119	
.1	-2.709		3.0	-1.928	
.2	-2.593		4.0	-1.753	
.3	-2.548		5.0	-1.596	
.4	-2.514		6.0	-1.453	
.5	-2.484		8.0	-1.211	
.6	-2.456		10.0	-1.014	
.7	-2.427		12.0	-.852	
.8	-2.401		14.0	-.720	
.9	-2.373		18.0	-.524	
1.0	-2.349		20.0	-.452	
1.5	-2.228		25.0	-.327	
			37	-.194	

WELL SCHEMATIC

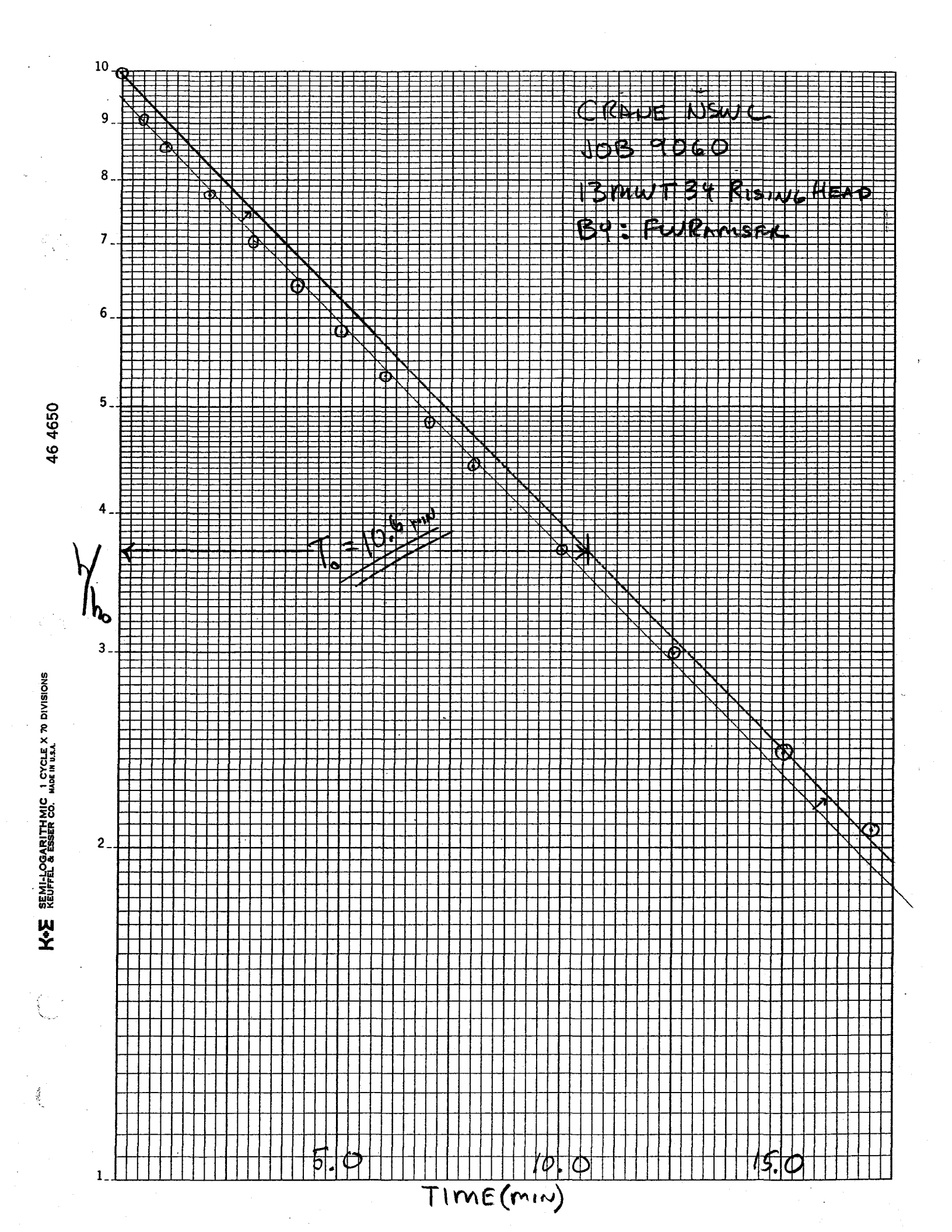


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB 9060
13MWT 3% RISING HEAD
BY: FURRAMSEK
$T_o = 10.6$ min
y/h_o
10
9
8
7
6
5
4
3
2
1
5.0
10.0
15.0
TIME (min)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 12:53:16
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-25 101615 13MWT34rising#1.bin
DataMgr Version 3.68

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT34rising#1

Test defined on: 11/25/2003 10:15:44
Test started on: 11/25/2003 10:16:15
Test stopped on: 11/25/2003 10:54:20
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 381

TOTAL DATA SAMPLES 381

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference 17.029 Feet H2O

● = PLOTTED DATA

ho = -2.709

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	
	11/25/2003 10:16	0	0			
	11/25/2003 10:16	0.1	-2.709	0	1.000	●
	11/25/2003 10:16	0.2	-2.593	0.1	0.957	
	11/25/2003 10:16	0.3	-2.548	0.2	0.941	
	11/25/2003 10:16	0.4	-2.514	0.3	0.928	
	11/25/2003 10:16	0.5	-2.484	0.4	0.917	
	11/25/2003 10:16	0.6	-2.456	0.5	0.907	●
	11/25/2003 10:16	0.7	-2.427	0.6	0.896	
	11/25/2003 10:17	0.8	-2.401	0.7	0.886	
	11/25/2003 10:17	0.9	-2.373	0.8	0.876	
	11/25/2003 10:17	1	-2.349	0.9	0.867	
	11/25/2003 10:17	1.1	-2.323	1	0.858	●
	11/25/2003 10:17	1.2	-2.298	1.1	0.848	
	11/25/2003 10:17	1.3	-2.274	1.2	0.839	
	11/25/2003 10:17	1.4	-2.252	1.3	0.831	
	11/25/2003 10:17	1.5	-2.228	1.4	0.822	
	11/25/2003 10:17	1.6	-2.208	1.5	0.815	
	11/25/2003 10:17	1.7	-2.184	1.6	0.806	
	11/25/2003 10:18	1.8	-2.161	1.7	0.798	
	11/25/2003 10:18	1.9	-2.141	1.8	0.790	
	11/25/2003 10:18	2	-2.119	1.9	0.782	
	11/25/2003 10:18	2.1	-2.099	2	0.775	●
	11/25/2003 10:18	2.2	-2.079	2.1	0.767	
	11/25/2003 10:18	2.3	-2.059	2.2	0.760	
	11/25/2003 10:18	2.4	-2.039	2.3	0.753	
	11/25/2003 10:18	2.5	-2.018	2.4	0.745	
	11/25/2003 10:18	2.6	-2	2.5	0.738	
	11/25/2003 10:18	2.7	-1.982	2.6	0.732	
	11/25/2003 10:19	2.8	-1.964	2.7	0.725	
	11/25/2003 10:19	2.9	-1.946	2.8	0.718	
	11/25/2003 10:19	3	-1.928	2.9	0.712	
	11/25/2003 10:19	3.1	-1.908	3	0.704	●
	11/25/2003 10:19	3.2	-1.892	3.1	0.698	
	11/25/2003 10:19	3.3	-1.874	3.2	0.692	
	11/25/2003 10:19	3.4	-1.855	3.3	0.685	
	11/25/2003 10:19	3.5	-1.837	3.4	0.678	
	11/25/2003 10:19	3.6	-1.821	3.5	0.672	
	11/25/2003 10:19	3.7	-1.803	3.6	0.666	
	11/25/2003 10:20	3.8	-1.787	3.7	0.660	
	11/25/2003 10:20	3.9	-1.769	3.8	0.653	

11/25/2003 10:20	4	-1.753	3.9	0.647
11/25/2003 10:20	4.1	-1.737	4	0.641
11/25/2003 10:20	4.2	-1.72	4.1	0.635
11/25/2003 10:20	4.3	-1.704	4.2	0.629
11/25/2003 10:20	4.4	-1.688	4.3	0.623
11/25/2003 10:20	4.5	-1.672	4.4	0.617
11/25/2003 10:20	4.6	-1.656	4.5	0.611
11/25/2003 10:20	4.7	-1.64	4.6	0.605
11/25/2003 10:21	4.8	-1.624	4.7	0.599
11/25/2003 10:21	4.9	-1.61	4.8	0.594
11/25/2003 10:21	5	-1.596	4.9	0.589
11/25/2003 10:21	5.1	-1.579	5	0.583
11/25/2003 10:21	5.2	-1.565	5.1	0.578
11/25/2003 10:21	5.3	-1.551	5.2	0.573
11/25/2003 10:21	5.4	-1.537	5.3	0.567
11/25/2003 10:21	5.5	-1.523	5.4	0.562
11/25/2003 10:21	5.6	-1.509	5.5	0.557
11/25/2003 10:21	5.7	-1.493	5.6	0.551
11/25/2003 10:22	5.8	-1.481	5.7	0.547
11/25/2003 10:22	5.9	-1.467	5.8	0.542
11/25/2003 10:22	6	-1.453	5.9	0.536
11/25/2003 10:22	6.1	-1.441	6	0.532
11/25/2003 10:22	6.2	-1.427	6.1	0.527
11/25/2003 10:22	6.3	-1.414	6.2	0.522
11/25/2003 10:22	6.4	-1.4	6.3	0.517
11/25/2003 10:22	6.5	-1.388	6.4	0.512
11/25/2003 10:22	6.6	-1.376	6.5	0.508
11/25/2003 10:22	6.7	-1.362	6.6	0.503
11/25/2003 10:23	6.8	-1.35	6.7	0.498
11/25/2003 10:23	6.9	-1.338	6.8	0.494
11/25/2003 10:23	7	-1.326	6.9	0.489
11/25/2003 10:23	7.1	-1.314	7	0.485
11/25/2003 10:23	7.2	-1.302	7.1	0.481
11/25/2003 10:23	7.3	-1.29	7.2	0.476
11/25/2003 10:23	7.4	-1.277	7.3	0.471
11/25/2003 10:23	7.5	-1.265	7.4	0.467
11/25/2003 10:23	7.6	-1.255	7.5	0.463
11/25/2003 10:23	7.7	-1.245	7.6	0.460
11/25/2003 10:24	7.8	-1.233	7.7	0.455
11/25/2003 10:24	7.9	-1.221	7.8	0.451
11/25/2003 10:24	8	-1.211	7.9	0.447
11/25/2003 10:24	8.1	-1.199	8	0.443
11/25/2003 10:24	8.2	-1.189	8.1	0.439
11/25/2003 10:24	8.3	-1.179	8.2	0.435
11/25/2003 10:24	8.4	-1.167	8.3	0.431
11/25/2003 10:24	8.5	-1.157	8.4	0.427
11/25/2003 10:24	8.6	-1.147	8.5	0.423
11/25/2003 10:24	8.7	-1.136	8.6	0.419
11/25/2003 10:25	8.8	-1.126	8.7	0.416
11/25/2003 10:25	8.9	-1.116	8.8	0.412
11/25/2003 10:25	9	-1.106	8.9	0.408
11/25/2003 10:25	9.1	-1.096	9	0.405
11/25/2003 10:25	9.2	-1.086	9.1	0.401
11/25/2003 10:25	9.3	-1.078	9.2	0.398
11/25/2003 10:25	9.4	-1.068	9.3	0.394
11/25/2003 10:25	9.5	-1.058	9.4	0.391
11/25/2003 10:25	9.6	-1.048	9.5	0.387
11/25/2003 10:25	9.7	-1.04	9.6	0.384
11/25/2003 10:26	9.8	-1.03	9.7	0.380
11/25/2003 10:26	9.9	-1.024	9.8	0.378
11/25/2003 10:26	10	-1.014	9.9	0.374
11/25/2003 10:26	10.1	-1.004	10	0.371
11/25/2003 10:26	10.2	-0.995	10.1	0.367
11/25/2003 10:26	10.3	-0.987	10.2	0.364
11/25/2003 10:26	10.4	-0.979	10.3	0.361
11/25/2003 10:26	10.5	-0.969	10.4	0.358
11/25/2003 10:26	10.6	-0.961	10.5	0.355
11/25/2003 10:26	10.7	-0.951	10.6	0.351
11/25/2003 10:27	10.8	-0.943	10.7	0.348
11/25/2003 10:27	10.9	-0.935	10.8	0.345
11/25/2003 10:27	11	-0.927	10.9	0.342
11/25/2003 10:27	11.1	-0.921	11	0.340
11/25/2003 10:27	11.2	-0.913	11.1	0.337
11/25/2003 10:27	11.3	-0.905	11.2	0.334
11/25/2003 10:27	11.4	-0.897	11.3	0.331
11/25/2003 10:27	11.5	-0.889	11.4	0.328
11/25/2003 10:27	11.6	-0.881	11.5	0.325
11/25/2003 10:27	11.7	-0.873	11.6	0.322
11/25/2003 10:28	11.8	-0.867	11.7	0.320

11/25/2003 10:28	11.9	-0.858	11.8	0.317
11/25/2003 10:28	12	-0.852	11.9	0.315
11/25/2003 10:28	12.1	-0.846	12	0.312
11/25/2003 10:28	12.2	-0.838	12.1	0.309
11/25/2003 10:28	12.3	-0.83	12.2	0.306
11/25/2003 10:28	12.4	-0.824	12.3	0.304
11/25/2003 10:28	12.5	-0.816	12.4	0.301
11/25/2003 10:28	12.6	-0.81	12.5	0.299
11/25/2003 10:28	12.7	-0.802	12.6	0.296
11/25/2003 10:29	12.8	-0.796	12.7	0.294
11/25/2003 10:29	12.9	-0.788	12.8	0.291
11/25/2003 10:29	13	-0.784	12.9	0.289
11/25/2003 10:29	13.1	-0.776	13	0.286
11/25/2003 10:29	13.2	-0.77	13.1	0.284
11/25/2003 10:29	13.3	-0.764	13.2	0.282
11/25/2003 10:29	13.4	-0.756	13.3	0.279
11/25/2003 10:29	13.5	-0.75	13.4	0.277
11/25/2003 10:29	13.6	-0.746	13.5	0.275
11/25/2003 10:29	13.7	-0.738	13.6	0.272
11/25/2003 10:30	13.8	-0.73	13.7	0.269
11/25/2003 10:30	13.9	-0.726	13.8	0.268
11/25/2003 10:30	14	-0.72	13.9	0.266
11/25/2003 10:30	14.1	-0.713	14	0.263
11/25/2003 10:30	14.2	-0.707	14.1	0.261
11/25/2003 10:30	14.3	-0.701	14.2	0.259
11/25/2003 10:30	14.4	-0.695	14.3	0.257
11/25/2003 10:30	14.5	-0.687	14.4	0.254
11/25/2003 10:30	14.6	-0.685	14.5	0.253
11/25/2003 10:30	14.7	-0.679	14.6	0.251
11/25/2003 10:31	14.8	-0.675	14.7	0.249
11/25/2003 10:31	14.9	-0.667	14.8	0.246
11/25/2003 10:31	15	-0.663	14.9	0.245
11/25/2003 10:31	15.1	-0.657	15	0.243
11/25/2003 10:31	15.2	-0.651	15.1	0.240
11/25/2003 10:31	15.3	-0.647	15.2	0.239
11/25/2003 10:31	15.4	-0.643	15.3	0.237
11/25/2003 10:31	15.5	-0.637	15.4	0.235
11/25/2003 10:31	15.6	-0.633	15.5	0.234
11/25/2003 10:31	15.7	-0.627	15.6	0.231
11/25/2003 10:32	15.8	-0.623	15.7	0.230
11/25/2003 10:32	15.9	-0.617	15.8	0.228
11/25/2003 10:32	16	-0.613	15.9	0.226
11/25/2003 10:32	16.1	-0.607	16	0.224
11/25/2003 10:32	16.2	-0.603	16.1	0.223
11/25/2003 10:32	16.3	-0.599	16.2	0.221
11/25/2003 10:32	16.4	-0.595	16.3	0.220
11/25/2003 10:32	16.5	-0.589	16.4	0.217
11/25/2003 10:32	16.6	-0.585	16.5	0.216
11/25/2003 10:32	16.7	-0.581	16.6	0.214
11/25/2003 10:33	16.8	-0.574	16.7	0.212
11/25/2003 10:33	16.9	-0.57	16.8	0.210
11/25/2003 10:33	17	-0.564	16.9	0.208
11/25/2003 10:33	17.1	-0.562	17	0.207
11/25/2003 10:33	17.2	-0.558	17.1	0.206
11/25/2003 10:33	17.3	-0.552	17.2	0.204
11/25/2003 10:33	17.4	-0.548	17.3	0.202
11/25/2003 10:33	17.5	-0.544	17.4	0.201
11/25/2003 10:33	17.6	-0.54	17.5	0.199
11/25/2003 10:33	17.7	-0.536	17.6	0.198
11/25/2003 10:34	17.8	-0.532	17.7	0.196
11/25/2003 10:34	17.9	-0.528	17.8	0.195
11/25/2003 10:34	18	-0.524	17.9	0.193
11/25/2003 10:34	18.1	-0.52	18	0.192
11/25/2003 10:34	18.2	-0.516	18.1	0.190
11/25/2003 10:34	18.3	-0.512	18.2	0.189
11/25/2003 10:34	18.4	-0.51	18.3	0.188
11/25/2003 10:34	18.5	-0.506	18.4	0.187
11/25/2003 10:34	18.6	-0.502	18.5	0.185
11/25/2003 10:34	18.7	-0.498	18.6	0.184
11/25/2003 10:35	18.8	-0.494	18.7	0.182
11/25/2003 10:35	18.9	-0.49	18.8	0.181
11/25/2003 10:35	19	-0.486	18.9	0.179
11/25/2003 10:35	19.1	-0.482	19	0.178
11/25/2003 10:35	19.2	-0.48	19.1	0.177
11/25/2003 10:35	19.3	-0.476	19.2	0.176
11/25/2003 10:35	19.4	-0.472	19.3	0.174
11/25/2003 10:35	19.5	-0.47	19.4	0.173
11/25/2003 10:35	19.6	-0.466	19.5	0.172
11/25/2003 10:35	19.7	-0.464	19.6	0.171

11/25/2003 10:36	19.8	-0.46	19.7	0.170
11/25/2003 10:36	19.9	-0.458	19.8	0.169
11/25/2003 10:36	20	-0.452	19.9	0.167
11/25/2003 10:36	20.1	-0.45	20	0.166
11/25/2003 10:36	20.2	-0.446	20.1	0.165
11/25/2003 10:36	20.3	-0.442	20.2	0.163
11/25/2003 10:36	20.4	-0.44	20.3	0.162
11/25/2003 10:36	20.5	-0.435	20.4	0.161
11/25/2003 10:36	20.6	-0.433	20.5	0.160
11/25/2003 10:36	20.7	-0.431	20.6	0.159
11/25/2003 10:37	20.8	-0.427	20.7	0.158
11/25/2003 10:37	20.9	-0.425	20.8	0.157
11/25/2003 10:37	21	-0.421	20.9	0.155
11/25/2003 10:37	21.1	-0.419	21	0.155
11/25/2003 10:37	21.2	-0.417	21.1	0.154
11/25/2003 10:37	21.3	-0.413	21.2	0.152
11/25/2003 10:37	21.4	-0.411	21.3	0.152
11/25/2003 10:37	21.5	-0.407	21.4	0.150
11/25/2003 10:37	21.6	-0.405	21.5	0.150
11/25/2003 10:37	21.7	-0.403	21.6	0.149
11/25/2003 10:38	21.8	-0.399	21.7	0.147
11/25/2003 10:38	21.9	-0.397	21.8	0.147
11/25/2003 10:38	22	-0.395	21.9	0.146
11/25/2003 10:38	22.1	-0.393	22	0.145
11/25/2003 10:38	22.2	-0.389	22.1	0.144
11/25/2003 10:38	22.3	-0.385	22.2	0.142
11/25/2003 10:38	22.4	-0.385	22.3	0.142
11/25/2003 10:38	22.5	-0.381	22.4	0.141
11/25/2003 10:38	22.6	-0.379	22.5	0.140
11/25/2003 10:38	22.7	-0.377	22.6	0.139
11/25/2003 10:39	22.8	-0.375	22.7	0.138
11/25/2003 10:39	22.9	-0.373	22.8	0.138
11/25/2003 10:39	23	-0.369	22.9	0.136
11/25/2003 10:39	23.1	-0.367	23	0.135
11/25/2003 10:39	23.2	-0.365	23.1	0.135
11/25/2003 10:39	23.3	-0.363	23.2	0.134
11/25/2003 10:39	23.4	-0.361	23.3	0.133
11/25/2003 10:39	23.5	-0.357	23.4	0.132
11/25/2003 10:39	23.6	-0.357	23.5	0.132
11/25/2003 10:39	23.7	-0.355	23.6	0.131
11/25/2003 10:40	23.8	-0.351	23.7	0.130
11/25/2003 10:40	23.9	-0.349	23.8	0.129
11/25/2003 10:40	24	-0.347	23.9	0.128
11/25/2003 10:40	24.1	-0.345	24	0.127
11/25/2003 10:40	24.2	-0.343	24.1	0.127
11/25/2003 10:40	24.3	-0.339	24.2	0.125
11/25/2003 10:40	24.4	-0.339	24.3	0.125
11/25/2003 10:40	24.5	-0.337	24.4	0.124
11/25/2003 10:40	24.6	-0.335	24.5	0.124
11/25/2003 10:40	24.7	-0.333	24.6	0.123
11/25/2003 10:41	24.8	-0.331	24.7	0.122
11/25/2003 10:41	24.9	-0.329	24.8	0.121
11/25/2003 10:41	25	-0.327	24.9	0.121
11/25/2003 10:42	26	-0.309	25.9	0.114
11/25/2003 10:43	27	-0.292	26.9	0.108
11/25/2003 10:44	28	-0.276	27.9	0.102
11/25/2003 10:45	29	-0.264	28.9	0.097
11/25/2003 10:46	30	-0.25	29.9	0.092
11/25/2003 10:47	31	-0.24	30.9	0.089
11/25/2003 10:48	32	-0.23	31.9	0.085
11/25/2003 10:49	33	-0.222	32.9	0.082
11/25/2003 10:50	34	-0.212	33.9	0.078
11/25/2003 10:51	35	-0.206	34.9	0.076
11/25/2003 10:52	36	-0.2	35.9	0.074
11/25/2003 10:53	37	-0.194	36.9	0.072
11/25/2003 10:54	38	-0.19	37.9	0.070

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT34
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166'	2 = R
Length of Well Screen (ft.) :	12.5	= L
Time for 37% head change (min.) :	10.60	= To

Hydraulic Conductivity (K) :

1.13E-04	ft./min.
1.89E-06	ft./sec.
1.63E-01	ft./day
5.75E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.5/.166)}{2 \times 12.5 \times 10.60} =$$

1.12×10^{-4} FT/MIN

CHECKED
MH
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT35
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	20-Jan-04

Done By: FWRamser
Checked By:

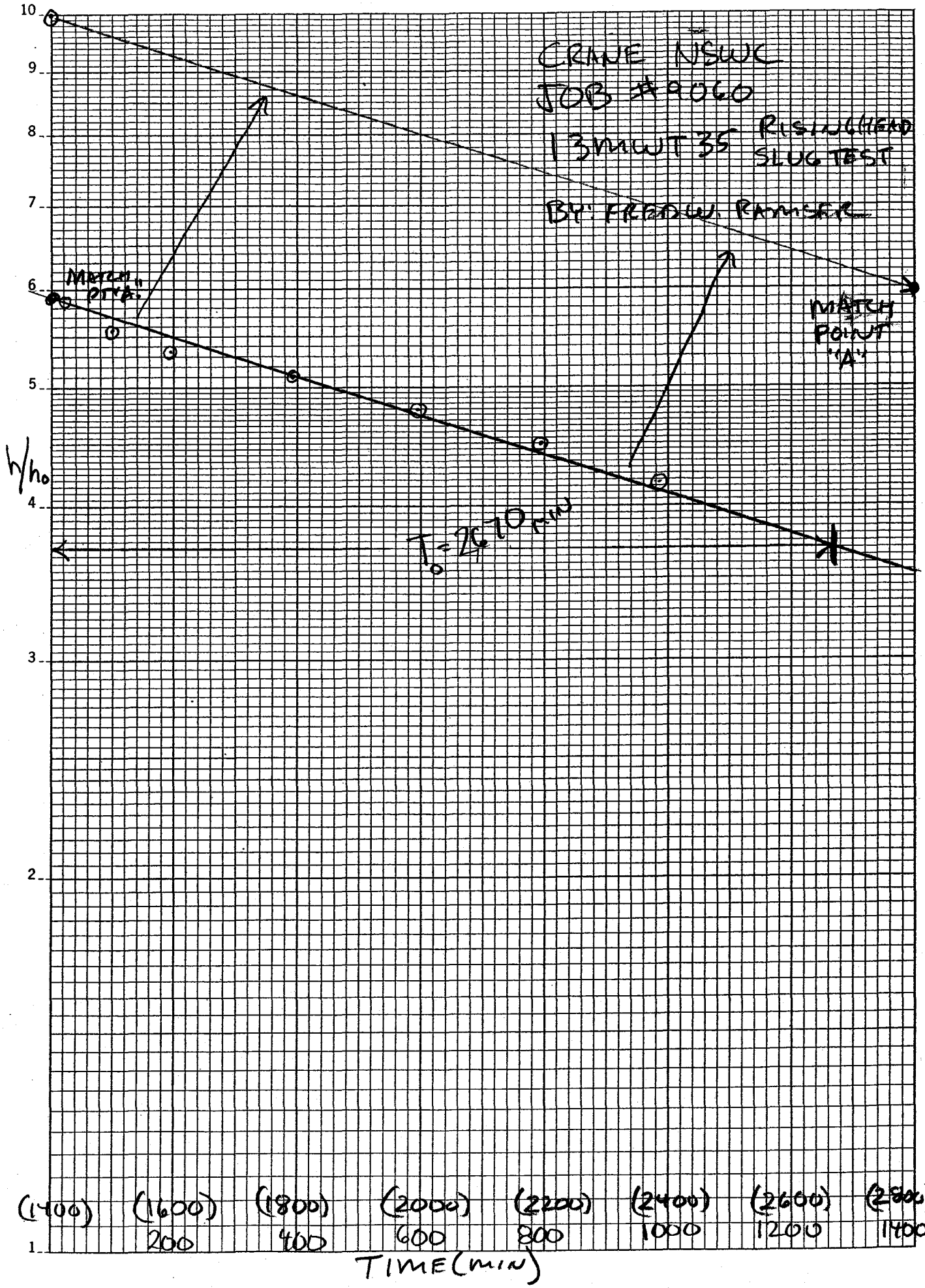
Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	8.14 = L
Time for 37% head change (min.) :	2670.00 = To

Hydraulic Conductivity (K) :

6.21E-07	ft./min.
1.04E-08	ft./sec.
8.95E-04	ft./day
3.16E-07	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$



46 4650

K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc.	MiniTroll Pro							
Report generated:	1/22/2004	21:46:32						
Report from file:	...\SN08670 2004-01-20 165520 13mwt35r1.bin							
Win-Situ Version	4.41							
Serial number:	8670							
Firmware Version	3.07							
Unit name:								
Test name:		13mwt35r1						
Test defined on:	1/20/2004	13:04:38						
Test started on:	1/20/2004	16:55:20						
Test stopped on:	N/A	N/A						
Test extracted on:	N/A	N/A						
Data gathered using Logarithmic testing								
Maximum time between dat	Minutes.							
Number of data samples:	232							
TOTAL DATA SAMPLES	232							
Channel number [1]								
Measurement type:	Temperature							
Channel name:								
Channel number [2]								
Measurement type:	Pressure							
Channel name:	Water level							
Sensor Range:	100 PSIG.							
Specific gravity:	1							
Mode:	TOC							
User-defined reference:	0	Feet H2O						
Referenced on:	test start							
Pressure head at reference:	6.209	Feet H2O						
			Chan[1]	Chan[2]				
Date	Time	ET (min)	Fahrenheit	Feet H2O	Adjusted ET. (min)	h/ho	ho =	0.807
1/20/2004	16:55:20	0	57.38	0				
1/20/2004	16:55:20	0.005	57.4	-0.012				
1/20/2004	16:55:20	0.01	57.4	-0.018				
1/20/2004	16:55:21	0.015	57.42	-0.017				
1/20/2004	16:55:21	0.02	57.42	-0.023				
1/20/2004	16:55:21	0.025	57.42	-0.023				
1/20/2004	16:55:22	0.03	57.45	-0.023				
1/20/2004	16:55:22	0.035	57.45	-0.029				
1/20/2004	16:55:22	0.04	57.45	-0.023				
1/20/2004	16:55:22	0.045	57.45	-0.029				
1/20/2004	16:55:23	0.05	57.45	-0.029				
1/20/2004	16:55:23	0.055	57.45	0.027				
1/20/2004	16:55:23	0.06	57.45	-0.06				
1/20/2004	16:55:24	0.065	57.45	0.793				
1/20/2004	16:55:24	0.07	57.45	1.647				
1/20/2004	16:55:24	0.075	57.45	0.065				
1/20/2004	16:55:25	0.08	57.45	1.31				
1/20/2004	16:55:25	0.085	57.45	1.491				
1/20/2004	16:55:25	0.09	57.45	1.379				
1/20/2004	16:55:25	0.095	57.47	1.261				
1/20/2004	16:55:26	0.1	57.45	1.173				
1/20/2004	16:55:26	0.1058	57.47	1.093				
1/20/2004	16:55:27	0.112	57.47	0.944				
1/20/2004	16:55:27	0.1185	57.47	0.863				
1/20/2004	16:55:27	0.1255	57.47	0.807	0	1.000		
1/20/2004	16:55:28	0.1328	57.47	0.782	0.0073	0.969		
1/20/2004	16:55:28	0.1407	57.47	0.682	0.0152	0.845		

1/20/2004	16:55:29	0.149	57.47	0.614	0.0235	0.761		
1/20/2004	16:55:29	0.1578	57.47	0.682	0.0323	0.845		
1/20/2004	16:55:30	0.1672	57.45	0.619	0.0417	0.767		
1/20/2004	16:55:30	0.177	57.45	0.613	0.0515	0.760		
1/20/2004	16:55:31	0.1875	57.45	0.65	0.062	0.805		
1/20/2004	16:55:32	0.1985	57.45	0.619	0.073	0.767		
1/20/2004	16:55:32	0.2102	57.45	0.569	0.0847	0.705		
1/20/2004	16:55:33	0.2227	57.45	0.625	0.0972	0.774	•	
1/20/2004	16:55:34	0.2358	57.45	0.575	0.1103	0.713		
1/20/2004	16:55:35	0.2498	57.45	0.569	0.1243	0.705		
1/20/2004	16:55:36	0.2647	57.45	0.557	0.1392	0.690		
1/20/2004	16:55:37	0.2803	57.45	0.55	0.1548	0.682		
1/20/2004	16:55:38	0.297	57.45	0.55	0.1715	0.682		
1/20/2004	16:55:39	0.3147	57.42	0.543	0.1892	0.673		
1/20/2004	16:55:40	0.3333	57.45	0.544	0.2078	0.674		
1/20/2004	16:55:41	0.3532	57.42	0.537	0.2277	0.665		
1/20/2004	16:55:42	0.3742	57.42	0.537	0.2487	0.665	•	
1/20/2004	16:55:44	0.3963	57.42	0.531	0.2708	0.658		
1/20/2004	16:55:45	0.4198	57.42	0.531	0.2943	0.658		
1/20/2004	16:55:46	0.4447	57.42	0.525	0.3192	0.651		
1/20/2004	16:55:48	0.4697	57.42	0.525	0.3442	0.651		
1/20/2004	16:55:50	0.4963	57.42	0.519	0.3708	0.643		
1/20/2004	16:55:51	0.5247	57.42	0.519	0.3992	0.643		
1/20/2004	16:55:53	0.5547	57.42	0.512	0.4292	0.634		
1/20/2004	16:55:55	0.5863	57.42	0.512	0.4608	0.634		
1/20/2004	16:55:57	0.6213	57.42	0.512	0.4958	0.634	•	
1/20/2004	16:55:59	0.658	57.42	0.506	0.5325	0.627		
1/20/2004	16:56:02	0.6963	57.42	0.506	0.5708	0.627		
1/20/2004	16:56:04	0.738	57.42	0.506	0.6125	0.627		
1/20/2004	16:56:07	0.7813	57.42	0.506	0.6558	0.627		
1/20/2004	16:56:09	0.828	57.42	0.5	0.7025	0.620		
1/20/2004	16:56:12	0.8763	57.42	0.5	0.7508	0.620		
1/20/2004	16:56:15	0.928	57.42	0.5	0.8025	0.620		
1/20/2004	16:56:19	0.983	57.42	0.5	0.8575	0.620		
1/20/2004	16:56:22	1.0413	57.42	0.5	0.9158	0.620		
1/20/2004	16:56:26	1.103	57.4	0.499	0.9775	0.618	•	
1/20/2004	16:56:30	1.168	57.4	0.493	1.0425	0.611		
1/20/2004	16:56:34	1.238	57.4	0.493	1.1125	0.611		
1/20/2004	16:56:38	1.3113	57.4	0.493	1.1858	0.611		
1/20/2004	16:56:43	1.3897	57.4	0.493	1.2642	0.611		
1/20/2004	16:56:48	1.473	57.4	0.493	1.3475	0.611		
1/20/2004	16:56:53	1.5613	57.4	0.487	1.4358	0.603		
1/20/2004	16:56:59	1.6547	57.4	0.487	1.5292	0.603		
1/20/2004	16:57:05	1.753	57.4	0.487	1.6275	0.603		
1/20/2004	16:57:11	1.858	57.4	0.487	1.7325	0.603		
1/20/2004	16:57:18	1.968	57.4	0.487	1.8425	0.603		
1/20/2004	16:57:25	2.0847	57.4	0.487	1.9592	0.603	•	
1/20/2004	16:57:32	2.2097	57.4	0.487	2.0842	0.603		
1/20/2004	16:57:40	2.3413	57.4	0.48	2.2158	0.595		
1/20/2004	16:57:49	2.4813	57.4	0.48	2.3558	0.595		
1/20/2004	16:57:58	2.6297	57.4	0.48	2.5042	0.595		
1/20/2004	16:58:07	2.7863	57.4	0.48	2.6608	0.595		
1/20/2004	16:58:17	2.953	57.38	0.48	2.8275	0.595		
1/20/2004	16:58:28	3.1297	57.4	0.48	3.0042	0.595	•	
1/20/2004	16:58:39	3.3163	57.38	0.48	3.1908	0.595		
1/20/2004	16:58:51	3.5147	57.38	0.48	3.3892	0.595		
1/20/2004	16:59:03	3.7247	57.38	0.48	3.5992	0.595		
1/20/2004	16:59:17	3.9463	57.38	0.473	3.8208	0.586		
1/20/2004	16:59:31	4.1813	57.38	0.473	4.0558	0.586		
1/20/2004	16:59:46	4.4297	57.38	0.473	4.3042	0.586		
1/20/2004	17:00:01	4.693	57.38	0.473	4.5675	0.586		
1/20/2004	17:00:18	4.973	57.38	0.473	4.8475	0.586		
1/20/2004	17:00:36	5.2697	57.38	0.473	5.1442	0.586		
1/20/2004	17:00:55	5.583	57.38	0.473	5.4575	0.586		
1/20/2004	17:01:15	5.9147	57.38	0.473	5.7892	0.586		
1/20/2004	17:01:36	6.2663	57.38	0.473	6.1408	0.586		
1/20/2004	17:01:58	6.6397	57.38	0.473	6.5142	0.586		
1/20/2004	17:02:22	7.0347	57.38	0.473	6.9092	0.586		
1/20/2004	17:02:47	7.453	57.38	0.473	7.3275	0.586		
1/20/2004	17:03:14	7.8963	57.38	0.467	7.7708	0.579		

1/20/2004	17:03:42	8.3663	57.38	0.473	8.2408	0.586		
1/20/2004	17:04:12	8.8647	57.38	0.473	8.7392	0.586		
1/20/2004	17:04:43	9.3913	57.38	0.473	9.2658	0.586		
1/20/2004	17:05:17	9.9497	57.38	0.473	9.8242	0.586		
1/20/2004	17:05:52	10.5413	57.38	0.473	10.4158	0.586		
1/20/2004	17:06:30	11.168	57.38	0.467	11.0425	0.579		
1/20/2004	17:07:10	11.8313	57.38	0.467	11.7058	0.579		
1/20/2004	17:07:52	12.5347	57.38	0.467	12.4092	0.579		
1/20/2004	17:08:37	13.2797	57.38	0.473	13.1542	0.586		
1/20/2004	17:09:24	14.0697	57.38	0.467	13.9442	0.579		
1/20/2004	17:10:14	14.9063	57.38	0.467	14.7808	0.579		
1/20/2004	17:11:07	15.7913	57.38	0.467	15.6658	0.579		
1/20/2004	17:12:04	16.7297	57.38	0.467	16.6042	0.579		
1/20/2004	17:13:03	17.723	57.4	0.468	17.5975	0.580		
1/20/2004	17:14:06	18.7763	57.38	0.467	18.6508	0.579		
1/20/2004	17:15:13	19.8913	57.38	0.467	19.7658	0.579		
1/20/2004	17:16:24	21.073	57.38	0.467	20.9475	0.579		
1/20/2004	17:17:39	22.3247	57.38	0.467	22.1992	0.579		
1/20/2004	17:18:59	23.6497	57.38	0.461	23.5242	0.571		
1/20/2004	17:20:23	25.0547	57.4	0.468	24.9292	0.580		
1/20/2004	17:21:52	26.543	57.38	0.461	26.4175	0.571		
1/20/2004	17:23:27	28.118	57.4	0.468	27.9925	0.580		
1/20/2004	17:25:07	29.7863	57.4	0.462	29.6608	0.572		
1/20/2004	17:26:53	31.5547	57.4	0.468	31.4292	0.580		
1/20/2004	17:28:45	33.428	57.4	0.468	33.3025	0.580		
1/20/2004	17:30:44	35.4113	57.4	0.462	35.2858	0.572		
1/20/2004	17:32:51	37.513	57.4	0.462	37.3875	0.572		
1/20/2004	17:35:04	39.7397	57.4	0.468	39.6142	0.580		
1/20/2004	17:37:26	42.098	57.4	0.462	41.9725	0.572		
1/20/2004	17:39:56	44.5963	57.4	0.462	44.4708	0.572		
1/20/2004	17:42:34	47.243	57.4	0.462	47.1175	0.572		
1/20/2004	17:45:23	50.0463	57.4	0.462	49.9208	0.572		
1/20/2004	17:48:21	53.0147	57.4	0.462	52.8892	0.572		
1/20/2004	17:51:29	56.1597	57.4	0.462	56.0342	0.572		
1/20/2004	17:54:49	59.4913	57.4	0.455	59.3658	0.564		
1/20/2004	17:58:21	63.0197	57.4	0.455	62.8942	0.564		
1/20/2004	18:02:05	66.758	57.4	0.455	66.6325	0.564		
1/20/2004	18:06:03	70.718	57.4	0.455	70.5925	0.564		
1/20/2004	18:10:14	74.9113	57.4	0.449	74.7858	0.556		
1/20/2004	18:14:41	79.3547	57.4	0.455	79.2292	0.564		
1/20/2004	18:19:23	84.0613	57.4	0.455	83.9358	0.564		
1/20/2004	18:24:23	89.0463	57.4	0.449	88.9208	0.556		
1/20/2004	18:29:39	94.3263	57.4	0.449	94.2008	0.556		
1/20/2004	18:35:15	99.9197	57.4	0.449	99.7942	0.556		
1/20/2004	18:41:10	105.8447	57.4	0.449	105.7192	0.556		
1/20/2004	18:47:27	112.1197	57.4	0.443	111.9942	0.549		
1/20/2004	18:54:06	118.768	57.4	0.443	118.6425	0.549		
1/20/2004	19:01:08	125.8097	57.4	0.443	125.6842	0.549		
1/20/2004	19:08:36	133.268	57.4	0.443	133.1425	0.549		
1/20/2004	19:16:30	141.168	57.4	0.443	141.0425	0.549		
1/20/2004	19:24:52	149.5363	57.4	0.443	149.4108	0.549		
1/20/2004	19:33:44	158.4013	57.4	0.437	158.2758	0.542		
1/20/2004	19:43:07	167.7913	57.4	0.437	167.6658	0.542		
1/20/2004	19:53:04	177.738	57.4	0.437	177.6125	0.542		
1/20/2004	20:03:04	187.738	57.4	0.431	187.6125	0.534		
1/20/2004	20:13:04	197.738	57.4	0.431	197.6125	0.534		
1/20/2004	20:23:04	207.738	57.4	0.431	207.6125	0.534		
1/20/2004	20:33:04	217.738	57.4	0.424	217.6125	0.525		
1/20/2004	20:43:04	227.738	57.4	0.431	227.6125	0.534		
1/20/2004	20:53:04	237.738	57.4	0.424	237.6125	0.525		
1/20/2004	21:03:04	247.738	57.4	0.431	247.6125	0.534		
1/20/2004	21:13:04	257.738	57.4	0.424	257.6125	0.525		
1/20/2004	21:23:04	267.738	57.4	0.418	267.6125	0.518		
1/20/2004	21:33:04	277.738	57.4	0.424	277.6125	0.525		
1/20/2004	21:43:04	287.738	57.4	0.418	287.6125	0.518		
1/20/2004	21:53:04	297.738	57.4	0.418	297.6125	0.518		
1/20/2004	22:03:04	307.738	57.4	0.418	307.6125	0.518		
1/20/2004	22:13:04	317.738	57.4	0.418	317.6125	0.518		
1/20/2004	22:23:04	327.738	57.4	0.418	327.6125	0.518		
1/20/2004	22:33:04	337.738	57.4	0.412	337.6125	0.511		

1/20/2004	22:43:04	347.738	57.4	0.418	347.6125	0.518		
1/20/2004	22:53:04	357.738	57.4	0.412	357.6125	0.511		
1/20/2004	23:03:04	367.738	57.4	0.418	367.6125	0.518		
1/20/2004	23:13:04	377.738	57.4	0.412	377.6125	0.511		
1/20/2004	23:23:04	387.738	57.4	0.412	387.6125	0.511		
1/20/2004	23:33:04	397.738	57.4	0.412	397.6125	0.511		
1/20/2004	23:43:04	407.738	57.4	0.412	407.6125	0.511		
1/20/2004	23:53:04	417.738	57.4	0.406	417.6125	0.503		
1/21/2004	0:03:04	427.738	57.4	0.406	427.6125	0.503		
1/21/2004	0:13:04	437.738	57.4	0.406	437.6125	0.503		
1/21/2004	0:23:04	447.738	57.4	0.406	447.6125	0.503		
1/21/2004	0:33:04	457.738	57.4	0.406	457.6125	0.503		
1/21/2004	0:43:04	467.738	57.4	0.406	467.6125	0.503		
1/21/2004	0:53:04	477.738	57.4	0.399	477.6125	0.494		
1/21/2004	1:03:04	487.738	57.4	0.399	487.6125	0.494		
1/21/2004	1:13:04	497.738	57.4	0.399	497.6125	0.494		
1/21/2004	1:23:04	507.738	57.4	0.399	507.6125	0.494		
1/21/2004	1:33:04	517.738	57.4	0.399	517.6125	0.494		
1/21/2004	1:43:04	527.738	57.4	0.399	527.6125	0.494		
1/21/2004	1:53:04	537.738	57.4	0.399	537.6125	0.494		
1/21/2004	2:03:04	547.738	57.4	0.393	547.6125	0.487		
1/21/2004	2:13:04	557.738	57.4	0.393	557.6125	0.487		
1/21/2004	2:23:04	567.738	57.4	0.393	567.6125	0.487		
1/21/2004	2:33:04	577.738	57.4	0.387	577.6125	0.480		
1/21/2004	2:43:04	587.738	57.4	0.393	587.6125	0.487		
1/21/2004	2:53:04	597.738	57.4	0.387	597.6125	0.480		
1/21/2004	3:03:04	607.738	57.4	0.387	607.6125	0.480		
1/21/2004	3:13:04	617.738	57.4	0.387	617.6125	0.480		
1/21/2004	3:23:04	627.738	57.4	0.387	627.6125	0.480		
1/21/2004	3:33:04	637.738	57.4	0.387	637.6125	0.480		
1/21/2004	3:43:04	647.738	57.4	0.381	647.6125	0.472		
1/21/2004	3:53:04	657.738	57.4	0.381	657.6125	0.472		
1/21/2004	4:03:04	667.738	57.4	0.381	667.6125	0.472		
1/21/2004	4:13:04	677.738	57.4	0.381	677.6125	0.472		
1/21/2004	4:23:04	687.738	57.4	0.381	687.6125	0.472		
1/21/2004	4:33:04	697.738	57.4	0.381	697.6125	0.472		
1/21/2004	4:43:04	707.738	57.4	0.381	707.6125	0.472		
1/21/2004	4:53:04	717.738	57.4	0.374	717.6125	0.463		
1/21/2004	5:03:04	727.738	57.4	0.374	727.6125	0.463		
1/21/2004	5:13:04	737.738	57.4	0.374	737.6125	0.463		
1/21/2004	5:23:04	747.738	57.4	0.374	747.6125	0.463		
1/21/2004	5:33:04	757.738	57.4	0.374	757.6125	0.463		
1/21/2004	5:43:04	767.738	57.4	0.368	767.6125	0.456		
1/21/2004	5:53:04	777.738	57.4	0.368	777.6125	0.456		
1/21/2004	6:03:04	787.738	57.4	0.362	787.6125	0.449		
1/21/2004	6:13:04	797.738	57.4	0.362	797.6125	0.449		
1/21/2004	6:23:04	807.738	57.4	0.362	807.6125	0.449		
1/21/2004	6:33:04	817.738	57.4	0.362	817.6125	0.449		
1/21/2004	6:43:04	827.738	57.4	0.362	827.6125	0.449		
1/21/2004	6:53:04	837.738	57.4	0.362	837.6125	0.449		
1/21/2004	7:03:04	847.738	57.4	0.356	847.6125	0.441		
1/21/2004	7:13:04	857.738	57.4	0.356	857.6125	0.441		
1/21/2004	7:23:04	867.738	57.4	0.356	867.6125	0.441		
1/21/2004	7:33:04	877.738	57.4	0.356	877.6125	0.441		
1/21/2004	7:43:04	887.738	57.4	0.356	887.6125	0.441		
1/21/2004	7:53:04	897.738	57.4	0.35	897.6125	0.434		
1/21/2004	8:03:04	907.738	57.4	0.35	907.6125	0.434		
1/21/2004	8:13:04	917.738	57.4	0.35	917.6125	0.434		
1/21/2004	8:23:04	927.738	57.4	0.343	927.6125	0.425		
1/21/2004	8:33:04	937.738	57.4	0.35	937.6125	0.434		
1/21/2004	8:43:04	947.738	57.4	0.343	947.6125	0.425		
1/21/2004	8:53:04	957.738	57.4	0.343	957.6125	0.425		
1/21/2004	9:03:04	967.738	57.4	0.343	967.6125	0.425		
1/21/2004	9:13:04	977.738	57.4	0.337	977.6125	0.418		
1/21/2004	9:23:04	987.738	57.4	0.337	987.6125	0.418		

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC WELL/BORING NO.: 13MWT35

PROJECT NO.: 9060 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10', 60.22-70.22 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 64.08 DATE: 1-20-04

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

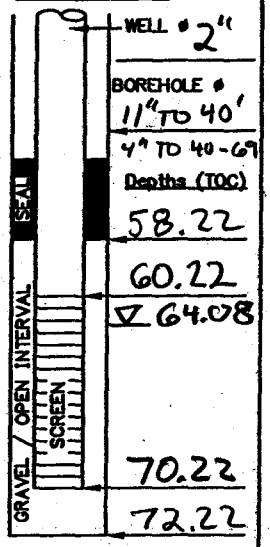
METHOD OF INDUCING WATER LEVEL CHANGE: BAILER ~ 1.5' DISPLACEMENT PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): WATER SURFACE REF = 0.00

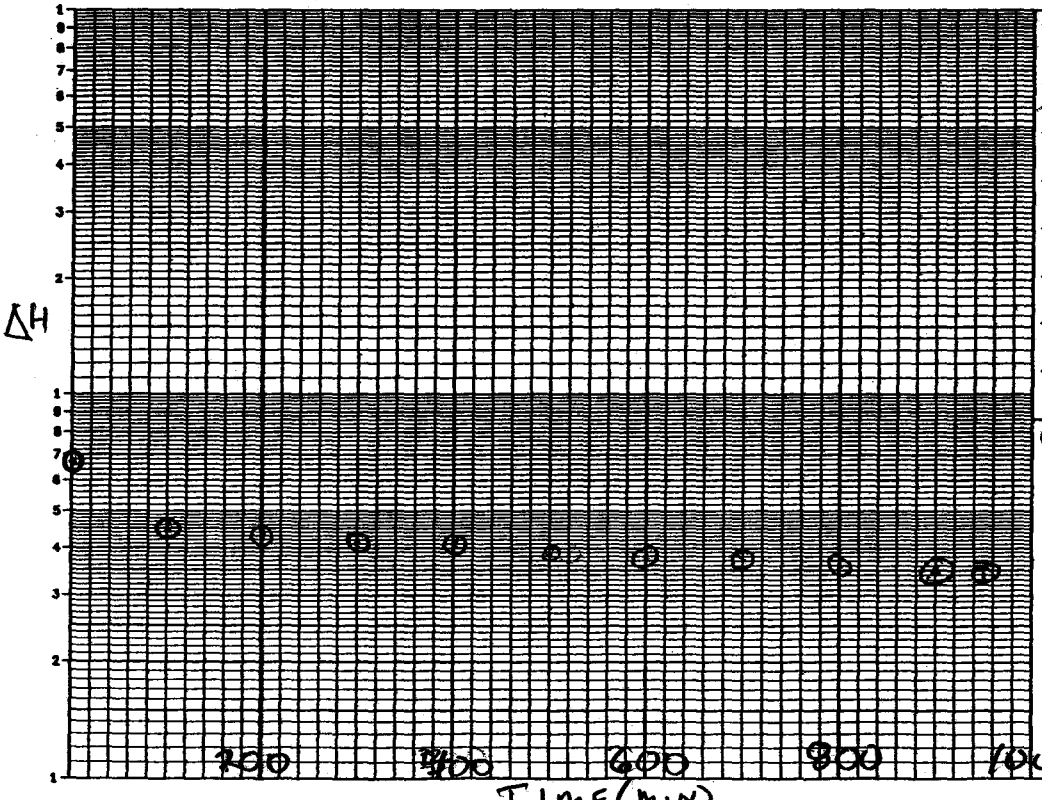
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.00	-0.023		607		0.387
0.085	1.49(h_o)		707		0.381
0.161*	0.682		807		0.362
0.30 *	0.550		907		0.350
0.98	0.500		957		0.343
14.9	0.467				
50.0	0.462				
100	0.449				
200	0.431				
297	0.418				
397	0.412				
507	0.399				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD_{H2O} = 6.166 PRIOR TO BAILER INSERTION

INSERT BAILER @ 1535

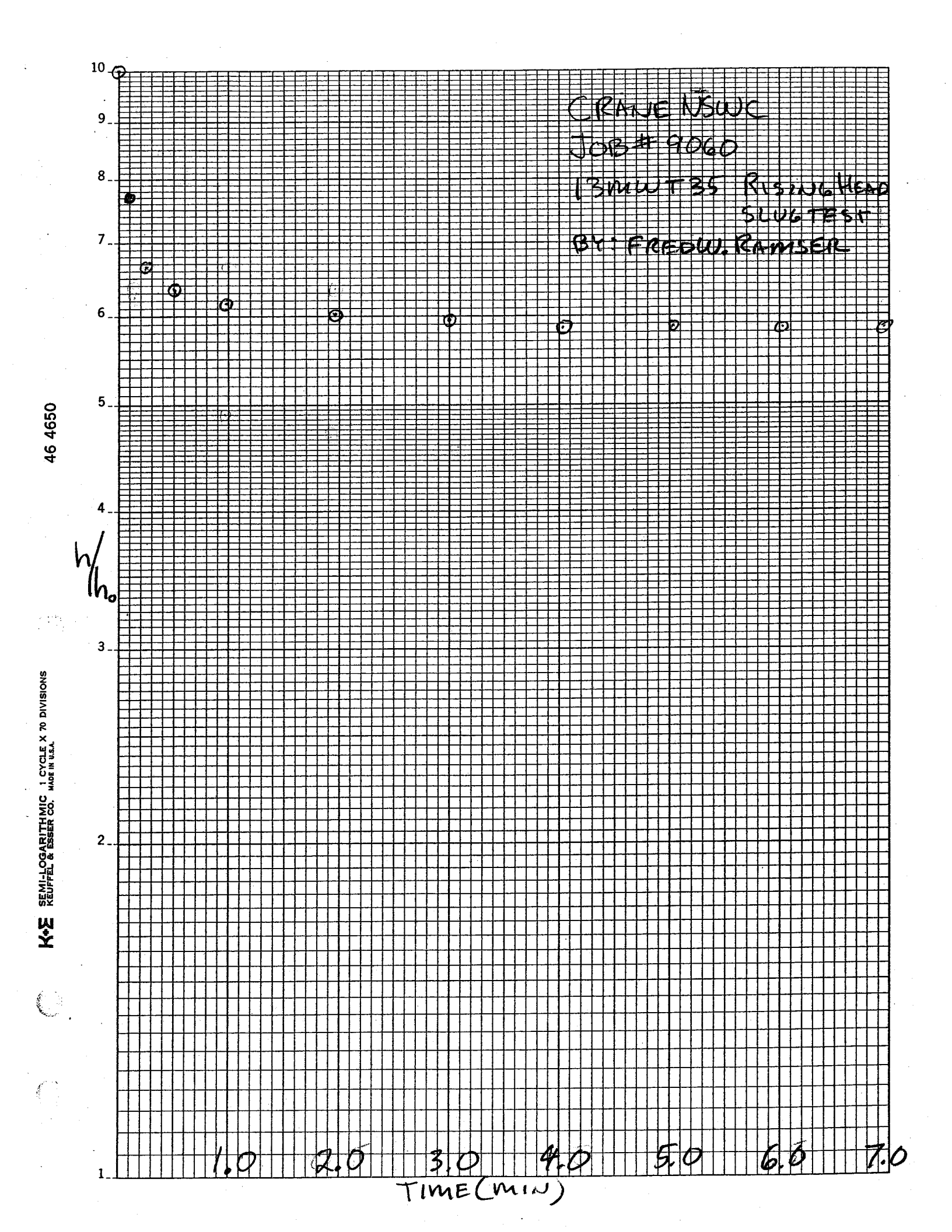
6.215

6.166

.049

START TEST @ 1655

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB# 9060
13MW35 RISING HEAD
SLUG TEST
BY: FRED W. RAMSER
h/h0
TIME (MIN)
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

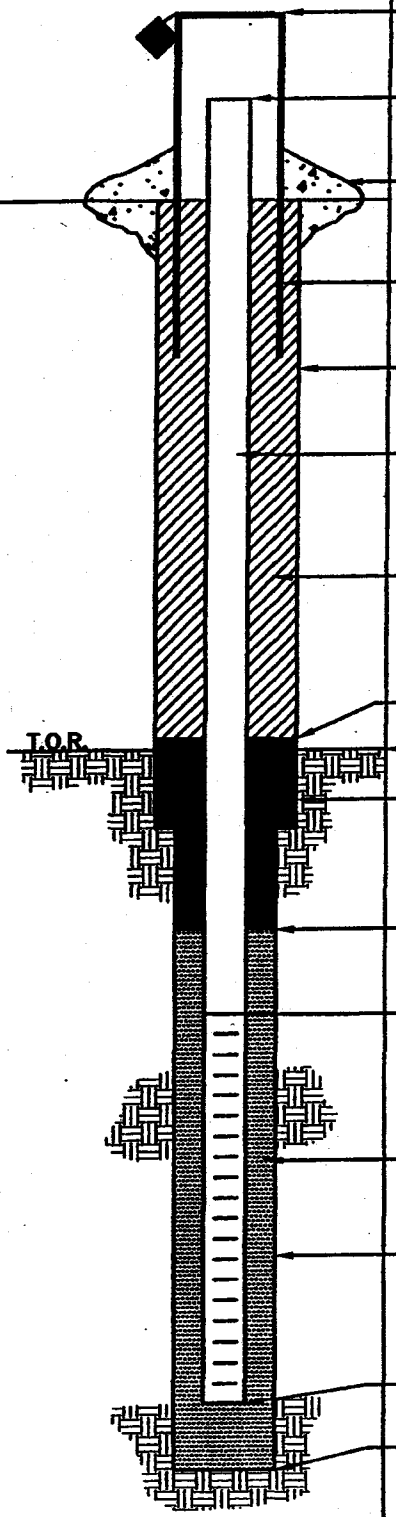
WELL NO.: 13MWT35

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NSWC CRANE	LOCATION CRANE, IN	DRILLER BOWSER MORNER	
PROJECT NO. 9060	BORING 13MWT35	DRILLING METHOD SONIC / A.R.	
DATE BEGUN 10-28-03	DATE COMPLETED 11-19-03		
FIELD GEOLOGIST M.G. COCHRAN		DEVELOPMENT METHOD	
GROUND ELEVATION	DATUM		

ACAD:FORM_MWINBR.dwg 07/20/99 INL



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT TOP OF RISER: /

TYPE OF SURFACE SEAL:

I.D. OF SURFACE CASING:

DIAMETER OF HOLE:

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC SCH 40

TYPE OF BACKFILL: CETCO VOLCLAY COARSE CHIPS

ELEVATION/DEPTH TOP OF SEAL: 13

ELEVATION/DEPTH TOP OF BEDROCK:

TYPE OF SEAL: CETCO VOLCLAY COARSE CHIPS

ELEVATION/DEPTH TOP OF SAND: 155

ELEVATION/DEPTH TOP OF SCREEN: 157
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .020 X 10'
I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ

DIAMETER OF HOLE IN BEDROCK:
CORE/REAM: 2" / 4"

ELEVATION/DEPTH BOTTOM SCREEN: 167
ELEVATION/DEPTH BOTTOM OF SAND: 169
ELEVATION/DEPTH BOTTOM OF HOLE: 169
BACKFILL MATERIAL BELOW SAND: NA

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	CRANE NSWC
Project No.:	9060
Method of Inducing Water Level Change:	BAILER
Reference Pt (Top of Casing, Transducer, etc):	WATER LEVEL (REF=0.00
Test Type (Rising Head / Falling Head):	RISING

Well / Boring No.:	13MWT35
Test No.:	1
Date:	1/20/2004
Geologist:	Fred W. Ramser
Checked by / Date:	

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.16666667
Screened / Monitored Interval Below Water Table, L (ft):	8.14
Static Water Level (Depth/ Elevation) (ft.):	64.08
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0	1.000	0.00	-1.00	1.00	0.0000	0.00
	0.0972	0.774	0.10	-0.77	0.77	-0.2556	0.00
	0.2277	0.665	0.23	-0.67	0.67	-0.4073	0.00
	0.4958	0.634	0.50	-0.63	0.63	-0.4550	0.00
	0.9775	0.618	0.98	-0.62	0.62	-0.4807	0.00
	1.9592	0.603	1.96	-0.60	0.60	-0.5051	0.00
	3.0042	0.595	3.00	-0.59	0.59	-0.5195	0.00
	9.8242	0.586	9.82	-0.59	0.59	-0.5342	-0.01
	197.6125	0.534	197.61	-0.53	0.53	-0.6272	-0.10
	397.6125	0.511	397.61	-0.51	0.51	-0.6723	-0.20
	597.6125	0.480	597.61	-0.48	0.48	-0.7349	-0.31
	797.6125	0.449	797.61	-0.45	0.45	-0.8017	-0.41
	987.6125	0.418	987.61	-0.42	0.42	-0.8732	-0.51
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	13
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	-0.001
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	-0.410
Actual Y-intercept is set to 0.	0.000
T_0 (min):	1944.577
K (ft/min):	8.52E-07
K (ft/day):	**0.001**

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum (x^2)) - (\sum x)^2}$$

$$b = \frac{(\sum y)(\sum (x^2)) - (\sum x)(\sum xy)}{n(\sum (x^2)) - (\sum x)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

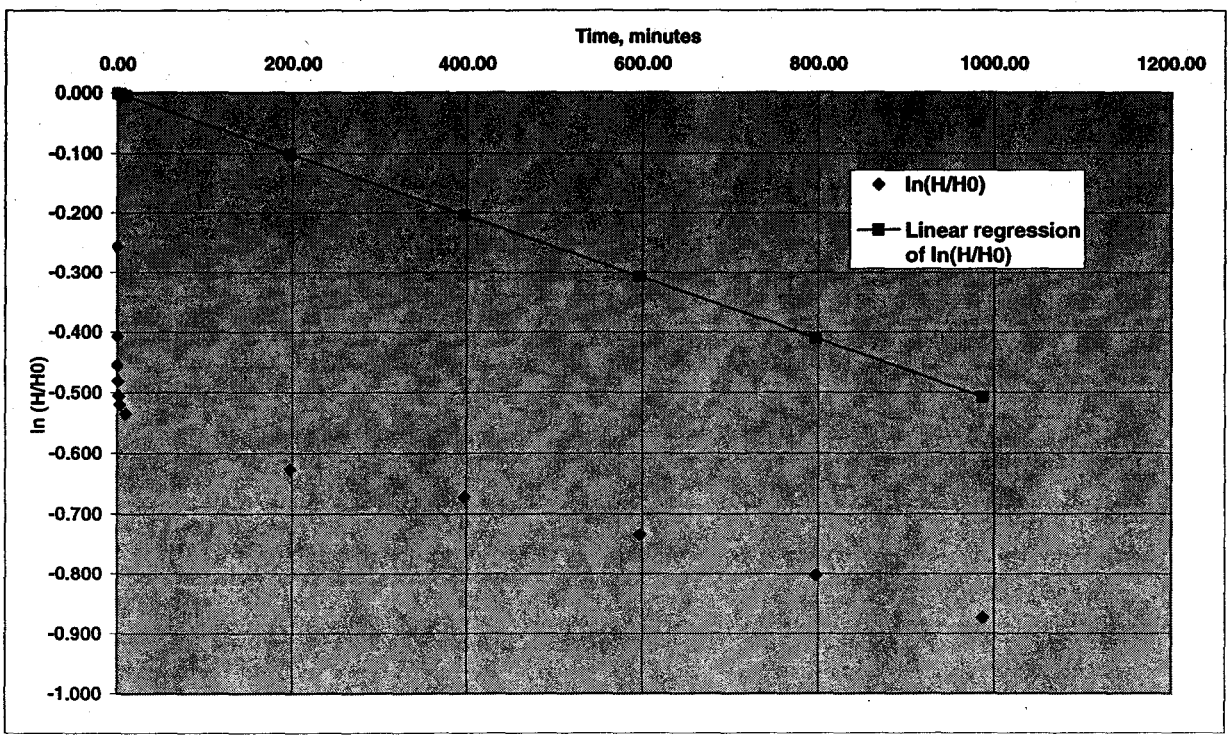
T_0: Time at which ln(H/H0)=-1

$K = r^2 * \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT35
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	20-Jan-04

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166'	2 = R
Length of Well Screen (ft.) :	8.14	= L
Time for 37% head change (min.) :	2670.00	= To

Hydraulic Conductivity (K) :

6.21E-07	ft./min.
1.04E-08	ft./sec.
8.95E-04	ft./day
3.16E-07	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(8.14/.166)}{2 \times 8.14 \times 2670}$$

6.16×10^{-7} Ft/min

CHECKED
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT37
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	13.5 = L
Time for 37% head change (min.) :	1.13 = To

Hydraulic Conductivity (K) :

9.49E-04	ft./min.
1.58E-05	ft./sec.
1.37E+00	ft./day
4.82E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT37

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 14.06 DATE: 11-22-03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

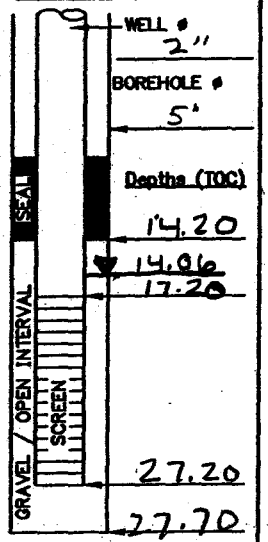
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL

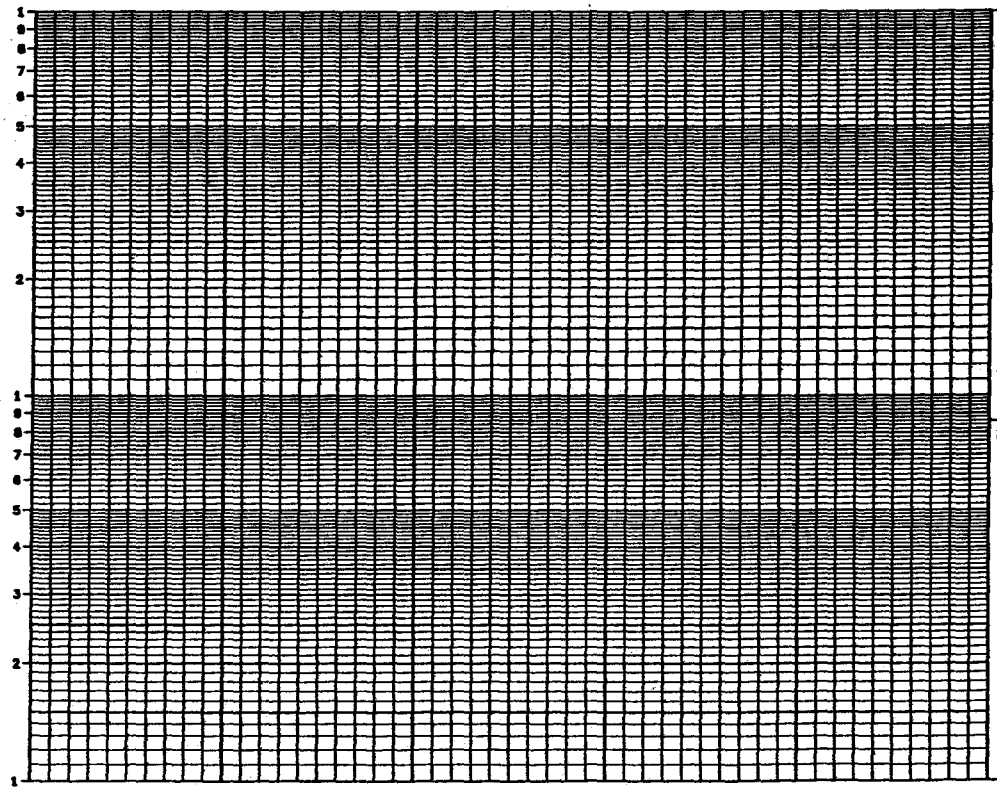
ACAD:FORM_HYDCONTST.dwg 07/08/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	.009		3	.676	
.1	2.783		5	.555	
.2	2.169		8	.447	
.3	1.895		10	.396	
.4	1.677		15	.290	
.5	1.506		18	.258	
.6	1.381		20	.238	
.7	1.266		25	.197	
.8	1.183		30	.162	
.9	1.118		35	.138	
1	1.062		40	.119	
2	.802		47	.101	

WELL SCHEMATIC

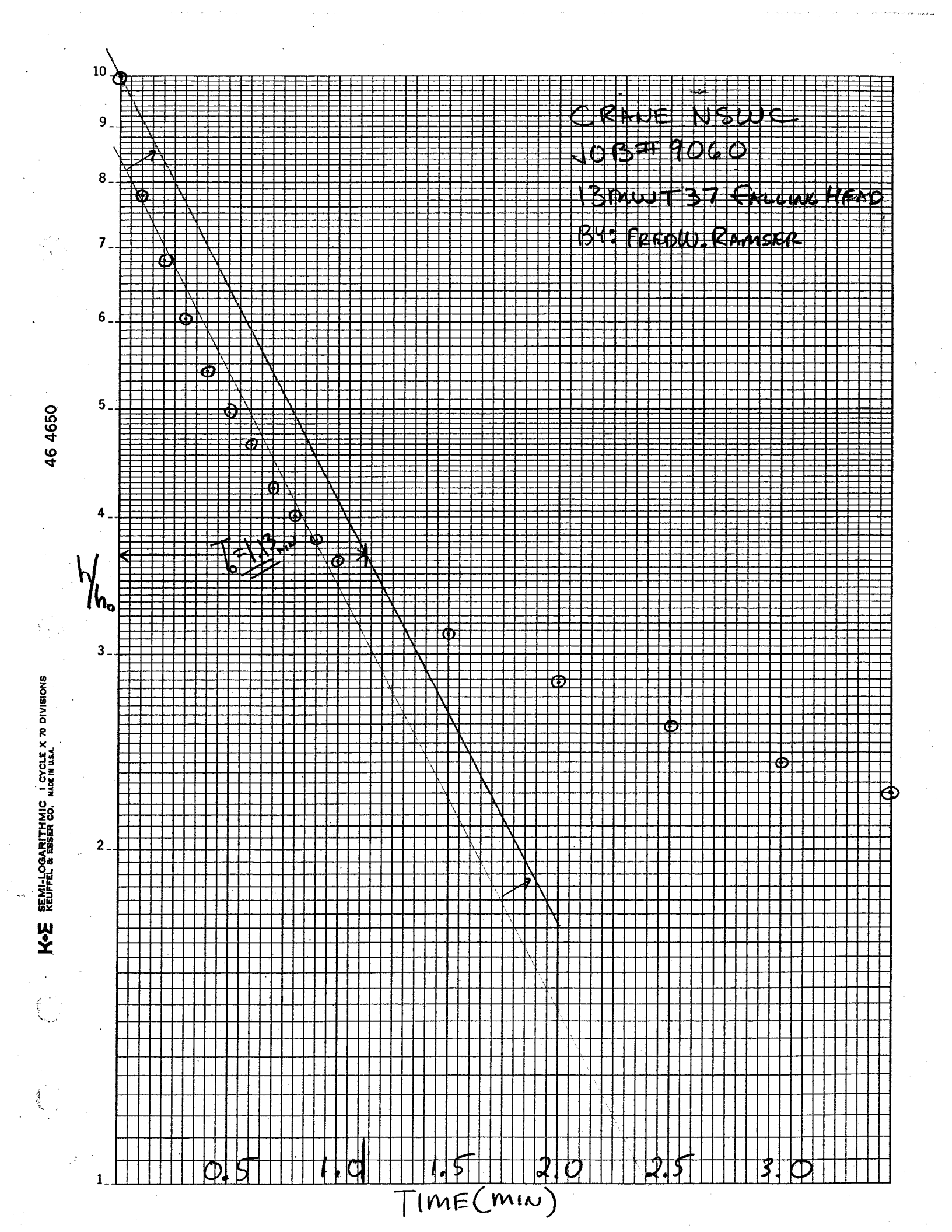


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB# 9060
13MW37 FALLING HEAD
BY: FRROW. RAMSER
h/h0
TIME(MIN)
0.5
1.0
1.5
2.0
2.5
3.0
10
9
8
7
6
5
4
3
2
1
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 9:54:42
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-22 145844
DataMgr Version 3.68 13MWT37falling#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT37falling#1

Test defined on: 11/22/2003 14:54:55
Test started on: 11/22/2003 14:58:44
Test stopped on: 11/22/2003 15:46:16
Test extracted on: N/A

Data gathered using Linear testing
Time between data Minutes.
Number of data sam 476

TOTAL DATA SAMPL 476

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined referen 0 Feet H2O
Referenced on: channel definition.
Pressure head at ref 13.213 Feet H2O

● = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.783
11/22/2003	14:58	0	0.009			
11/22/2003	14:58	0.1	2.783	0	1.000	●
11/22/2003	14:58	0.2	2.169	0.1	0.779	●
11/22/2003	14:59	0.3	1.895	0.2	0.681	●
11/22/2003	14:59	0.4	1.677	0.3	0.603	●
11/22/2003	14:59	0.5	1.506	0.4	0.541	●
11/22/2003	14:59	0.6	1.381	0.5	0.496	●
11/22/2003	14:59	0.7	1.266	0.6	0.455	●
11/22/2003	14:59	0.8	1.183	0.7	0.425	●
11/22/2003	14:59	0.9	1.118	0.8	0.402	●
11/22/2003	14:59	1	1.062	0.9	0.382	
11/22/2003	14:59	1.1	1.015	1	0.365	●
11/22/2003	14:59	1.2	0.977	1.1	0.351	
11/22/2003	15:00	1.3	0.944	1.2	0.339	
11/22/2003	15:00	1.4	0.916	1.3	0.329	
11/22/2003	15:00	1.5	0.894	1.4	0.321	
11/22/2003	15:00	1.6	0.871	1.5	0.313	
11/22/2003	15:00	1.7	0.851	1.6	0.306	
11/22/2003	15:00	1.8	0.834	1.7	0.300	

11/22/2003 15:00	1.9	0.818	1.8	0.294
11/22/2003 15:00	2	0.802	1.9	0.288
11/22/2003 15:00	2.1	0.788	2	0.283
11/22/2003 15:00	2.2	0.771	2.1	0.277
11/22/2003 15:01	2.3	0.757	2.2	0.272
11/22/2003 15:01	2.4	0.745	2.3	0.268
11/22/2003 15:01	2.5	0.733	2.4	0.263
11/22/2003 15:01	2.6	0.718	2.5	0.258
11/22/2003 15:01	2.7	0.706	2.6	0.254
11/22/2003 15:01	2.8	0.696	2.7	0.250
11/22/2003 15:01	2.9	0.686	2.8	0.246
11/22/2003 15:01	3	0.675	2.9	0.243
11/22/2003 15:01	3.1	0.667	3	0.240
11/22/2003 15:01	3.2	0.657	3.1	0.236
11/22/2003 15:02	3.3	0.649	3.2	0.233
11/22/2003 15:02	3.4	0.643	3.3	0.231
11/22/2003 15:02	3.5	0.635	3.4	0.228
11/22/2003 15:02	3.6	0.627	3.5	0.225
11/22/2003 15:02	3.7	0.622	3.6	0.223
11/22/2003 15:02	3.8	0.614	3.7	0.221
11/22/2003 15:02	3.9	0.61	3.8	0.219
11/22/2003 15:02	4	0.604	3.9	0.217
11/22/2003 15:02	4.1	0.598	4	0.215
11/22/2003 15:02	4.2	0.594	4.1	0.213
11/22/2003 15:03	4.3	0.588	4.2	0.211
11/22/2003 15:03	4.4	0.584	4.3	0.210
11/22/2003 15:03	4.5	0.577	4.4	0.207
11/22/2003 15:03	4.6	0.571	4.5	0.205
11/22/2003 15:03	4.7	0.567	4.6	0.204
11/22/2003 15:03	4.8	0.563	4.7	0.202
11/22/2003 15:03	4.9	0.559	4.8	0.201
11/22/2003 15:03	5	0.555	4.9	0.199
11/22/2003 15:03	5.1	0.549	5	0.197
11/22/2003 15:03	5.2	0.549	5.1	0.197
11/22/2003 15:04	5.3	0.543	5.2	0.195
11/22/2003 15:04	5.4	0.537	5.3	0.193
11/22/2003 15:04	5.5	0.534	5.4	0.192
11/22/2003 15:04	5.6	0.532	5.5	0.191
11/22/2003 15:04	5.7	0.528	5.6	0.190
11/22/2003 15:04	5.8	0.524	5.7	0.188
11/22/2003 15:04	5.9	0.52	5.8	0.187
11/22/2003 15:04	6	0.516	5.9	0.185
11/22/2003 15:04	6.1	0.512	6	0.184
11/22/2003 15:04	6.2	0.51	6.1	0.183
11/22/2003 15:05	6.3	0.506	6.2	0.182
11/22/2003 15:05	6.4	0.502	6.3	0.180
11/22/2003 15:05	6.5	0.482	6.4	0.173
11/22/2003 15:05	6.6	0.497	6.5	0.179
11/22/2003 15:05	6.7	0.503	6.6	0.181
11/22/2003 15:05	6.8	0.505	6.7	0.181
11/22/2003 15:05	6.9	0.488	6.8	0.175
11/22/2003 15:05	7	0.481	6.9	0.173
11/22/2003 15:05	7.1	0.477	7	0.171
11/22/2003 15:05	7.2	0.473	7.1	0.170
11/22/2003 15:06	7.3	0.469	7.2	0.169
11/22/2003 15:06	7.4	0.467	7.3	0.168
11/22/2003 15:06	7.5	0.461	7.4	0.166
11/22/2003 15:06	7.6	0.459	7.5	0.165

11/22/2003 15:06	7.7	0.457	7.6	0.164
11/22/2003 15:06	7.8	0.451	7.7	0.162
11/22/2003 15:06	7.9	0.449	7.8	0.161
11/22/2003 15:06	8	0.447	7.9	0.161
11/22/2003 15:06	8.1	0.445	8	0.160
11/22/2003 15:06	8.2	0.441	8.1	0.158
11/22/2003 15:07	8.3	0.439	8.2	0.158
11/22/2003 15:07	8.4	0.435	8.3	0.156
11/22/2003 15:07	8.5	0.433	8.4	0.156
11/22/2003 15:07	8.6	0.433	8.5	0.156
11/22/2003 15:07	8.7	0.429	8.6	0.154
11/22/2003 15:07	8.8	0.427	8.7	0.153
11/22/2003 15:07	8.9	0.425	8.8	0.153
11/22/2003 15:07	9	0.421	8.9	0.151
11/22/2003 15:07	9.1	0.419	9	0.151
11/22/2003 15:07	9.2	0.417	9.1	0.150
11/22/2003 15:08	9.3	0.413	9.2	0.148
11/22/2003 15:08	9.4	0.409	9.3	0.147
11/22/2003 15:08	9.5	0.407	9.4	0.146
11/22/2003 15:08	9.6	0.404	9.5	0.145
11/22/2003 15:08	9.7	0.404	9.6	0.145
11/22/2003 15:08	9.8	0.402	9.7	0.144
11/22/2003 15:08	9.9	0.398	9.8	0.143
11/22/2003 15:08	10	0.396	9.9	0.142
11/22/2003 15:08	10.1	0.395	10	0.142
11/22/2003 15:08	10.2	0.393	10.1	0.141
11/22/2003 15:09	10.3	0.389	10.2	0.140
11/22/2003 15:09	10.4	0.387	10.3	0.139
11/22/2003 15:09	10.5	0.385	10.4	0.138
11/22/2003 15:09	10.6	0.383	10.5	0.138
11/22/2003 15:09	10.7	0.381	10.6	0.137
11/22/2003 15:09	10.8	0.379	10.7	0.136
11/22/2003 15:09	10.9	0.374	10.8	0.134
11/22/2003 15:09	11	0.374	10.9	0.134
11/22/2003 15:09	11.1	0.372	11	0.134
11/22/2003 15:09	11.2	0.37	11.1	0.133
11/22/2003 15:10	11.3	0.366	11.2	0.132
11/22/2003 15:10	11.4	0.364	11.3	0.131
11/22/2003 15:10	11.5	0.362	11.4	0.130
11/22/2003 15:10	11.6	0.362	11.5	0.130

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT37
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083	1 = r
Effective Radius of Well Screen (in.) :	.208	2.5 = R
Length of Well Screen (ft.) :		13.5 = L
Time for 37% head change (min.) :		1.13 = To

Hydraulic Conductivity (K) :

9.49E-04	ft./min.
1.58E-05	ft./sec.
1.37E+00	ft./day
4.82E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(13.5/.208)}{2 \times 13.5 \times 1.13} =$$

9.42×10^{-4} Ft / Min.

CHECKED
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT37
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	13.5 = L
Time for 37% head change (min.) :	1.50 = To

Hydraulic Conductivity (K) :

7.15E-04	ft./min.
1.19E-05	ft./sec.
1.03E+00	ft./day
3.63E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NWSC CRANE WELL/BORING NO.: 13MWT37

PROJECT NO.: 9060 GEOLOGIST: M.G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 14.06 DATE: 11-22-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

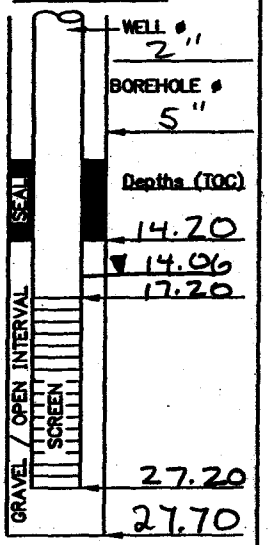
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL

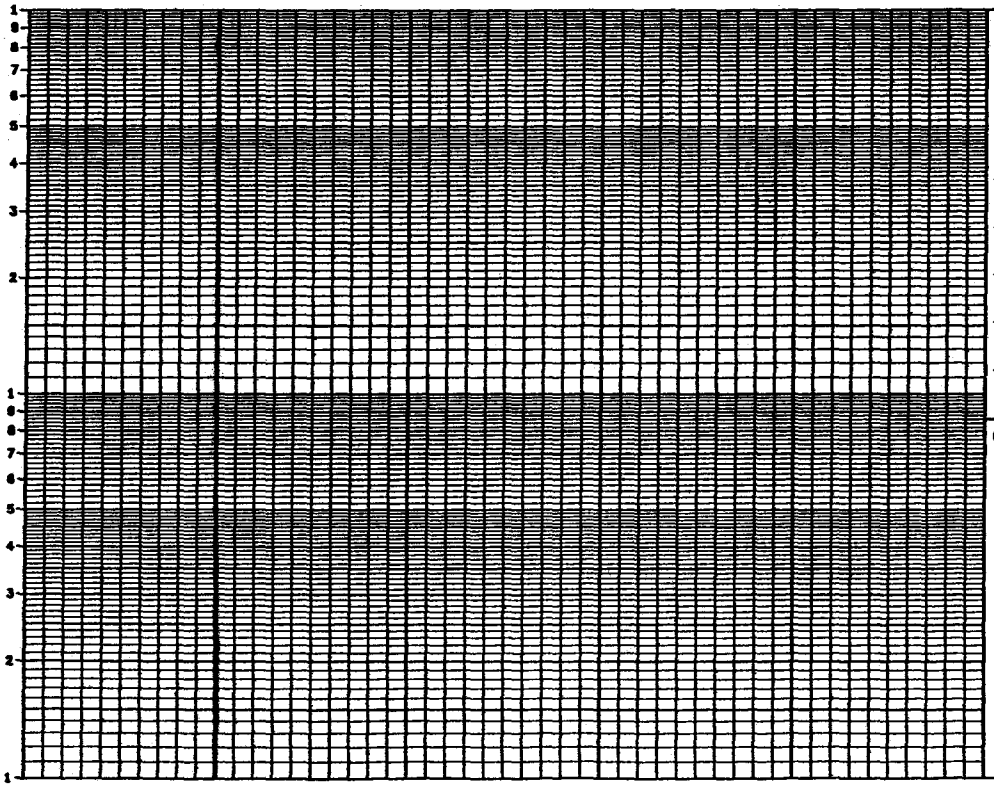
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	-.807	
.1	-2.868		5	-.652	
.2	-2.346		8	-.504	
.3	-2.044		10	-.440	
.4	-1.814		15	-.330	
.5	-1.637		18	-.290	
.6	-1.504		20	-.268	
.7	-1.397		25	-.227	
.8	-1.320		30	-.199	
.9	-1.254		35	-.179	
1.0	-1.202		40	-.164	
2.0	-.932		45	-.154	

WELL SCHEMATIC

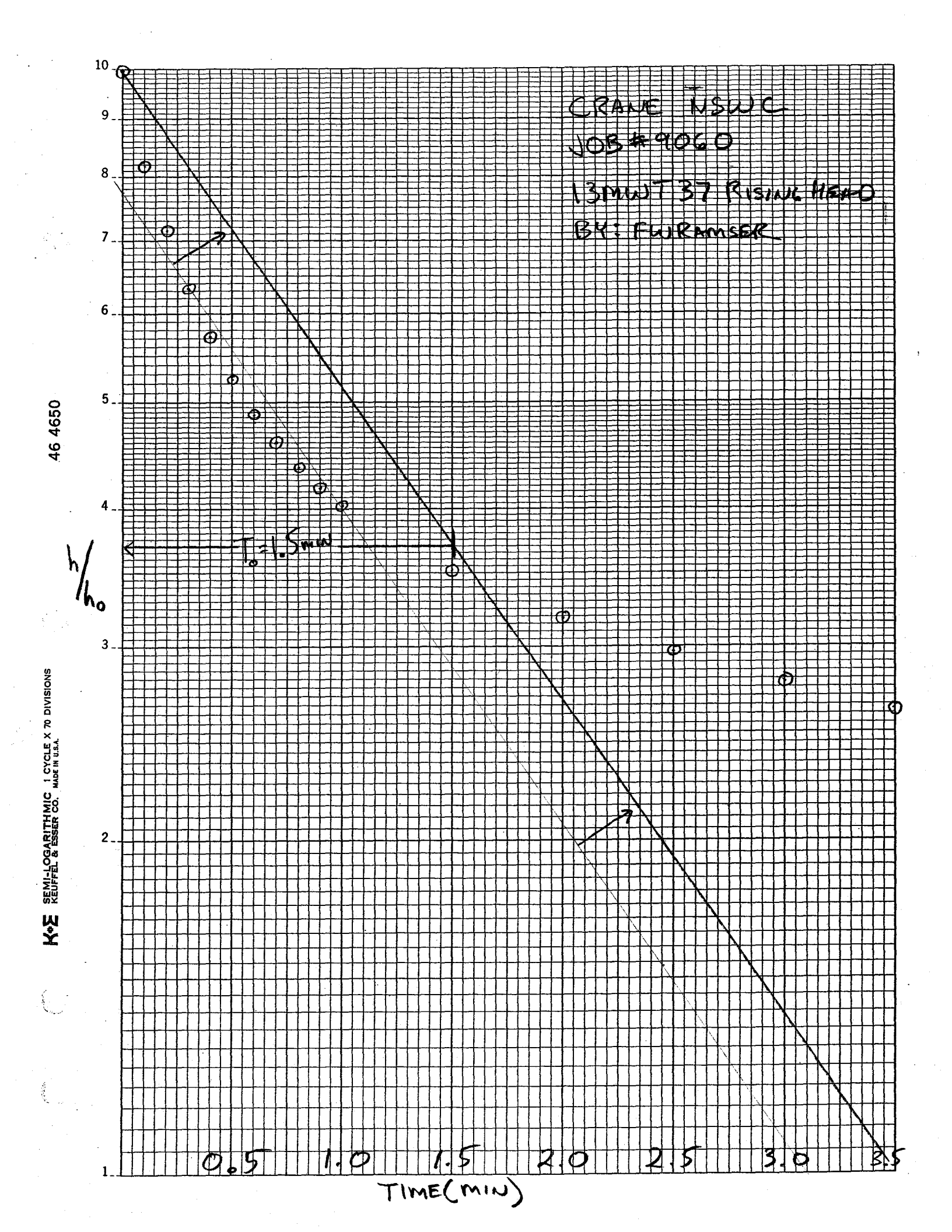


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB #9060
13MWT 37 RISING HEAD
BY: FUIRAMSER
h/h0
$T_0 = 1.5 S_{MIN}$
TIME (MIN)
0.5
1.0
1.5
2.0
2.5
3.0
3.5
10
9
8
7
6
5
4
3
2
1
46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc.	MiniTroll Pro						
Report generated:	12/9/2003	10:06:22					
Report from file:	H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-22 154857						
DataMgr Version	3.68					13MWT37rising#1.bin	
Serial number:	6899						
Firmware Version	3.07						
Unit name:							
Test name:		13MWT37rising#1					
Test defined on:	11/22/2003	15:47:51					
Test started on:	11/22/2003	15:48:57					
Test stopped on:	11/22/2003	16:36:48					
Test extracted on: N/A							
Data gathered using Linear testing							
Time between data points:	Minutes.						
Number of data samples:	479						
TOTAL DATA SAMPLES	479						
Channel number [2]							
Measurement type:	Pressure						
Channel name:							
Sensor Range:	30 PSI.						
Specific gravity:	1						
Mode:	Surface						
User-defined reference:	0	Feet H2O					
Referenced on:	test start						
Pressure head at reference:	13.305	Feet H2O					
		Chan[2]					
Date Time	ET (min)	Feet H2O	Adjusted ET. (min)	h/ho	ho =	-2.868	
11/22/2003 15:48	0	0					
11/22/2003 15:49	0.1	-2.868	0	1.000			
11/22/2003 15:49	0.2	-2.346	0.1	0.818			
11/22/2003 15:49	0.3	-2.044	0.2	0.713			
11/22/2003 15:49	0.4	-1.814	0.3	0.632			
11/22/2003 15:49	0.5	-1.637	0.4	0.571			
11/22/2003 15:49	0.6	-1.504	0.5	0.524			
11/22/2003 15:49	0.7	-1.397	0.6	0.487			
11/22/2003 15:49	0.8	-1.32	0.7	0.460			
11/22/2003 15:49	0.9	-1.254	0.8	0.437			
11/22/2003 15:49	1	-1.202	0.9	0.419			
11/22/2003 15:50	1.1	-1.157	1	0.403			
11/22/2003 15:50	1.2	-1.119	1.1	0.390			
11/22/2003 15:50	1.3	-1.087	1.2	0.379			
11/22/2003 15:50	1.4	-1.059	1.3	0.369			
11/22/2003 15:50	1.5	-1.03	1.4	0.359			
11/22/2003 15:50	1.6	-1.008	1.5	0.351			
11/22/2003 15:50	1.7	-0.984	1.6	0.343			
11/22/2003 15:50	1.8	-0.964	1.7	0.336			

11/22/2003 15:50	1.9	-0.948	1.8	0.331			
11/22/2003 15:50	2	-0.932	1.9	0.325			
11/22/2003 15:51	2.1	-0.916	2	0.319			
11/22/2003 15:51	2.2	-0.902	2.1	0.315			
11/22/2003 15:51	2.3	-0.887	2.2	0.309			
11/22/2003 15:51	2.4	-0.875	2.3	0.305			
11/22/2003 15:51	2.5	-0.861	2.4	0.300			
11/22/2003 15:51	2.6	-0.849	2.5	0.296			
11/22/2003 15:51	2.7	-0.837	2.6	0.292			
11/22/2003 15:51	2.8	-0.827	2.7	0.288			
11/22/2003 15:51	2.9	-0.817	2.8	0.285			
11/22/2003 15:51	3	-0.807	2.9	0.281			
11/22/2003 15:52	3.1	-0.797	3	0.278			
11/22/2003 15:52	3.2	-0.785	3.1	0.274			
11/22/2003 15:52	3.3	-0.776	3.2	0.271			
11/22/2003 15:52	3.4	-0.768	3.3	0.268			
11/22/2003 15:52	3.5	-0.758	3.4	0.264			
11/22/2003 15:52	3.6	-0.75	3.5	0.262			
11/22/2003 15:52	3.7	-0.742	3.6	0.259			
11/22/2003 15:52	3.8	-0.734	3.7	0.256			
11/22/2003 15:52	3.9	-0.726	3.8	0.253			
11/22/2003 15:52	4	-0.718	3.9	0.250			
11/22/2003 15:53	4.1	-0.71	4	0.248			
11/22/2003 15:53	4.2	-0.704	4.1	0.245			
11/22/2003 15:53	4.3	-0.696	4.2	0.243			
11/22/2003 15:53	4.4	-0.69	4.3	0.241			
11/22/2003 15:53	4.5	-0.684	4.4	0.238			
11/22/2003 15:53	4.6	-0.676	4.5	0.236			
11/22/2003 15:53	4.7	-0.67	4.6	0.234			
11/22/2003 15:53	4.8	-0.664	4.7	0.232			
11/22/2003 15:53	4.9	-0.658	4.8	0.229			
11/22/2003 15:53	5	-0.652	4.9	0.227			
11/22/2003 15:54	5.1	-0.643	5	0.224			
11/22/2003 15:54	5.2	-0.637	5.1	0.222			
11/22/2003 15:54	5.3	-0.631	5.2	0.220			
11/22/2003 15:54	5.4	-0.625	5.3	0.218			
11/22/2003 15:54	5.5	-0.619	5.4	0.216			
11/22/2003 15:54	5.6	-0.613	5.5	0.214			
11/22/2003 15:54	5.7	-0.609	5.6	0.212			
11/22/2003 15:54	5.8	-0.603	5.7	0.210			
11/22/2003 15:54	5.9	-0.599	5.8	0.209			
11/22/2003 15:54	6	-0.593	5.9	0.207			
11/22/2003 15:55	6.1	-0.587	6	0.205			
11/22/2003 15:55	6.2	-0.583	6.1	0.203			
11/22/2003 15:55	6.3	-0.577	6.2	0.201			
11/22/2003 15:55	6.4	-0.573	6.3	0.200			
11/22/2003 15:55	6.5	-0.567	6.4	0.198			
11/22/2003 15:55	6.6	-0.561	6.5	0.196			
11/22/2003 15:55	6.7	-0.559	6.6	0.195			
11/22/2003 15:55	6.8	-0.549	6.7	0.191			
11/22/2003 15:55	6.9	-0.551	6.8	0.192			
11/22/2003 15:55	7	-0.545	6.9	0.190			
11/22/2003 15:56	7.1	-0.54	7	0.188			
11/22/2003 15:56	7.2	-0.536	7.1	0.187			
11/22/2003 15:56	7.3	-0.532	7.2	0.185			
11/22/2003 15:56	7.4	-0.528	7.3	0.184			
11/22/2003 15:56	7.5	-0.524	7.4	0.183			
11/22/2003 15:56	7.6	-0.52	7.5	0.181			

11/22/2003 15:56	7.7	-0.516	7.6	0.180			
11/22/2003 15:56	7.8	-0.512	7.7	0.179			
11/22/2003 15:56	7.9	-0.508	7.8	0.177			
11/22/2003 15:56	8	-0.504	7.9	0.176			
11/22/2003 15:57	8.1	-0.502	8	0.175			
11/22/2003 15:57	8.2	-0.498	8.1	0.174			
11/22/2003 15:57	8.3	-0.492	8.2	0.172			
11/22/2003 15:57	8.4	-0.49	8.3	0.171			
11/22/2003 15:57	8.5	-0.486	8.4	0.169			
11/22/2003 15:57	8.6	-0.484	8.5	0.169			
11/22/2003 15:57	8.7	-0.48	8.6	0.167			
11/22/2003 15:57	8.8	-0.476	8.7	0.166			
11/22/2003 15:57	8.9	-0.474	8.8	0.165			
11/22/2003 15:57	9	-0.47	8.9	0.164			
11/22/2003 15:58	9.1	-0.468	9	0.163			
11/22/2003 15:58	9.2	-0.464	9.1	0.162			
11/22/2003 15:58	9.3	-0.462	9.2	0.161			
11/22/2003 15:58	9.4	-0.458	9.3	0.160			
11/22/2003 15:58	9.5	-0.454	9.4	0.158			
11/22/2003 15:58	9.6	-0.45	9.5	0.157			
11/22/2003 15:58	9.7	-0.446	9.6	0.156			
11/22/2003 15:58	9.8	-0.446	9.7	0.156			
11/22/2003 15:58	9.9	-0.442	9.8	0.154			
11/22/2003 15:58	10	-0.44	9.9	0.153			
11/22/2003 15:59	10.1	-0.436	10	0.152			
11/22/2003 15:59	10.2	-0.433	10.1	0.151			
11/22/2003 15:59	10.3	-0.43	10.2	0.150			
11/22/2003 15:59	10.4	-0.425	10.3	0.148			
11/22/2003 15:59	10.5	-0.425	10.4	0.148			
11/22/2003 15:59	10.6	-0.421	10.5	0.147			
11/22/2003 15:59	10.7	-0.419	10.6	0.146			
11/22/2003 15:59	10.8	-0.417	10.7	0.145			
11/22/2003 15:59	10.9	-0.411	10.8	0.143			
11/22/2003 15:59	11	-0.409	10.9	0.143			
11/22/2003 16:00	11.1	-0.409	11	0.143			
11/22/2003 16:00	11.2	-0.405	11.1	0.141			
11/22/2003 16:00	11.3	-0.403	11.2	0.141			
11/22/2003 16:00	11.4	-0.399	11.3	0.139			
11/22/2003 16:00	11.5	-0.397	11.4	0.138			
11/22/2003 16:00	11.6	-0.395	11.5	0.138			
11/22/2003 16:00	11.7	-0.393	11.6	0.137			
11/22/2003 16:00	11.8	-0.391	11.7	0.136			
11/22/2003 16:00	11.9	-0.387	11.8	0.135			
11/22/2003 16:00	12	-0.385	11.9	0.134			

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT37
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		13.5 = L
Time for 37% head change (min.) :		1.50 = To

Hydraulic Conductivity (K) :

7.15E-04	ft./min.
1.19E-05	ft./sec.
1.03E+00	ft./day
3.63E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(13.5/.208)}{2 \times 13.5 \times 1.50} =$$

7.10×10^{-4} Ft / Min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT38
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	8.95 = L
Time for 37% head change (min.) :	310.00 = To

Hydraulic Conductivity (K) :

4.71E-06	ft./min.
7.84E-08	ft./sec.
6.78E-03	ft./day
2.39E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT38

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 61.65 TOC DATE: 11-22-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

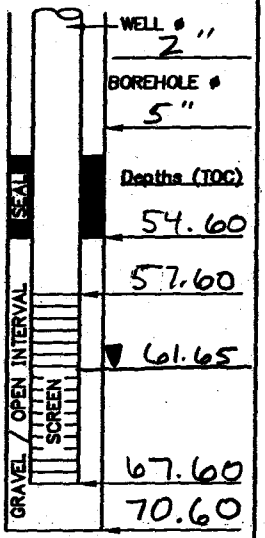
METHOD OF INDUCING WATER LEVEL CHANGE: BAILER PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL

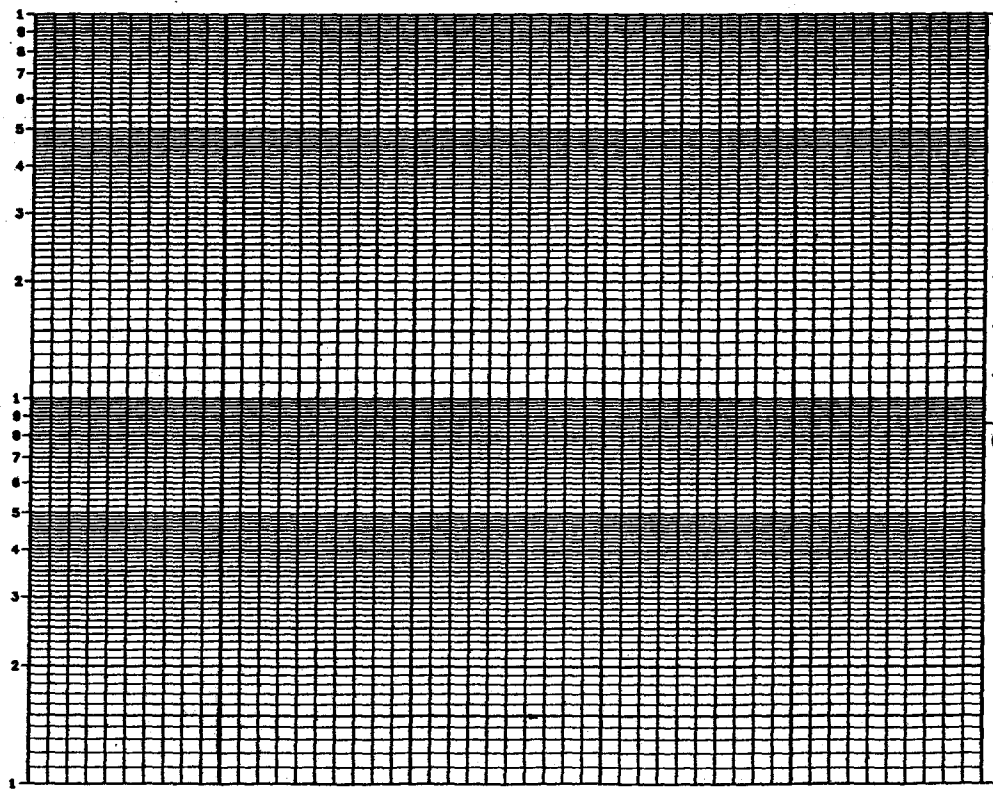
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	-.667	
.1	-1.474		5	-.654	
.2	-.894		10	-.631	
.3	-.783		15	-.614	
.4	-.752		20	-.603	
.5	-.743		30	-.591	
.6	-.736		40	-.563	
.7	-.729		50	-.547	
.8	-.723		60	-.534	
.9	-.718		70	-.522	
1	-.711		80	-.504	
2	-.685		86	-.497	

WELL SCHEMATIC

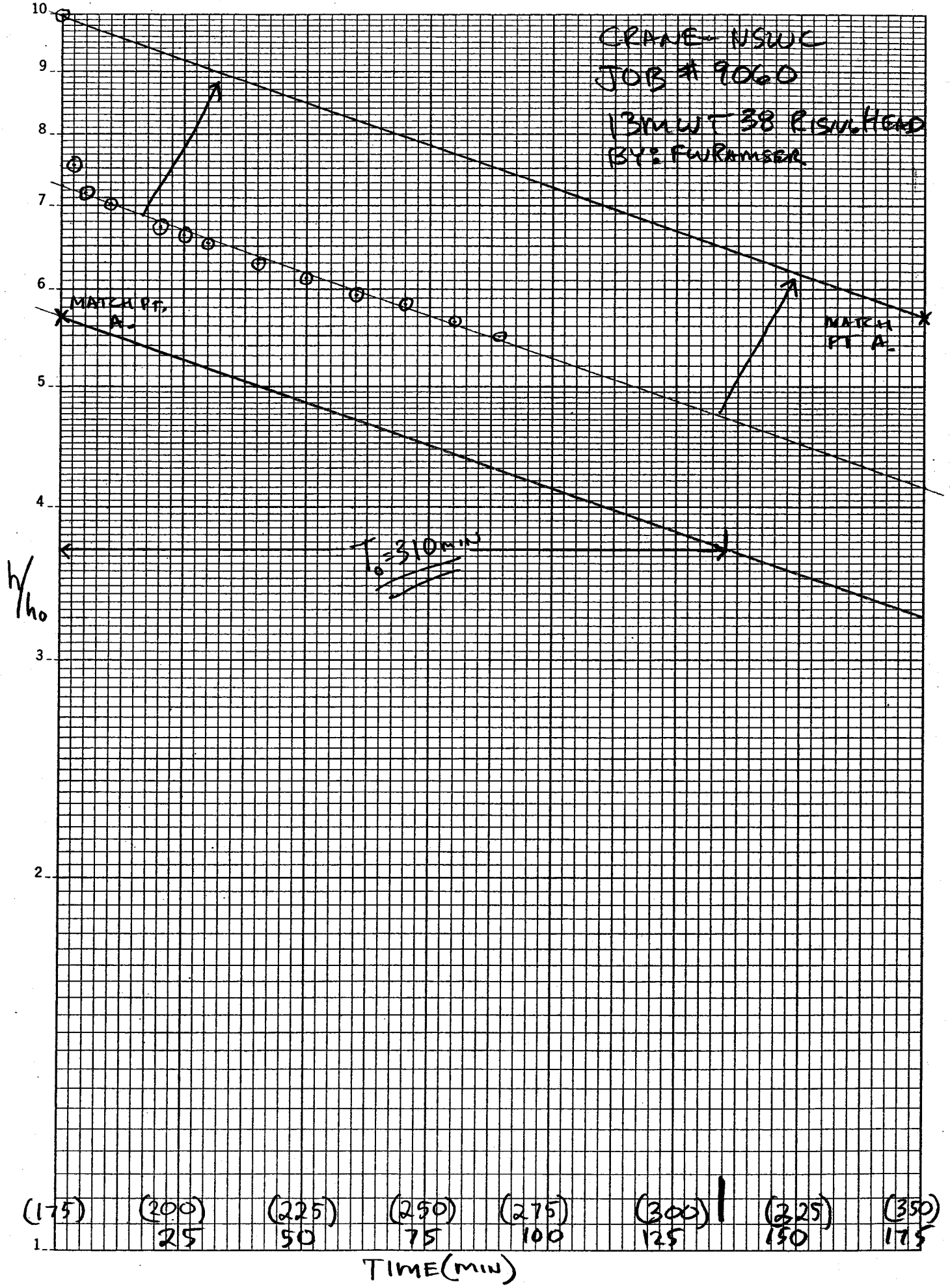


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/4/2003 10:30:13
Report from file: C:\Win-Situ\Data\SN00916 2003-11-22 161814 13MWT38rising#1.bin
DataMgr Version 3.68

Serial number: 916
Firmware Version 3.07
Unit name:

Test name: 13MWT38rising#1

Test defined on: 11/22/2003 16:17:38
Test started on: 11/22/2003 16:18:14
Test stopped on: 11/22/2003 17:48:04
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 899

TOTAL DATA SAMPLES 899

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 6.165 Feet H2O

● = DATA PLOTTED

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = -0.894
	11/22/2003 16:18	0	0			
	11/22/2003 16:18	0.1	-1.474			
	11/22/2003 16:18	0.2	-0.894	0	1.000	
	11/22/2003 16:18	0.3	-0.783	0.1	0.876	
	11/22/2003 16:18	0.4	-0.752	0.2	0.841	
	11/22/2003 16:18	0.5	-0.743	0.3	0.831	
	11/22/2003 16:18	0.6	-0.736	0.4	0.823	
	11/22/2003 16:18	0.7	-0.729	0.5	0.815	
	11/22/2003 16:19	0.8	-0.723	0.6	0.809	
	11/22/2003 16:19	0.9	-0.718	0.7	0.803	
	11/22/2003 16:19	1	-0.711	0.8	0.795	
	11/22/2003 16:19	1.1	-0.707	0.9	0.791	
	11/22/2003 16:19	1.2	-0.705	1	0.789	
	11/22/2003 16:19	1.3	-0.703	1.1	0.786	
	11/22/2003 16:19	1.4	-0.698	1.2	0.781	
	11/22/2003 16:19	1.5	-0.694	1.3	0.776	
	11/22/2003 16:19	1.6	-0.689	1.4	0.771	
	11/22/2003 16:19	1.7	-0.689	1.5	0.771	
	11/22/2003 16:20	1.8	-0.687	1.6	0.768	
	11/22/2003 16:20	1.9	-0.685	1.7	0.766	
	11/22/2003 16:20	2	-0.685	1.8	0.766	
	11/22/2003 16:20	2.1	-0.683	1.9	0.764	
	11/22/2003 16:20	2.2	-0.678	2	0.758	
	11/22/2003 16:20	2.3	-0.678	2.1	0.758	
	11/22/2003 16:20	2.4	-0.676	2.2	0.756	
	11/22/2003 16:20	2.5	-0.676	2.3	0.756	
	11/22/2003 16:20	2.6	-0.674	2.4	0.754	
	11/22/2003 16:20	2.7	-0.671	2.5	0.751	
	11/22/2003 16:21	2.8	-0.671	2.6	0.751	
	11/22/2003 16:21	2.9	-0.671	2.7	0.751	
	11/22/2003 16:21	3	-0.667	2.8	0.746	
	11/22/2003 16:21	3.1	-0.669	2.9	0.748	
	11/22/2003 16:21	3.2	-0.667	3	0.746	
	11/22/2003 16:21	3.3	-0.665	3.1	0.744	
	11/22/2003 16:21	3.4	-0.665	3.2	0.744	

11/22/2003 16:21	3.5	-0.665	3.3	0.744
11/22/2003 16:21	3.6	-0.663	3.4	0.742
11/22/2003 16:21	3.7	-0.66	3.5	0.738
11/22/2003 16:22	3.8	-0.66	3.6	0.738
11/22/2003 16:22	3.9	-0.66	3.7	0.738
11/22/2003 16:22	4	-0.66	3.8	0.738
11/22/2003 16:22	4.1	-0.66	3.9	0.738
11/22/2003 16:22	4.2	-0.658	4	0.736
11/22/2003 16:22	4.3	-0.658	4.1	0.736
11/22/2003 16:22	4.4	-0.658	4.2	0.736
11/22/2003 16:22	4.5	-0.656	4.3	0.734
11/22/2003 16:22	4.6	-0.654	4.4	0.732
11/22/2003 16:22	4.7	-0.654	4.5	0.732
11/22/2003 16:23	4.8	-0.654	4.6	0.732
11/22/2003 16:23	4.9	-0.654	4.7	0.732
11/22/2003 16:23	5	-0.654	4.8	0.732
11/22/2003 16:23	5.1	-0.649	4.9	0.726
11/22/2003 16:23	5.2	-0.651	5	0.728
11/22/2003 16:23	5.3	-0.651	5.1	0.728
11/22/2003 16:23	5.4	-0.649	5.2	0.726
11/22/2003 16:23	5.5	-0.651	5.3	0.728
11/22/2003 16:23	5.6	-0.649	5.4	0.726
11/22/2003 16:23	5.7	-0.647	5.5	0.724
11/22/2003 16:24	5.8	-0.645	5.6	0.721
11/22/2003 16:24	5.9	-0.649	5.7	0.726
11/22/2003 16:24	6	-0.647	5.8	0.724
11/22/2003 16:24	6.1	-0.647	5.9	0.724
11/22/2003 16:24	6.2	-0.645	6	0.721
11/22/2003 16:24	6.3	-0.647	6.1	0.724
11/22/2003 16:24	6.4	-0.647	6.2	0.724
11/22/2003 16:24	6.5	-0.645	6.3	0.721
11/22/2003 16:24	6.6	-0.645	6.4	0.721
11/22/2003 16:24	6.7	-0.645	6.5	0.721
11/22/2003 16:25	6.8	-0.645	6.6	0.721
11/22/2003 16:25	6.9	-0.643	6.7	0.719
11/22/2003 16:25	7	-0.643	6.8	0.719
11/22/2003 16:25	7.1	-0.64	6.9	0.716
11/22/2003 16:25	7.2	-0.643	7	0.719
11/22/2003 16:25	7.3	-0.64	7.1	0.716
11/22/2003 16:25	7.4	-0.638	7.2	0.714
11/22/2003 16:25	7.5	-0.638	7.3	0.714
11/22/2003 16:25	7.6	-0.638	7.4	0.714
11/22/2003 16:25	7.7	-0.64	7.5	0.716
11/22/2003 16:26	7.8	-0.638	7.6	0.714
11/22/2003 16:26	7.9	-0.638	7.7	0.714
11/22/2003 16:26	8	-0.638	7.8	0.714
11/22/2003 16:26	8.1	-0.638	7.9	0.714
11/22/2003 16:26	8.2	-0.64	8	0.716
11/22/2003 16:26	8.3	-0.638	8.1	0.714
11/22/2003 16:26	8.4	-0.643	8.2	0.719
11/22/2003 16:26	8.5	-0.636	8.3	0.711
11/22/2003 16:26	8.6	-0.636	8.4	0.711
11/22/2003 16:26	8.7	-0.636	8.5	0.711
11/22/2003 16:27	8.8	-0.636	8.6	0.711
11/22/2003 16:27	8.9	-0.634	8.7	0.709
11/22/2003 16:27	9	-0.631	8.8	0.706
11/22/2003 16:27	9.1	-0.631	8.9	0.706
11/22/2003 16:27	9.2	-0.631	9	0.706
11/22/2003 16:27	9.3	-0.631	9.1	0.706
11/22/2003 16:27	9.4	-0.631	9.2	0.706
11/22/2003 16:27	9.5	-0.631	9.3	0.706
11/22/2003 16:27	9.6	-0.631	9.4	0.706
11/22/2003 16:27	9.7	-0.634	9.5	0.709
11/22/2003 16:28	9.8	-0.631	9.6	0.706
11/22/2003 16:28	9.9	-0.631	9.7	0.706
11/22/2003 16:28	10	-0.631	9.8	0.706
11/22/2003 16:28	10.1	-0.629	9.9	0.704
11/22/2003 16:28	10.2	-0.627	10	0.701
11/22/2003 16:29	11.2	-0.625	11	0.699
11/22/2003 16:30	12.2	-0.623	12	0.697
11/22/2003 16:31	13.2	-0.62	13	0.694
11/22/2003 16:32	14.2	-0.618	14	0.691
11/22/2003 16:33	15.2	-0.611	15	0.683
11/22/2003 16:34	16.2	-0.611	16	0.683

11/22/2003 16:35	17.2	-0.607	17	0.679
11/22/2003 16:36	18.2	-0.607	18	0.679
11/22/2003 16:37	19.2	-0.605	19	0.677
11/22/2003 16:38	20.2	-0.6	20	0.671
11/22/2003 16:39	21.2	-0.6	21	0.671
11/22/2003 16:40	22.2	-0.598	22	0.669
11/22/2003 16:41	23.2	-0.6	23	0.671
11/22/2003 16:42	24.2	-0.594	24	0.664
11/22/2003 16:43	25.2	-0.591	25	0.661
11/22/2003 16:44	26.2	-0.589	26	0.659
11/22/2003 16:45	27.2	-0.587	27	0.657
11/22/2003 16:46	28.2	-0.585	28	0.654
11/22/2003 16:47	29.2	-0.58	29	0.649
11/22/2003 16:48	30.2	-0.583	30	0.652
11/22/2003 16:49	31.2	-0.578	31	0.647
11/22/2003 16:50	32.2	-0.576	32	0.644
11/22/2003 16:51	33.2	-0.574	33	0.642
11/22/2003 16:52	34.2	-0.571	34	0.639
11/22/2003 16:53	35.2	-0.571	35	0.639
11/22/2003 16:54	36.2	-0.571	36	0.639
11/22/2003 16:55	37.2	-0.569	37	0.636
11/22/2003 16:56	38.2	-0.567	38	0.634
11/22/2003 16:57	39.2	-0.565	39	0.632
11/22/2003 16:58	40.2	-0.563	40	0.630
11/22/2003 16:59	41.2	-0.56	41	0.626
11/22/2003 17:00	42.2	-0.56	42	0.626
11/22/2003 17:01	43.2	-0.56	43	0.626
11/22/2003 17:02	44.2	-0.556	44	0.622
11/22/2003 17:03	45.2	-0.554	45	0.620
11/22/2003 17:04	46.2	-0.553	46	0.619
11/22/2003 17:05	47.2	-0.551	47	0.616
11/22/2003 17:06	48.2	-0.551	48	0.616
11/22/2003 17:07	49.2	-0.549	49	0.614
11/22/2003 17:08	50.2	-0.547	50	0.612
11/22/2003 17:09	51.2	-0.545	51	0.610
11/22/2003 17:10	52.2	-0.544	52	0.609
11/22/2003 17:11	53.2	-0.543	53	0.607
11/22/2003 17:12	54.2	-0.54	54	0.604
11/22/2003 17:13	55.2	-0.54	55	0.604
11/22/2003 17:14	56.2	-0.538	56	0.602
11/22/2003 17:15	57.2	-0.538	57	0.602
11/22/2003 17:16	58.2	-0.534	58	0.597
11/22/2003 17:17	59.2	-0.539	59	0.603
11/22/2003 17:18	60.2	-0.53	60	0.593
11/22/2003 17:19	61.2	-0.53	61	0.593
11/22/2003 17:20	62.2	-0.529	62	0.592
11/22/2003 17:21	63.2	-0.527	63	0.589
11/22/2003 17:22	64.2	-0.534	64	0.597
11/22/2003 17:23	65.2	-0.534	65	0.597
11/22/2003 17:24	66.2	-0.531	66	0.594
11/22/2003 17:25	67.2	-0.527	67	0.589
11/22/2003 17:26	68.2	-0.527	68	0.589
11/22/2003 17:27	69.2	-0.524	69	0.586
11/22/2003 17:28	70.2	-0.52	70	0.582
11/22/2003 17:29	71.2	-0.52	71	0.582
11/22/2003 17:30	72.2	-0.518	72	0.579
11/22/2003 17:31	73.2	-0.516	73	0.577
11/22/2003 17:32	74.2	-0.513	74	0.574
11/22/2003 17:33	75.2	-0.511	75	0.572
11/22/2003 17:34	76.2	-0.509	76	0.569
11/22/2003 17:35	77.2	-0.509	77	0.569
11/22/2003 17:36	78.2	-0.507	78	0.567
11/22/2003 17:37	79.2	-0.504	79	0.564
11/22/2003 17:38	80.2	-0.504	80	0.564
11/22/2003 17:39	81.2	-0.502	81	0.562
11/22/2003 17:40	82.2	-0.502	82	0.562
11/22/2003 17:41	83.2	-0.498	83	0.557
11/22/2003 17:42	84.2	-0.504	84	0.564
11/22/2003 17:43	85.2	-0.502	85	0.562
11/22/2003 17:44	86.2	-0.495	86	0.554
11/22/2003 17:45	87.2	-0.497	87	0.556
11/22/2003 17:46	88.2	-0.494	88	0.553
11/22/2003 17:47	89.2	-0.492	89	0.550

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT38
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	22-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		8.95 = L
Time for 37% head change (min.) :		310.00 = To

Hydraulic Conductivity (K) :

4.71E-06	ft./min.
7.84E-08	ft./sec.
6.78E-03	ft./day
2.39E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(8.95/.208)}{2 \times 8.95 \times 310} =$$

4.67×10^{-6} Ft/min

CHECKED
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT42
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	4.42 = L
Time for 37% head change (min.) :	43.50 = To

Hydraulic Conductivity (K) :

5.52E-05	ft./min.
9.19E-07	ft./sec.
7.94E-02	ft./day
2.80E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

3.108

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT42

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 20.58 DATE: 11-23-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

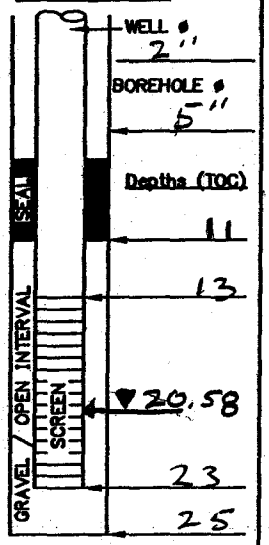
METHOD OF INDUCING WATER LEVEL CHANGE: BAILER PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC ZERO AT SWL + START

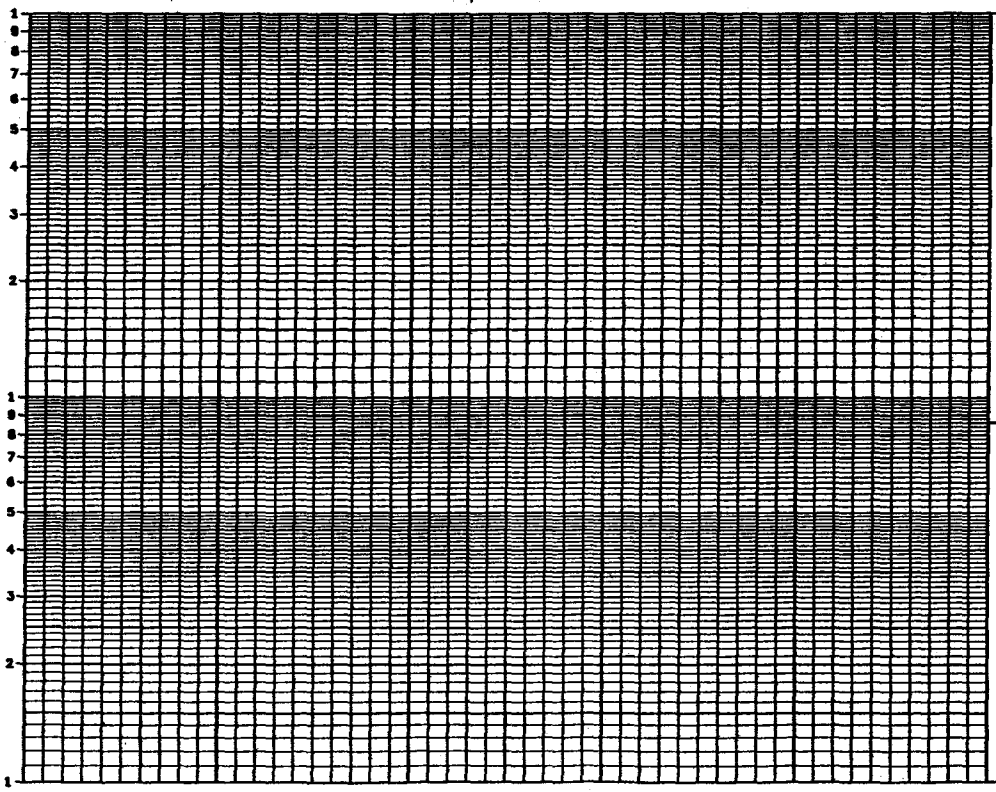
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	.210	
.1	-.170		4	.238	
.2	-.075		5	.264	
.3	-.020		8	.327	
.4	.016		10	.365	
.5	.042		12	.400	
.6	.063		15	.456	
.7	.079		20	.503	
.8	.089		25	.560	
.9	.101		30	.609	
1	.111		35	.639	
2	.169				

WELL SCHEMATIC



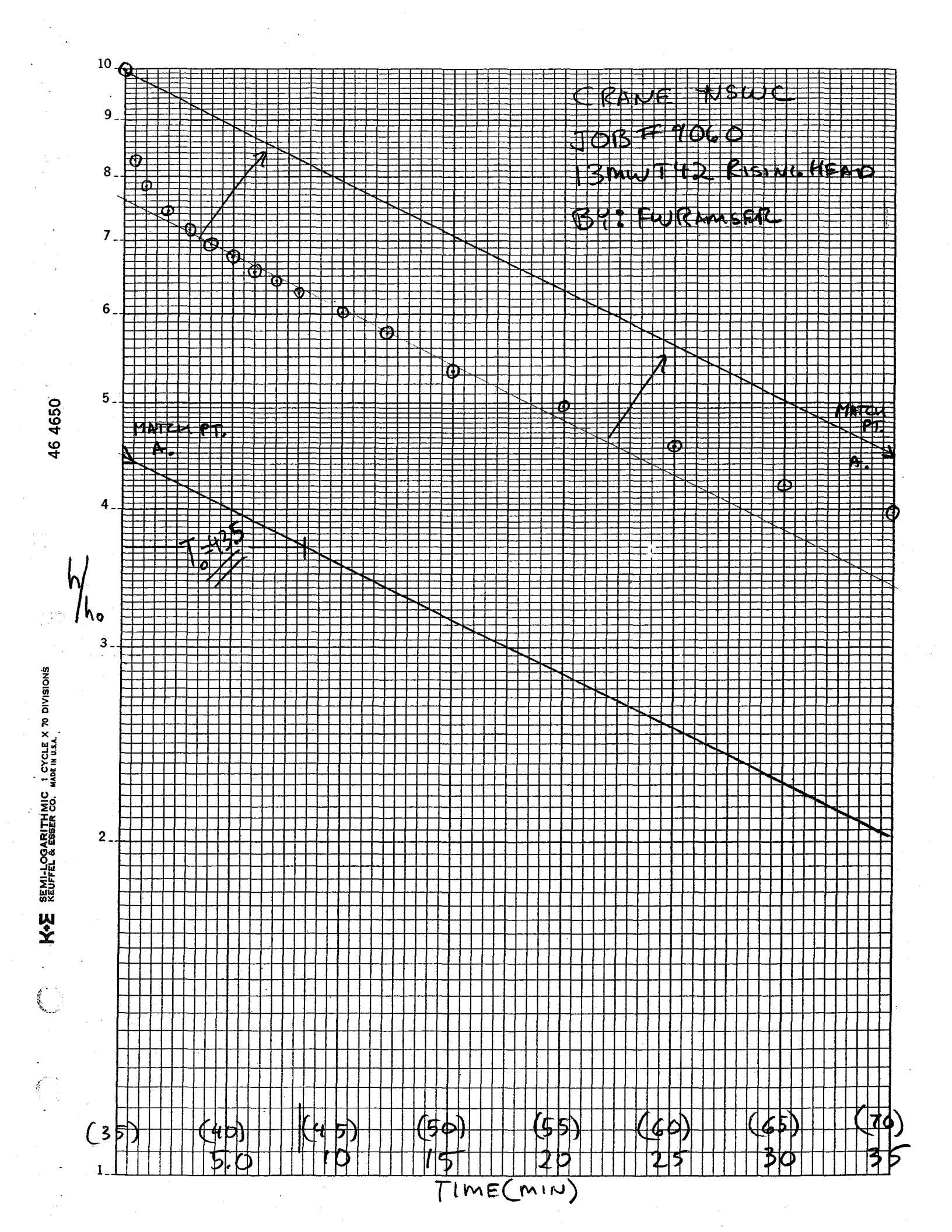
∇ Indicate SWL Depth on Drawing



REMARKS:

COULD NOT FIT H_2O INDICATOR PAST BAILER TO CHECK SWL BEFORE TEST. CHECKED SWL AT END OF TEST TO VERIFY. TEST STOPPED DUE TO DARKNESS. H_2O LEVEL 20.70 AT

CALCS, SKETCH MAPS, ETC.:
END OF TEST


CRANE NSWC
JOB F 9060
13MW T 42 RISING HEAD
BY: FWRAMSAR
MATCH PT. A.
MATCH PT. B.
$T_0 = 43.5$
h/h0
TIME(MIN)
10
9
8
7
6
5
4
3
2
1
(35)
(40)
(45)
(50)
(55)
(60)
(65)
(70)
5.0
10
15
20
25
30
35
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 15:23:33
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-23 164637
DataMgr Version 3.68 13MWT42rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT42rising#1

Test defined on: 11/23/2003 16:37:58
Test started on: 11/23/2003 16:46:37
Test stopped on: 11/23/2003 17:23:37
Test extracted on: N/A

Data gathered using Linear testing
Time between data poi Minutes.
Number of data sample 370

TOTAL DATA SAMPLES 370

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at refere 2.111 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	corrected feet h2o	Adjusted ET. (min)	h/ho	ho = -1.345
11/23/2003	16:46	0	0				
11/23/2003	16:46	0.1	-0.17	-1.345	0	1.000 •	
11/23/2003	16:46	0.2	-0.075	-1.25	0.1	0.929	
11/23/2003	16:46	0.3	-0.02	-1.195	0.2	0.888	
11/23/2003	16:47	0.4	0.016	-1.159	0.3	0.862	
11/23/2003	16:47	0.5	0.042	-1.133	0.4	0.842	
11/23/2003	16:47	0.6	0.063	-1.112	0.5	0.827 •	
11/23/2003	16:47	0.7	0.079	-1.096	0.6	0.815	
11/23/2003	16:47	0.8	0.089	-1.086	0.7	0.807	
11/23/2003	16:47	0.9	0.101	-1.074	0.8	0.799	
11/23/2003	16:47	1	0.111	-1.064	0.9	0.791	
11/23/2003	16:47	1.1	0.119	-1.056	1	0.785 •	
11/23/2003	16:47	1.2	0.125	-1.05	1.1	0.781	
11/23/2003	16:47	1.3	0.131	-1.044	1.2	0.776	
11/23/2003	16:48	1.4	0.137	-1.038	1.3	0.772	
11/23/2003	16:48	1.5	0.145	-1.03	1.4	0.766	
11/23/2003	16:48	1.6	0.149	-1.026	1.5	0.763	
11/23/2003	16:48	1.7	0.155	-1.02	1.6	0.758	
11/23/2003	16:48	1.8	0.159	-1.016	1.7	0.755	

11/23/2003 16:48	1.9	0.165	-1.01	1.8	0.751
11/23/2003 16:48	2	0.169	-1.006	1.9	0.748
11/23/2003 16:48	2.1	0.173	-1.002	2	0.745
11/23/2003 16:48	2.2	0.179	-0.996	2.1	0.741
11/23/2003 16:48	2.3	0.183	-0.992	2.2	0.738
11/23/2003 16:49	2.4	0.188	-0.987	2.3	0.734
11/23/2003 16:49	2.5	0.192	-0.983	2.4	0.731
11/23/2003 16:49	2.6	0.196	-0.979	2.5	0.728
11/23/2003 16:49	2.7	0.198	-0.977	2.6	0.726
11/23/2003 16:49	2.8	0.202	-0.973	2.7	0.723
11/23/2003 16:49	2.9	0.204	-0.971	2.8	0.722
11/23/2003 16:49	3	0.21	-0.965	2.9	0.717
11/23/2003 16:49	3.1	0.212	-0.963	3	0.716
11/23/2003 16:49	3.2	0.216	-0.959	3.1	0.713
11/23/2003 16:49	3.3	0.22	-0.955	3.2	0.710
11/23/2003 16:50	3.4	0.222	-0.953	3.3	0.709
11/23/2003 16:50	3.5	0.224	-0.951	3.4	0.707
11/23/2003 16:50	3.6	0.228	-0.947	3.5	0.704
11/23/2003 16:50	3.7	0.23	-0.945	3.6	0.703
11/23/2003 16:50	3.8	0.234	-0.941	3.7	0.700
11/23/2003 16:50	3.9	0.236	-0.939	3.8	0.698
11/23/2003 16:50	4	0.238	-0.937	3.9	0.697
11/23/2003 16:50	4.1	0.242	-0.933	4	0.694
11/23/2003 16:50	4.2	0.244	-0.931	4.1	0.692
11/23/2003 16:50	4.3	0.248	-0.927	4.2	0.689
11/23/2003 16:51	4.4	0.25	-0.925	4.3	0.688
11/23/2003 16:51	4.5	0.252	-0.923	4.4	0.686
11/23/2003 16:51	4.6	0.256	-0.919	4.5	0.683
11/23/2003 16:51	4.7	0.256	-0.919	4.6	0.683
11/23/2003 16:51	4.8	0.26	-0.915	4.7	0.680
11/23/2003 16:51	4.9	0.262	-0.913	4.8	0.679
11/23/2003 16:51	5	0.264	-0.911	4.9	0.677
11/23/2003 16:51	5.1	0.266	-0.909	5	0.676
11/23/2003 16:51	5.2	0.268	-0.907	5.1	0.674
11/23/2003 16:51	5.3	0.272	-0.903	5.2	0.671
11/23/2003 16:52	5.4	0.274	-0.901	5.3	0.670
11/23/2003 16:52	5.5	0.278	-0.897	5.4	0.667
11/23/2003 16:52	5.6	0.28	-0.895	5.5	0.665
11/23/2003 16:52	5.7	0.28	-0.895	5.6	0.665
11/23/2003 16:52	5.8	0.284	-0.891	5.7	0.662
11/23/2003 16:52	5.9	0.286	-0.889	5.8	0.661
11/23/2003 16:52	6	0.286	-0.889	5.9	0.661
11/23/2003 16:52	6.1	0.29	-0.885	6	0.658
11/23/2003 16:52	6.2	0.29	-0.885	6.1	0.658
11/23/2003 16:52	6.3	0.294	-0.881	6.2	0.655
11/23/2003 16:53	6.4	0.296	-0.879	6.3	0.654
11/23/2003 16:53	6.5	0.298	-0.877	6.4	0.652
11/23/2003 16:53	6.6	0.3	-0.875	6.5	0.651
11/23/2003 16:53	6.7	0.302	-0.873	6.6	0.649
11/23/2003 16:53	6.8	0.304	-0.871	6.7	0.648
11/23/2003 16:53	6.9	0.308	-0.867	6.8	0.645
11/23/2003 16:53	7	0.31	-0.865	6.9	0.643
11/23/2003 16:53	7.1	0.312	-0.863	7	0.642
11/23/2003 16:53	7.2	0.314	-0.861	7.1	0.640
11/23/2003 16:53	7.3	0.316	-0.859	7.2	0.639
11/23/2003 16:54	7.4	0.321	-0.854	7.3	0.635
11/23/2003 16:54	7.5	0.321	-0.854	7.4	0.635
11/23/2003 16:54	7.6	0.369	-0.806	7.5	0.599

11/23/2003 16:54	7.7	0.325	-0.85	7.6	0.632
11/23/2003 16:54	7.8	0.329	-0.846	7.7	0.629
11/23/2003 16:54	7.9	0.323	-0.852	7.8	0.633
11/23/2003 16:54	8	0.327	-0.848	7.9	0.630
11/23/2003 16:54	8.1	0.329	-0.846	8	0.629
11/23/2003 16:54	8.2	0.331	-0.844	8.1	0.628
11/23/2003 16:54	8.3	0.333	-0.842	8.2	0.626
11/23/2003 16:55	8.4	0.335	-0.84	8.3	0.625
11/23/2003 16:55	8.5	0.337	-0.838	8.4	0.623
11/23/2003 16:55	8.6	0.341	-0.834	8.5	0.620
11/23/2003 16:55	8.7	0.343	-0.832	8.6	0.619
11/23/2003 16:55	8.8	0.345	-0.83	8.7	0.617
11/23/2003 16:55	8.9	0.347	-0.828	8.8	0.616
11/23/2003 16:55	9	0.347	-0.828	8.9	0.616
11/23/2003 16:55	9.1	0.349	-0.826	9	0.614
11/23/2003 16:55	9.2	0.351	-0.824	9.1	0.613
11/23/2003 16:55	9.3	0.353	-0.822	9.2	0.611
11/23/2003 16:56	9.4	0.355	-0.82	9.3	0.610
11/23/2003 16:56	9.5	0.357	-0.818	9.4	0.608
11/23/2003 16:56	9.6	0.359	-0.816	9.5	0.607
11/23/2003 16:56	9.7	0.361	-0.814	9.6	0.605
11/23/2003 16:56	9.8	0.361	-0.814	9.7	0.605
11/23/2003 16:56	9.9	0.365	-0.81	9.8	0.602
11/23/2003 16:56	10	0.365	-0.81	9.9	0.602
11/23/2003 16:56	10.1	0.367	-0.808	10	0.601
11/23/2003 16:57	11.1	0.383	-0.792	11	0.589
11/23/2003 16:58	12.1	0.4	-0.775	12	0.576
11/23/2003 16:59	13.1	0.414	-0.761	13	0.566
11/23/2003 17:00	14.1	0.43	-0.745	14	0.554
11/23/2003 17:01	15.1	0.458	-0.717	15	0.533
11/23/2003 17:02	16.1	0.456	-0.719	16	0.535
11/23/2003 17:03	17.1	0.47	-0.705	17	0.524
11/23/2003 17:04	18.1	0.481	-0.694	18	0.516
11/23/2003 17:05	19.1	0.495	-0.68	19	0.506
11/23/2003 17:06	20.1	0.507	-0.668	20	0.497
11/23/2003 17:07	21.1	0.517	-0.658	21	0.489
11/23/2003 17:08	22.1	0.545	-0.63	22	0.468
11/23/2003 17:09	23.1	0.539	-0.636	23	0.473
11/23/2003 17:10	24.1	0.549	-0.626	24	0.465
11/23/2003 17:11	25.1	0.562	-0.613	25	0.456
11/23/2003 17:12	26.1	0.572	-0.603	26	0.448
11/23/2003 17:13	27.1	0.582	-0.593	27	0.441
11/23/2003 17:14	28.1	0.59	-0.585	28	0.435
11/23/2003 17:15	29.1	0.601	-0.574	29	0.427
11/23/2003 17:16	30.1	0.609	-0.566	30	0.421
11/23/2003 17:17	31.1	0.617	-0.558	31	0.415
11/23/2003 17:18	32.1	0.625	-0.55	32	0.409
11/23/2003 17:19	33.1	0.631	-0.544	33	0.404
11/23/2003 17:20	34.1	0.629	-0.546	34	0.406
11/23/2003 17:21	35.1	0.641	-0.534	35	0.397
11/23/2003 17:22	36.1	0.649	-0.526	36	0.391

TETRA TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT42
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	23-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		4.42 = L
Time for 37% head change (min.) :		43.50 = To

Hydraulic Conductivity (K) :

5.52E-05	ft./min.
9.19E-07	ft./sec.
7.94E-02	ft./day
2.80E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(4.42/.208)}{2 \times 4.42 \times 43.50} =$$

5.48×10^{-5} Ft/min

CHECKED
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT45
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

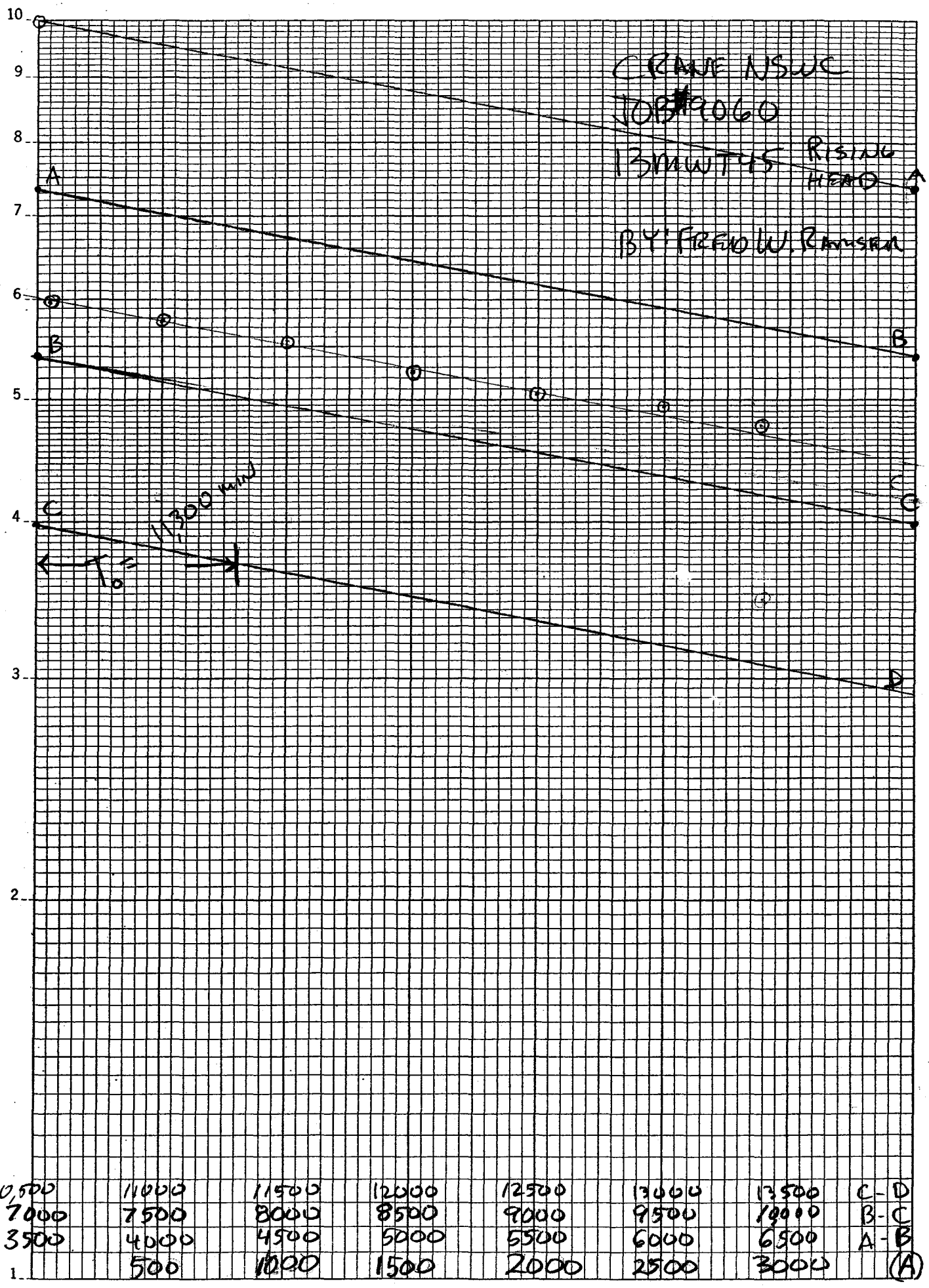
Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	13.45 = L
Time for 37% head change (min.) :	11300 = To

Hydraulic Conductivity (K) :

9.52E-08	ft./min.
1.59E-09	ft./sec.
1.37E-04	ft./day
4.84E-08	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$



10,500	11000	11500	12000	12500	13000	13500	C - D
7000	7500	8000	8500	9000	9500	10000	B - C
3500	4000	4500	5000	5500	6000	6500	A - B
	500	1000	1500	2000	2500	3000	(A)

46 4650

K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT45

PROJECT NO.: 9060 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10', 72.14-82.14 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 72.69 DATE: 1-20-04

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

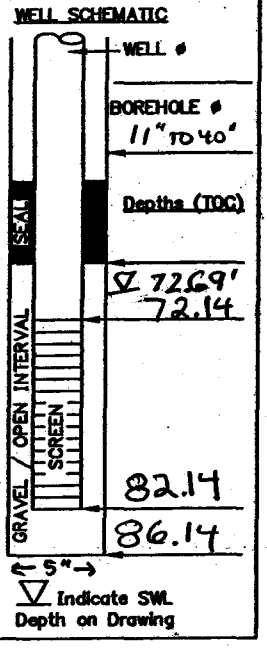
METHOD OF INDUCING WATER LEVEL CHANGE: 1L BAILER x 2 ≈ ~3' DISPLACEMENT PAGE ..... OF .....

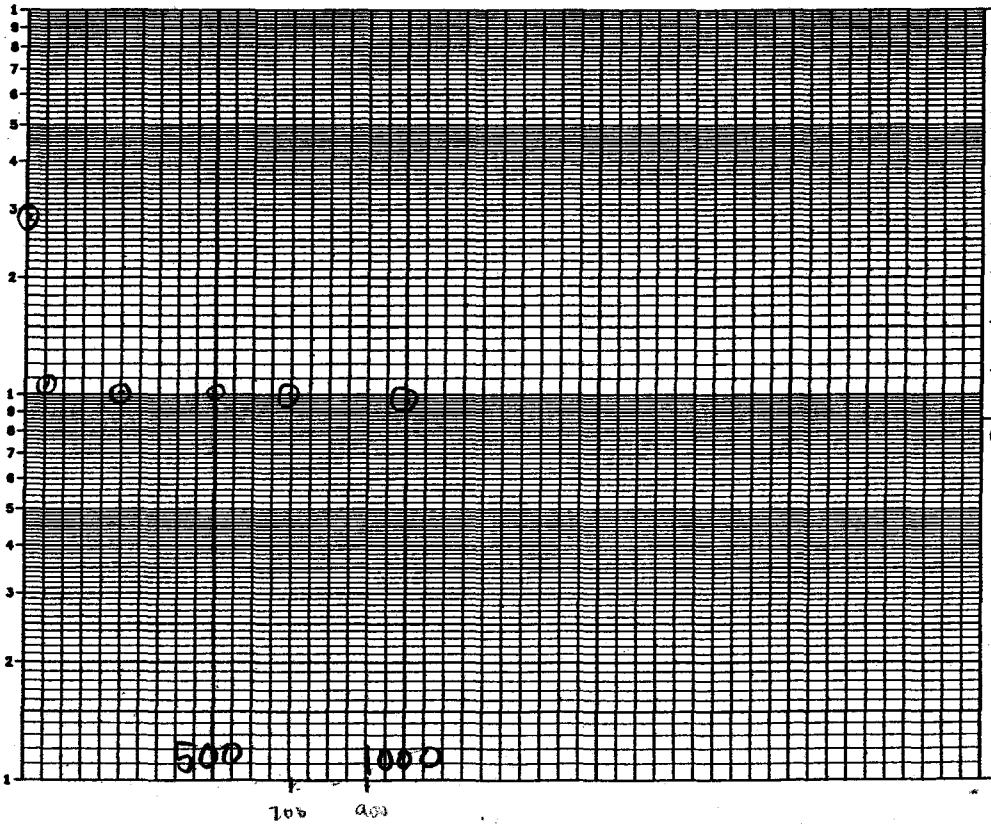
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): WATER SURFACE 0.0 = REF

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0	2.916		10		1.077
50	1.067		20		1.088
250	1.04				
500	1.034				
700	0.997				
1000	0.992				
1500	0.939				
2000	0.902				
2500	0.886				
2897	0.849				

WELL SCHEMATIC





REMARKS:

WL @ XD = 9553

INSERTED BAILERS

@ 1455 XD = 9.892

1717 XD = 9.813

1736 XD = 9.813

START TEST @ 1740

STOP TEST @ 1800

1-22-04

CALCS, SKETCH MAPS, ETC.:

9.813

9.553

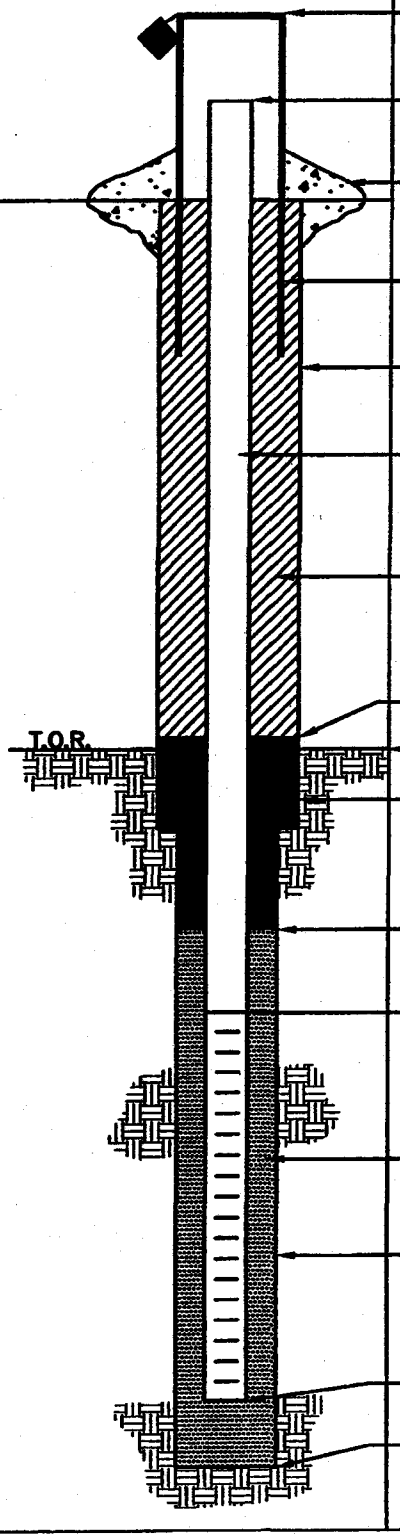
.260

WELL NO.: 13MWT45

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT CRANE NSWC	LOCATION SWMU 13	DRILLER JON KEIFER
PROJECT NO. 9060	BORING 13MWT45	DRILLING METHOD ROTA-SONIC
DATE BEGUN 10-27-03	DATE COMPLETED 11-10-03	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 130 / 1.8

ELEVATION/HEIGHT TOP OF RISER: 125 / 1.8

TYPE OF SURFACE SEAL: CONCRETE 4' x 4' x 6"

I.D. OF SURFACE CASING: 4" x 4" SQ

DIAMETER OF HOLE: 11"

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

TYPE OF BACKFILL: BENTONITE "PURE GOLD" CETCO. 6" ISOLATION CASING INSTALLED USING CEMENT/BENTONITE GROUT TO 39'

ELEVATION/DEPTH TOP OF SEAL: 15'

ELEVATION/DEPTH TOP OF BEDROCK: 10'

TYPE OF SEAL: BENTONITE "PURE GOLD" CHIPS CETCO

ELEVATION/DEPTH TOP OF SAND: 167

ELEVATION/DEPTH TOP OF SCREEN: 170

TYPE OF SCREEN: PVC SCH. 40

SLOT SIZE x LENGTH: 0.02 x 10'

I.D. SCREEN: 2"

TYPE OF SAND PACK: QTZ SAND 10/30 SEP/18B

DIAMETER OF HOLE IN BEDROCK: 5"

CORE/REAM: CORE

ELEVATION/DEPTH BOTTOM SCREEN: 180

ELEVATION/DEPTH BOTTOM OF SAND: 184

ELEVATION/DEPTH BOTTOM OF HOLE: 184

BACKFILL MATERIAL BELOW SAND: NONE

ACAD: FORM_MWINBR.dwg 07/20/99 INL

In-Situ Inc. MiniTroll Pro

Report generated: 1/22/2004 21:31:28
Report from file: ...\SN12487 2004-01-20 173850 13mwt45r1.bin
Win-Situ Version 4.41

Serial number: 12487
Firmware Version 3.07
Unit name:

Test name: 13mwt45r1

Test defined on: 1/20/2004 13:21:03
Test started on: 1/20/2004 17:38:50
Test stopped on: 1/22/2004 18:01:02
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time betwee Minutes.
Number of data sample 423

TOTAL DATA SAMPLES 423

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: Water level
Sensor Range: 100 PSIG.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at refere 9.818 Feet H2O

		Chan[1]	Chan[2]				
Date	Time	ET (min)	Fahrenheit	Feet H2O	Adjusted ET. (min)	h/ho	ho = 1.785
1/20/2004	17:38:50	0	57.07	0			
1/20/2004	17:38:50	0.005	57.09	-0.005			
1/20/2004	17:38:51	0.01	57.09	-0.01			
1/20/2004	17:38:51	0.015	57.11	-0.015			
1/20/2004	17:38:51	0.02	57.11	-0.015			
1/20/2004	17:38:52	0.025	57.11	-0.015			
1/20/2004	17:38:52	0.03	57.14	-0.014			
1/20/2004	17:38:52	0.035	57.14	-0.019			
1/20/2004	17:38:53	0.04	57.14	-0.014			
1/20/2004	17:38:53	0.045	57.14	-0.019			
1/20/2004	17:38:53	0.05	57.14	-0.014			
1/20/2004	17:38:53	0.055	57.14	0.229			
1/20/2004	17:38:54	0.06	57.16	-0.319			
1/20/2004	17:38:54	0.065	57.16	0.018			
1/20/2004	17:38:54	0.07	57.16	1.016			
1/20/2004	17:38:55	0.075	57.16	6.167			
1/20/2004	17:38:55	0.08	57.16	6.652			
1/20/2004	17:38:55	0.085	57.16	6.304			
1/20/2004	17:38:56	0.09	57.16	1.512			
1/20/2004	17:38:56	0.095	57.16	3.554			
1/20/2004	17:38:56	0.1	57.16	3.18			
1/20/2004	17:38:56	0.1058	57.16	3.138			
1/20/2004	17:38:57	0.112	57.18	3.101			
1/20/2004	17:38:57	0.1185	57.16	3.016			
1/20/2004	17:38:58	0.1255	57.18	2.916			
1/20/2004	17:38:58	0.1328	57.16	2.847			
1/20/2004	17:38:59	0.1407	57.18	2.774			
1/20/2004	17:38:59	0.149	57.18	2.721			
1/20/2004	17:39:00	0.1578	57.18	2.658			
1/20/2004	17:39:00	0.1672	57.16	2.589			
1/20/2004	17:39:01	0.177	57.16	2.457			
1/20/2004	17:39:01	0.1875	57.16	2.346			
1/20/2004	17:39:02	0.1985	57.16	2.256			
1/20/2004	17:39:03	0.2102	57.14	2.203			
1/20/2004	17:39:03	0.2227	57.14	2.092			
1/20/2004	17:39:04	0.2358	57.14	2.034			
1/20/2004	17:39:05	0.2498	57.14	1.928			
1/20/2004	17:39:06	0.2647	57.14	1.839			
1/20/2004	17:39:07	0.2803	57.11	1.896			
1/20/2004	17:39:08	0.297	57.11	1.785	0	1.000	
1/20/2004	17:39:09	0.3147	57.11	1.764	0.1377	0.988	

t dh

13mwt45r1

1/20/2004	17:39:10	0.3333	57.11	1.69	0.1563	0.947
1/20/2004	17:39:11	0.3532	57.11	1.653	0.1762	0.926
1/20/2004	17:39:13	0.3742	57.11	1.627	0.1972	0.911
1/20/2004	17:39:14	0.3963	57.11	1.595	0.2193	0.894
1/20/2004	17:39:15	0.4198	57.11	1.564	0.2428	0.876
1/20/2004	17:39:17	0.4447	57.11	1.532	0.2677	0.858
1/20/2004	17:39:18	0.4697	57.11	1.511	0.2927	0.846
1/20/2004	17:39:20	0.4963	57.11	1.479	0.3193	0.829
1/20/2004	17:39:22	0.5247	57.11	1.432	0.3477	0.802
1/20/2004	17:39:23	0.5547	57.11	1.41	0.3777	0.790
1/20/2004	17:39:25	0.5863	57.11	1.384	0.4093	0.775
1/20/2004	17:39:27	0.6213	57.11	1.358	0.4443	0.761
1/20/2004	17:39:30	0.658	57.11	1.347	0.481	0.755
1/20/2004	17:39:32	0.6963	57.09	1.32	0.5193	0.739
1/20/2004	17:39:34	0.738	57.11	1.279	0.561	0.717
1/20/2004	17:39:37	0.7813	57.09	1.262	0.6043	0.707
1/20/2004	17:39:40	0.828	57.09	1.241	0.651	0.695
1/20/2004	17:39:43	0.8763	57.09	1.236	0.6993	0.692
1/20/2004	17:39:46	0.928	57.09	1.22	0.751	0.683
1/20/2004	17:39:49	0.983	57.09	1.209	0.806	0.677
1/20/2004	17:39:53	1.0413	57.09	1.199	0.8643	0.672
1/20/2004	17:39:56	1.103	57.09	1.193	0.926	0.668
1/20/2004	17:40:00	1.168	57.09	1.183	0.991	0.663
1/20/2004	17:40:04	1.238	57.09	1.178	1.061	0.660
1/20/2004	17:40:09	1.3113	57.09	1.172	1.1343	0.657
1/20/2004	17:40:14	1.3897	57.09	1.167	1.2127	0.654
1/20/2004	17:40:19	1.473	57.09	1.167	1.296	0.654
1/20/2004	17:40:24	1.5613	57.09	1.157	1.3843	0.648
1/20/2004	17:40:29	1.6547	57.09	1.157	1.4777	0.648
1/20/2004	17:40:35	1.753	57.07	1.151	1.576	0.645
1/20/2004	17:40:42	1.858	57.07	1.145	1.681	0.641
1/20/2004	17:40:48	1.968	57.07	1.145	1.791	0.641
1/20/2004	17:40:55	2.0847	57.07	1.14	1.9077	0.639
1/20/2004	17:41:03	2.2097	57.07	1.135	2.0327	0.636
1/20/2004	17:41:11	2.3413	57.07	1.135	2.1643	0.636
1/20/2004	17:41:19	2.4813	57.07	1.129	2.3043	0.632
1/20/2004	17:41:28	2.6297	57.07	1.129	2.4527	0.632
1/20/2004	17:41:37	2.7863	57.07	1.129	2.6093	0.632
1/20/2004	17:41:47	2.953	57.07	1.124	2.776	0.630
1/20/2004	17:41:58	3.1297	57.07	1.124	2.9527	0.630
1/20/2004	17:42:09	3.3163	57.07	1.114	3.1393	0.624
1/20/2004	17:42:21	3.5147	57.07	1.119	3.3377	0.627
1/20/2004	17:42:34	3.7247	57.07	1.119	3.5477	0.627
1/20/2004	17:42:47	3.9463	57.07	1.114	3.7693	0.624
1/20/2004	17:43:01	4.1813	57.07	1.114	4.0043	0.624
1/20/2004	17:43:16	4.4297	57.07	1.114	4.2527	0.624
1/20/2004	17:43:32	4.693	57.07	1.108	4.516	0.621
1/20/2004	17:43:49	4.973	57.07	1.098	4.796	0.615
1/20/2004	17:44:06	5.2697	57.05	1.092	5.0927	0.612
1/20/2004	17:44:25	5.583	57.07	1.093	5.406	0.612
1/20/2004	17:44:45	5.9147	57.07	1.093	5.7377	0.612
1/20/2004	17:45:06	6.2663	57.07	1.093	6.0893	0.612
1/20/2004	17:45:29	6.6397	57.07	1.087	6.4627	0.609
1/20/2004	17:45:52	7.0347	57.07	1.087	6.8577	0.609
1/20/2004	17:46:17	7.453	57.07	1.087	7.276	0.609
1/20/2004	17:46:44	7.8963	57.07	1.087	7.7193	0.609
1/20/2004	17:47:12	8.3663	57.07	1.082	8.1893	0.606
1/20/2004	17:47:42	8.8647	57.07	1.082	8.6877	0.606
1/20/2004	17:48:14	9.3913	57.07	1.082	9.2143	0.606
1/20/2004	17:48:47	9.9497	57.07	1.077	9.7727	0.603
1/20/2004	17:49:23	10.5413	57.07	1.082	10.3643	0.606
1/20/2004	17:50:00	11.168	57.07	1.077	10.991	0.603
1/20/2004	17:50:40	11.8313	57.07	1.077	11.6543	0.603
1/20/2004	17:51:22	12.5347	57.07	1.077	12.3577	0.603
1/20/2004	17:52:07	13.2797	57.07	1.087	13.1027	0.609
1/20/2004	17:52:54	14.0697	57.09	1.088	13.8927	0.610
1/20/2004	17:53:45	14.9063	57.09	1.088	14.7293	0.610
1/20/2004	17:54:38	15.7913	57.09	1.088	15.6143	0.610
1/20/2004	17:55:34	16.7297	57.09	1.093	16.5527	0.612
1/20/2004	17:56:34	17.723	57.09	1.088	17.546	0.610
1/20/2004	17:57:37	18.7763	57.09	1.083	18.5993	0.607
1/20/2004	17:58:44	19.8913	57.09	1.088	19.7143	0.610
1/20/2004	17:59:55	21.073	57.09	1.088	20.896	0.610
1/20/2004	18:01:10	22.3247	57.11	1.083	22.1477	0.607
1/20/2004	18:02:29	23.6497	57.11	1.083	23.4727	0.607
1/20/2004	18:03:53	25.0547	57.14	1.084	24.8777	0.607
1/20/2004	18:05:23	26.543	57.14	1.084	26.366	0.607
1/20/2004	18:06:57	28.118	57.14	1.084	27.941	0.607
1/20/2004	18:08:37	29.7863	57.14	1.084	29.6093	0.607
1/20/2004	18:10:23	31.5547	57.14	1.084	31.3777	0.607
1/20/2004	18:12:16	33.428	57.14	1.084	33.251	0.607
1/20/2004	18:14:15	35.4113	57.14	1.084	35.2343	0.607
1/20/2004	18:16:21	37.513	57.14	1.084	37.336	0.607
1/20/2004	18:18:35	39.7397	57.14	1.068	39.5627	0.598

1/20/2004	18:20:56	42.098	57.11	1.067	41.921	0.598
1/20/2004	18:23:26	44.5963	57.11	1.067	44.4193	0.598
1/20/2004	18:26:05	47.243	57.11	1.067	47.066	0.598
1/20/2004	18:28:53	50.0463	57.11	1.067	49.8693	0.598
1/20/2004	18:31:51	53.0147	57.11	1.062	52.8377	0.595
1/20/2004	18:35:00	56.1597	57.11	1.067	55.9827	0.598
1/20/2004	18:38:20	59.4913	57.11	1.078	59.3143	0.604
1/20/2004	18:41:51	63.0197	57.11	1.078	62.8427	0.604
1/20/2004	18:45:36	66.758	57.11	1.073	66.581	0.601
1/20/2004	18:49:33	70.718	57.11	1.078	70.541	0.604
1/20/2004	18:53:45	74.9113	57.11	1.073	74.7343	0.601
1/20/2004	18:58:11	79.3547	57.11	1.073	79.1777	0.601
1/20/2004	19:02:54	84.0613	57.11	1.073	83.8843	0.601
1/20/2004	19:07:53	89.0463	57.11	1.073	88.8693	0.601
1/20/2004	19:13:10	94.3263	57.11	1.057	94.1493	0.592
1/20/2004	19:18:45	99.9197	57.11	1.062	99.7427	0.595
1/20/2004	19:24:41	105.8447	57.11	1.052	105.6677	0.589
1/20/2004	19:30:57	112.1197	57.09	1.056	111.9427	0.592
1/20/2004	19:37:36	118.768	57.09	1.051	118.591	0.589
1/20/2004	19:44:39	125.8097	57.09	1.051	125.6327	0.589
1/20/2004	19:52:06	133.268	57.09	1.051	133.091	0.589
1/20/2004	20:00:00	141.168	57.09	1.051	140.991	0.589
1/20/2004	20:08:22	149.5363	57.09	1.062	149.3593	0.595
1/20/2004	20:17:14	158.4013	57.09	1.062	158.2243	0.595
1/20/2004	20:26:38	167.7913	57.09	1.062	167.6143	0.595
1/20/2004	20:36:34	177.738	57.09	1.062	177.561	0.595
1/20/2004	20:46:34	187.738	57.09	1.062	187.561	0.595
1/20/2004	20:56:34	197.738	57.07	1.061	197.561	0.594
1/20/2004	21:06:34	207.738	57.07	1.045	207.561	0.585
1/20/2004	21:16:34	217.738	57.07	1.045	217.561	0.585
1/20/2004	21:26:34	227.738	57.07	1.04	227.561	0.583
1/20/2004	21:36:34	237.738	57.07	1.04	237.561	0.583
1/20/2004	21:46:34	247.738	57.07	1.04	247.561	0.583
1/20/2004	21:56:34	257.738	57.07	1.056	257.561	0.592
1/20/2004	22:06:34	267.738	57.07	1.04	267.561	0.583
1/20/2004	22:16:34	277.738	57.07	1.04	277.561	0.583
1/20/2004	22:26:34	287.738	57.07	1.04	287.561	0.583
1/20/2004	22:36:34	297.738	57.07	1.034	297.561	0.579
1/20/2004	22:46:34	307.738	57.07	1.034	307.561	0.579
1/20/2004	22:56:34	317.738	57.07	1.034	317.561	0.579
1/20/2004	23:06:34	327.738	57.07	1.034	327.561	0.579
1/20/2004	23:16:34	337.738	57.07	1.034	337.561	0.579
1/20/2004	23:26:34	347.738	57.07	1.034	347.561	0.579
1/20/2004	23:36:34	357.738	57.07	1.029	357.561	0.576
1/20/2004	23:46:34	367.738	57.07	1.029	367.561	0.576
1/20/2004	23:56:34	377.738	57.07	1.029	377.561	0.576
1/21/2004	0:06:34	387.738	57.07	1.029	387.561	0.576
1/21/2004	0:16:34	397.738	57.07	1.04	397.561	0.583
1/21/2004	0:26:34	407.738	57.07	1.024	407.561	0.574
1/21/2004	0:36:34	417.738	57.07	1.04	417.561	0.583
1/21/2004	0:46:34	427.738	57.07	1.04	427.561	0.583
1/21/2004	0:56:34	437.738	57.07	1.034	437.561	0.579
1/21/2004	1:06:34	447.738	57.07	1.034	447.561	0.579
1/21/2004	1:16:34	457.738	57.07	1.034	457.561	0.579
1/21/2004	1:26:34	467.738	57.07	1.034	467.561	0.579
1/21/2004	1:36:34	477.738	57.07	1.034	477.561	0.579
1/21/2004	1:46:34	487.738	57.07	1.034	487.561	0.579
1/21/2004	1:56:34	497.738	57.07	1.034	497.561	0.579
1/21/2004	2:06:34	507.738	57.05	1.018	507.561	0.570
1/21/2004	2:16:34	517.738	57.05	1.018	517.561	0.570
1/21/2004	2:26:34	527.738	57.05	1.013	527.561	0.568
1/21/2004	2:36:34	537.738	57.07	1.013	537.561	0.568
1/21/2004	2:46:34	547.738	57.07	1.013	547.561	0.568
1/21/2004	2:56:34	557.738	57.05	1.013	557.561	0.568
1/21/2004	3:06:34	567.738	57.07	1.013	567.561	0.568
1/21/2004	3:16:34	577.738	57.05	1.013	577.561	0.568
1/21/2004	3:26:34	587.738	57.05	1.007	587.561	0.564
1/21/2004	3:36:34	597.738	57.07	1.008	597.561	0.565
1/21/2004	3:46:34	607.738	57.05	1.007	607.561	0.564
1/21/2004	3:56:34	617.738	57.07	1.019	617.561	0.571
1/21/2004	4:06:34	627.738	57.05	1.023	627.561	0.573
1/21/2004	4:16:34	637.738	57.05	1.023	637.561	0.573
1/21/2004	4:26:34	647.738	57.05	1.018	647.561	0.570
1/21/2004	4:36:34	657.738	57.05	1.018	657.561	0.570
1/21/2004	4:46:34	667.738	57.05	1.018	667.561	0.570
1/21/2004	4:56:34	677.738	57.05	1.002	677.561	0.561
1/21/2004	5:06:34	687.738	57.05	1.002	687.561	0.561
1/21/2004	5:16:34	697.738	57.05	0.997	697.561	0.559
1/21/2004	5:26:34	707.738	57.05	1.013	707.561	0.568
1/21/2004	5:36:34	717.738	57.05	1.013	717.561	0.568
1/21/2004	5:46:34	727.738	57.05	1.013	727.561	0.568
1/21/2004	5:56:34	737.738	57.05	1.013	737.561	0.568
1/21/2004	6:06:34	747.738	57.05	1.007	747.561	0.564
1/21/2004	6:16:34	757.738	57.05	1.007	757.561	0.564

1/21/2004	6:26:34	767.738	57.05	1.007	767.561	0.564
1/21/2004	6:36:34	777.738	57.05	0.997	777.561	0.559
1/21/2004	6:46:34	787.738	57.05	0.992	787.561	0.556
1/21/2004	6:56:34	797.738	57.07	0.992	797.561	0.556
1/21/2004	7:06:34	807.738	57.05	0.992	807.561	0.556
1/21/2004	7:16:34	817.738	57.05	1.002	817.561	0.561
1/21/2004	7:26:34	827.738	57.05	0.992	827.561	0.556
1/21/2004	7:36:34	837.738	57.07	0.992	837.561	0.556
1/21/2004	7:46:34	847.738	57.05	0.992	847.561	0.556
1/21/2004	7:56:34	857.738	57.05	0.986	857.561	0.552
1/21/2004	8:06:34	867.738	57.05	0.986	867.561	0.552
1/21/2004	8:16:34	877.738	57.05	0.986	877.561	0.552
1/21/2004	8:26:34	887.738	57.05	0.981	887.561	0.550
1/21/2004	8:36:34	897.738	57.05	0.986	897.561	0.552
1/21/2004	8:46:34	907.738	57.05	0.981	907.561	0.550
1/21/2004	8:56:34	917.738	57.05	0.986	917.561	0.552
1/21/2004	9:06:34	927.738	57.05	0.981	927.561	0.550
1/21/2004	9:16:34	937.738	57.05	0.986	937.561	0.552
1/21/2004	9:26:34	947.738	57.05	0.981	947.561	0.550
1/21/2004	9:36:34	957.738	57.05	0.981	957.561	0.550
1/21/2004	9:46:34	967.738	57.05	0.981	967.561	0.550
1/21/2004	9:56:34	977.738	57.05	0.976	977.561	0.547
1/21/2004	10:06:34	987.738	57.05	0.992	987.561	0.556
1/21/2004	10:16:34	997.738	57.07	0.992	997.561	0.556
1/21/2004	10:26:34	1007.738	57.05	0.992	1007.561	0.556
1/21/2004	10:36:34	1017.738	57.05	0.992	1017.561	0.556
1/21/2004	10:46:34	1027.738	57.05	0.992	1027.561	0.556
1/21/2004	10:56:34	1037.738	57.05	0.992	1037.561	0.556
1/21/2004	11:06:34	1047.738	57.05	0.992	1047.561	0.556
1/21/2004	11:16:34	1057.738	57.05	0.976	1057.561	0.547
1/21/2004	11:26:34	1067.738	57.05	0.971	1067.561	0.544
1/21/2004	11:36:34	1077.738	57.05	0.971	1077.561	0.544
1/21/2004	11:46:34	1087.738	57.05	0.971	1087.561	0.544
1/21/2004	11:56:34	1097.738	57.05	0.971	1097.561	0.544
1/21/2004	12:06:34	1107.738	57.05	0.986	1107.561	0.552
1/21/2004	12:16:34	1117.738	57.05	0.981	1117.561	0.550
1/21/2004	12:26:34	1127.738	57.05	0.981	1127.561	0.550
1/21/2004	12:36:34	1137.738	57.05	0.965	1137.561	0.541
1/21/2004	12:46:34	1147.738	57.05	0.965	1147.561	0.541
1/21/2004	12:56:34	1157.738	57.05	0.965	1157.561	0.541
1/21/2004	13:06:34	1167.738	57.05	0.965	1167.561	0.541
1/21/2004	13:16:34	1177.738	57.05	0.976	1177.561	0.547
1/21/2004	13:26:34	1187.738	57.05	0.976	1187.561	0.547
1/21/2004	13:36:34	1197.738	57.05	0.976	1197.561	0.547
1/21/2004	13:46:34	1207.738	57.05	0.976	1207.561	0.547
1/21/2004	13:56:34	1217.738	57.05	0.976	1217.561	0.547
1/21/2004	14:06:34	1227.738	57.05	0.971	1227.561	0.544
1/21/2004	14:16:34	1237.738	57.05	0.965	1237.561	0.541
1/21/2004	14:26:34	1247.738	57.05	0.955	1247.561	0.535
1/21/2004	14:36:34	1257.738	57.05	0.955	1257.561	0.535
1/21/2004	14:46:34	1267.738	57.05	0.955	1267.561	0.535
1/21/2004	14:56:34	1277.738	57.05	0.955	1277.561	0.535
1/21/2004	15:06:34	1287.738	57.05	0.955	1287.561	0.535
1/21/2004	15:16:34	1297.738	57.05	0.955	1297.561	0.535
1/21/2004	15:26:34	1307.738	57.05	0.949	1307.561	0.532
1/21/2004	15:36:34	1317.738	57.05	0.949	1317.561	0.532
1/21/2004	15:46:34	1327.738	57.05	0.949	1327.561	0.532
1/21/2004	15:56:34	1337.738	57.05	0.949	1337.561	0.532
1/21/2004	16:06:34	1347.738	57.05	0.949	1347.561	0.532
1/21/2004	16:16:34	1357.738	57.05	0.965	1357.561	0.541
1/21/2004	16:26:34	1367.738	57.05	0.96	1367.561	0.538
1/21/2004	16:36:34	1377.738	57.05	0.96	1377.561	0.538
1/21/2004	16:46:34	1387.738	57.05	0.944	1387.561	0.529
1/21/2004	16:56:34	1397.738	57.05	0.944	1397.561	0.529
1/21/2004	17:06:34	1407.738	57.05	0.944	1407.561	0.529
1/21/2004	17:16:34	1417.738	57.05	0.944	1417.561	0.529
1/21/2004	17:26:34	1427.738	57.05	0.944	1427.561	0.529
1/21/2004	17:36:34	1437.738	57.05	0.944	1437.561	0.529
1/21/2004	17:46:34	1447.738	57.05	0.939	1447.561	0.526
1/21/2004	17:56:34	1457.738	57.05	0.939	1457.561	0.526
1/21/2004	18:06:34	1467.738	57.05	0.955	1467.561	0.535
1/21/2004	18:16:34	1477.738	57.05	0.939	1477.561	0.526
1/21/2004	18:26:34	1487.738	57.05	0.939	1487.561	0.526
1/21/2004	18:36:34	1497.738	57.05	0.934	1497.561	0.523
1/21/2004	18:46:34	1507.738	57.05	0.939	1507.561	0.526
1/21/2004	18:56:34	1517.738	57.05	0.949	1517.561	0.532
1/21/2004	19:06:34	1527.738	57.05	0.949	1527.561	0.532
1/21/2004	19:16:34	1537.738	57.05	0.949	1537.561	0.532
1/21/2004	19:26:34	1547.738	57.05	0.949	1547.561	0.532
1/21/2004	19:36:34	1557.738	57.05	0.949	1557.561	0.532
1/21/2004	19:46:34	1567.738	57.05	0.944	1567.561	0.529
1/21/2004	19:56:34	1577.738	57.05	0.934	1577.561	0.523
1/21/2004	20:06:34	1587.738	57.05	0.944	1587.561	0.529
1/21/2004	20:16:34	1597.738	57.05	0.928	1597.561	0.520

1/21/2004	20:26:34	1607.738	57.05	0.928	1607.561	0.520
1/21/2004	20:36:34	1617.738	57.05	0.928	1617.561	0.520
1/21/2004	20:46:34	1627.738	57.05	0.928	1627.561	0.520
1/21/2004	20:56:34	1637.738	57.05	0.928	1637.561	0.520
1/21/2004	21:06:34	1647.738	57.05	0.928	1647.561	0.520
1/21/2004	21:16:34	1657.738	57.05	0.939	1657.561	0.526
1/21/2004	21:26:34	1667.738	57.05	0.944	1667.561	0.529
1/21/2004	21:36:34	1677.738	57.05	0.928	1677.561	0.520
1/21/2004	21:46:34	1687.738	57.05	0.928	1687.561	0.520
1/21/2004	21:56:34	1697.738	57.05	0.923	1697.561	0.517
1/21/2004	22:06:34	1707.738	57.05	0.923	1707.561	0.517
1/21/2004	22:16:34	1717.738	57.05	0.923	1717.561	0.517
1/21/2004	22:26:34	1727.738	57.05	0.923	1727.561	0.517
1/21/2004	22:36:34	1737.738	57.05	0.923	1737.561	0.517
1/21/2004	22:46:34	1747.738	57.05	0.923	1747.561	0.517
1/21/2004	22:56:34	1757.738	57.05	0.923	1757.561	0.517
1/21/2004	23:06:34	1767.738	57.05	0.918	1767.561	0.514
1/21/2004	23:16:34	1777.738	57.05	0.918	1777.561	0.514
1/21/2004	23:26:34	1787.738	57.05	0.923	1787.561	0.517
1/21/2004	23:36:34	1797.738	57.05	0.939	1797.561	0.526
1/21/2004	23:46:34	1807.738	57.05	0.934	1807.561	0.523
1/21/2004	23:56:34	1817.738	57.05	0.934	1817.561	0.523
1/22/2004	0:06:34	1827.738	57.05	0.928	1827.561	0.520
1/22/2004	0:16:34	1837.738	57.05	0.928	1837.561	0.520
1/22/2004	0:26:34	1847.738	57.05	0.928	1847.561	0.520
1/22/2004	0:36:34	1857.738	57.05	0.928	1857.561	0.520
1/22/2004	0:46:34	1867.738	57.05	0.928	1867.561	0.520
1/22/2004	0:56:34	1877.738	57.05	0.923	1877.561	0.517
1/22/2004	1:06:34	1887.738	57.05	0.907	1887.561	0.508
1/22/2004	1:16:34	1897.738	57.05	0.907	1897.561	0.508
1/22/2004	1:26:34	1907.738	57.05	0.907	1907.561	0.508
1/22/2004	1:36:34	1917.738	57.05	0.907	1917.561	0.508
1/22/2004	1:46:34	1927.738	57.05	0.907	1927.561	0.508
1/22/2004	1:56:34	1937.738	57.05	0.907	1937.561	0.508
1/22/2004	2:06:34	1947.738	57.05	0.907	1947.561	0.508
1/22/2004	2:16:34	1957.738	57.05	0.902	1957.561	0.505
1/22/2004	2:26:34	1967.738	57.05	0.907	1967.561	0.508
1/22/2004	2:36:34	1977.738	57.05	0.902	1977.561	0.505
1/22/2004	2:46:34	1987.738	57.05	0.902	1987.561	0.505
1/22/2004	2:56:34	1997.738	57.05	0.902	1997.561	0.505
1/22/2004	3:06:34	2007.738	57.05	0.902	2007.561	0.505
1/22/2004	3:16:34	2017.738	57.05	0.897	2017.561	0.503
1/22/2004	3:26:34	2027.738	57.05	0.902	2027.561	0.505
1/22/2004	3:36:34	2037.738	57.05	0.902	2037.561	0.505
1/22/2004	3:46:34	2047.738	57.05	0.897	2047.561	0.503
1/22/2004	3:56:34	2057.738	57.05	0.897	2057.561	0.503
1/22/2004	4:06:34	2067.738	57.05	0.897	2067.561	0.503
1/22/2004	4:16:34	2077.738	57.05	0.912	2077.561	0.511
1/22/2004	4:26:34	2087.738	57.05	0.912	2087.561	0.511
1/22/2004	4:36:34	2097.738	57.05	0.907	2097.561	0.508
1/22/2004	4:46:34	2107.738	57.05	0.897	2107.561	0.503
1/22/2004	4:56:34	2117.738	57.05	0.897	2117.561	0.503
1/22/2004	5:06:34	2127.738	57.05	0.891	2127.561	0.499
1/22/2004	5:16:34	2137.738	57.05	0.907	2137.561	0.508
1/22/2004	5:26:34	2147.738	57.05	0.907	2147.561	0.508
1/22/2004	5:36:34	2157.738	57.05	0.907	2157.561	0.508
1/22/2004	5:46:34	2167.738	57.05	0.891	2167.561	0.499
1/22/2004	5:56:34	2177.738	57.05	0.891	2177.561	0.499
1/22/2004	6:06:34	2187.738	57.05	0.891	2187.561	0.499
1/22/2004	6:16:34	2197.738	57.05	0.891	2197.561	0.499
1/22/2004	6:26:34	2207.738	57.05	0.891	2207.561	0.499
1/22/2004	6:36:34	2217.738	57.05	0.891	2217.561	0.499
1/22/2004	6:46:34	2227.738	57.05	0.891	2227.561	0.499
1/22/2004	6:56:34	2237.738	57.05	0.886	2237.561	0.496
1/22/2004	7:06:34	2247.738	57.05	0.886	2247.561	0.496
1/22/2004	7:16:34	2257.738	57.05	0.886	2257.561	0.496
1/22/2004	7:26:34	2267.738	57.05	0.886	2267.561	0.496
1/22/2004	7:36:34	2277.738	57.05	0.886	2277.561	0.496
1/22/2004	7:46:34	2287.738	57.05	0.902	2287.561	0.505
1/22/2004	7:56:34	2297.738	57.05	0.897	2297.561	0.503
1/22/2004	8:06:34	2307.738	57.05	0.881	2307.561	0.494
1/22/2004	8:16:34	2317.738	57.05	0.881	2317.561	0.494
1/22/2004	8:26:34	2327.738	57.05	0.881	2327.561	0.494
1/22/2004	8:36:34	2337.738	57.05	0.897	2337.561	0.503
1/22/2004	8:46:34	2347.738	57.05	0.897	2347.561	0.503
1/22/2004	8:56:34	2357.738	57.05	0.897	2357.561	0.503
1/22/2004	9:06:34	2367.738	57.05	0.891	2367.561	0.499
1/22/2004	9:16:34	2377.738	57.05	0.891	2377.561	0.499
1/22/2004	9:26:34	2387.738	57.05	0.897	2387.561	0.503
1/22/2004	9:36:34	2397.738	57.05	0.891	2397.561	0.499
1/22/2004	9:46:34	2407.738	57.05	0.891	2407.561	0.499
1/22/2004	9:56:34	2417.738	57.05	0.876	2417.561	0.491
1/22/2004	10:06:34	2427.738	57.05	0.876	2427.561	0.491
1/22/2004	10:16:34	2437.738	57.05	0.876	2437.561	0.491

1/22/2004	10:26:34	2447.738	57.05	0.876	2447.561	0.491
1/22/2004	10:36:34	2457.738	57.05	0.876	2457.561	0.491
1/22/2004	10:46:34	2467.738	57.05	0.886	2467.561	0.496
1/22/2004	10:56:34	2477.738	57.05	0.891	2477.561	0.499
1/22/2004	11:06:34	2487.738	57.05	0.891	2487.561	0.499
1/22/2004	11:16:34	2497.738	57.05	0.886	2497.561	0.496
1/22/2004	11:26:34	2507.738	57.05	0.886	2507.561	0.496
1/22/2004	11:36:34	2517.738	57.05	0.881	2517.561	0.494
1/22/2004	11:46:34	2527.738	57.05	0.886	2527.561	0.496
1/22/2004	11:56:34	2537.738	57.05	0.886	2537.561	0.496
1/22/2004	12:06:34	2547.738	57.05	0.886	2547.561	0.496
1/22/2004	12:16:34	2557.738	57.05	0.886	2557.561	0.496
1/22/2004	12:26:34	2567.738	57.05	0.881	2567.561	0.494
1/22/2004	12:36:34	2577.738	57.05	0.881	2577.561	0.494
1/22/2004	12:46:34	2587.738	57.05	0.881	2587.561	0.494
1/22/2004	12:56:34	2597.738	57.05	0.881	2597.561	0.494
1/22/2004	13:06:34	2607.738	57.05	0.881	2607.561	0.494
1/22/2004	13:16:34	2617.738	57.05	0.881	2617.561	0.494
1/22/2004	13:26:34	2627.738	57.05	0.881	2627.561	0.494
1/22/2004	13:36:34	2637.738	57.05	0.865	2637.561	0.485
1/22/2004	13:46:34	2647.738	57.05	0.865	2647.561	0.485
1/22/2004	13:56:34	2657.738	57.05	0.865	2657.561	0.485
1/22/2004	14:06:34	2667.738	57.05	0.865	2667.561	0.485
1/22/2004	14:16:34	2677.738	57.05	0.86	2677.561	0.482
1/22/2004	14:26:34	2687.738	57.05	0.865	2687.561	0.485
1/22/2004	14:36:34	2697.738	57.05	0.86	2697.561	0.482
1/22/2004	14:46:34	2707.738	57.05	0.86	2707.561	0.482
1/22/2004	14:56:34	2717.738	57.05	0.86	2717.561	0.482
1/22/2004	15:06:34	2727.738	57.05	0.86	2727.561	0.482
1/22/2004	15:16:34	2737.738	57.05	0.86	2737.561	0.482
1/22/2004	15:26:34	2747.738	57.05	0.87	2747.561	0.487
1/22/2004	15:36:34	2757.738	57.05	0.87	2757.561	0.487
1/22/2004	15:46:34	2767.738	57.05	0.87	2767.561	0.487
1/22/2004	15:56:34	2777.738	57.05	0.87	2777.561	0.487
1/22/2004	16:06:34	2787.738	57.05	0.87	2787.561	0.487
1/22/2004	16:16:34	2797.738	57.05	0.87	2797.561	0.487
1/22/2004	16:26:34	2807.738	57.05	0.87	2807.561	0.487
1/22/2004	16:36:34	2817.738	57.05	0.854	2817.561	0.478
1/22/2004	16:46:34	2827.738	57.05	0.854	2827.561	0.478
1/22/2004	16:56:34	2837.738	57.05	0.865	2837.561	0.485
1/22/2004	17:06:34	2847.738	57.05	0.849	2847.561	0.476
1/22/2004	17:16:34	2857.738	57.05	0.854	2857.561	0.478
1/22/2004	17:26:34	2867.738	57.05	0.849	2867.561	0.476
1/22/2004	17:36:34	2877.738	57.05	0.849	2877.561	0.476
1/22/2004	17:46:34	2887.738	57.05	0.849	2887.561	0.476
1/22/2004	17:56:34	2897.738	57.05	0.849	2897.561	0.476

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	12
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	0.000
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	-0.353
Actual Y-intercept is set to 0.	0.000
T_0 (min):	6423.738
K (ft/min):	1.67E-07
K (ft/day):	**0.000**

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum (x^2)) - (\sum x)^2}$$

$$b = \frac{(\sum y)(\sum (x^2)) - (\sum x)(\sum xy)}{n(\sum (x^2)) - (\sum x)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

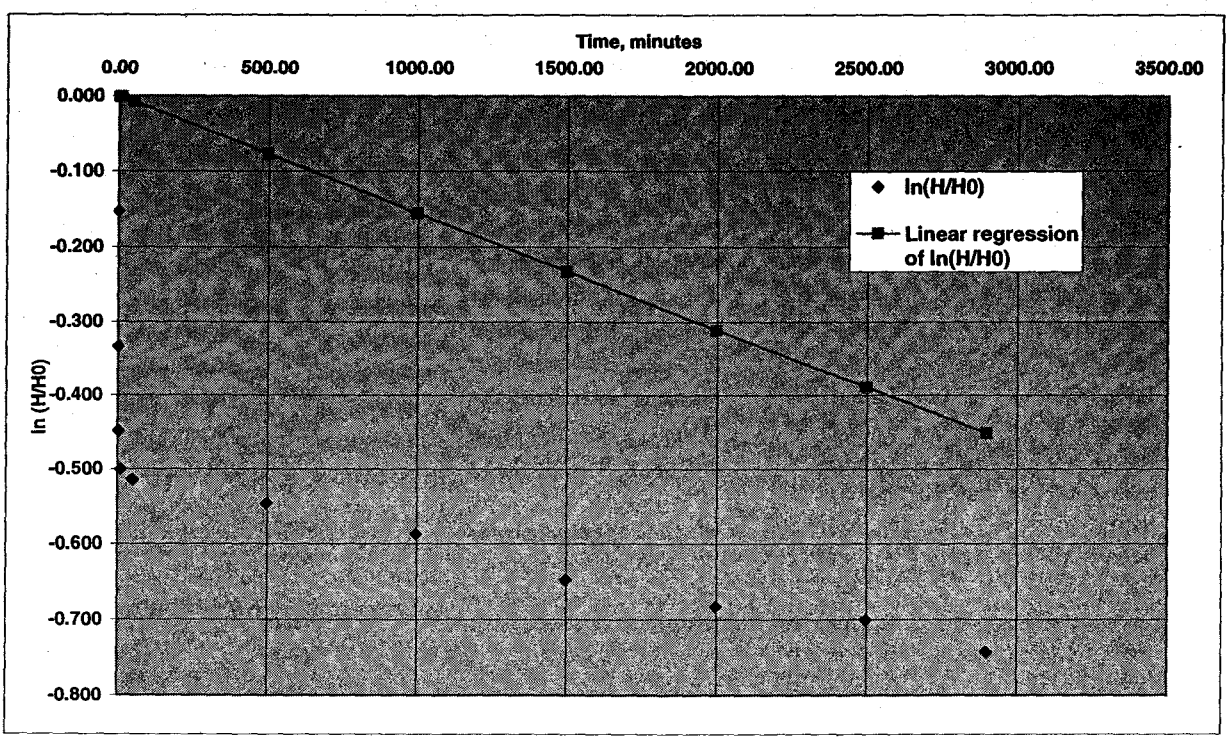
T_0: Time at which ln(H/H0)=-1

$K = r^2 * \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	CRANE NSWC
Project No.:	9060
Method of Inducing Water Level Change:	BAILER
Reference Pt (Top of Casing, Transducer, etc):	WATER LEVEL (REF=0.00
Test Type (Rising Head / Falling Head):	RISING

Well / Boring No.:	13MWT45
Test No.:	1
Date:	1/21/2004
Geologist:	Fred W. Ramser
Checked by / Date:	

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.20833333
Screened / Monitored Interval Below Water Table, L (ft):	13.45
Static Water Level (Depth/ Elevation) (ft.):	72.69
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0	1.000	0.00	-1.00	1.00	0.0000	0.00
	0.2677	0.858	0.27	-0.86	0.86	-0.1528	0.00
	0.561	0.717	0.56	-0.72	0.72	-0.3333	0.00
	1.9077	0.639	1.91	-0.64	0.64	-0.4484	0.00
	10.3643	0.606	10.36	-0.61	0.61	-0.5006	0.00
	49.8693	0.598	49.87	-0.60	0.60	-0.5146	-0.01
	497.561	0.579	497.56	-0.58	0.58	-0.5460	-0.08
	997.561	0.556	997.56	-0.56	0.56	-0.5875	-0.16
	1497.561	0.523	1497.56	-0.52	0.52	-0.6477	-0.23
	1997.561	0.505	1997.56	-0.51	0.51	-0.6826	-0.31
	2497.561	0.496	2497.56	-0.50	0.50	-0.7005	-0.39
	2897.561	0.476	2897.56	-0.48	0.48	-0.7431	-0.45
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT45
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		13.45 = L ✓
Time for 37% head change (min.) :		11300 = To

Hydraulic Conductivity (K) :

9.52E-08	ft./min.
1.59E-09	ft./sec.
2.37E-04	ft./day
4.84E-08	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(13.45/.208)}{2 \times 13.45 \times 11300}$$

9.4×10^{-8} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT46
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

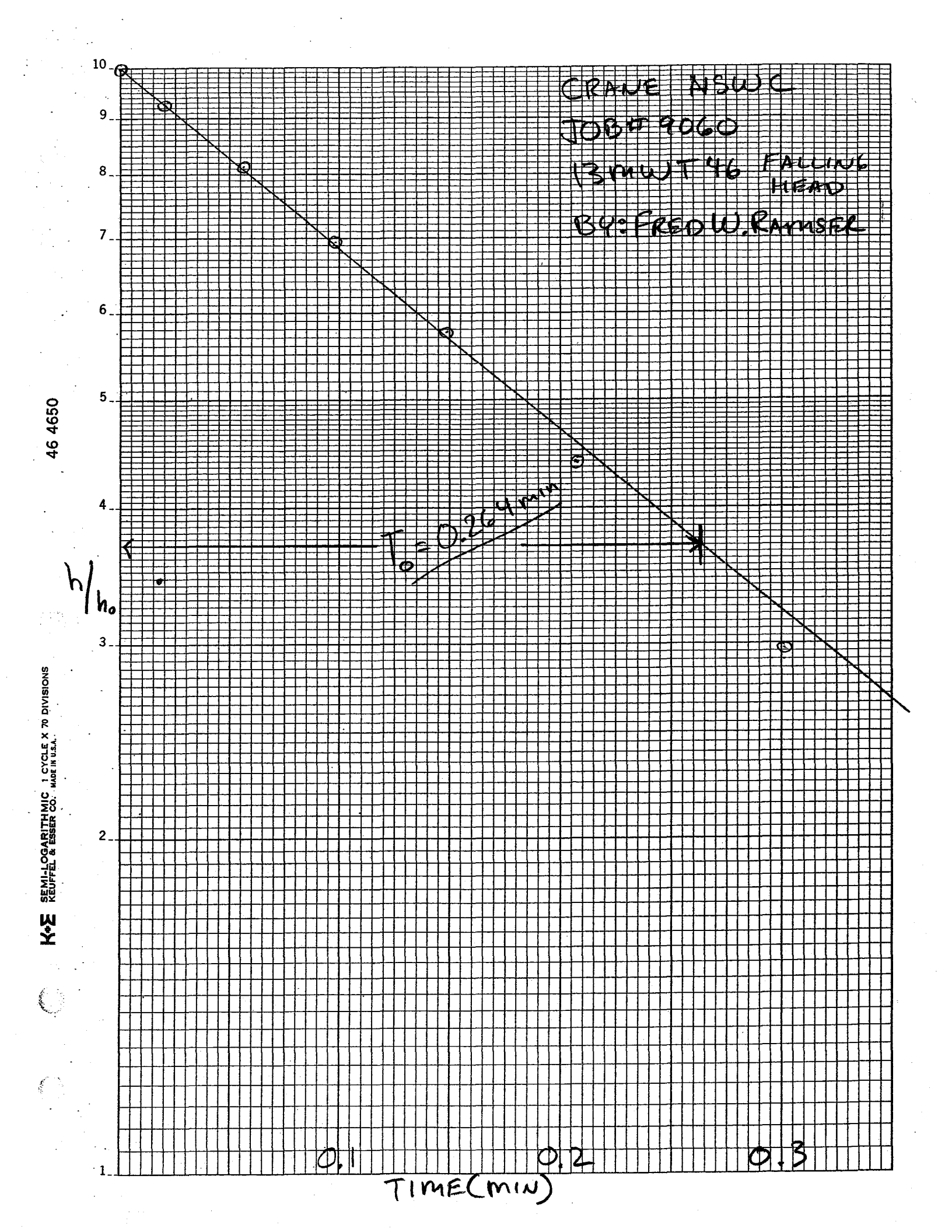
Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12.72 = L
Time for 37% head change (min.) :	0.264 = To

Hydraulic Conductivity (K) :

4.25E-03	ft./min.
7.09E-05	ft./sec.
6.12E+00	ft./day
2.16E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$


CRANE NSWC
JOB# 9060
13 MW T46 FALLING HEAD
BY: FRED W. RAMSEK
$T_0 = 0.264$ min
h/h₀
TIME(MIN)
0.1
0.2
0.3
1
2
3
4
5
6
7
8
9
10
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT46

PROJECT NO.: 9060 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10', 57.65-67.65 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 57.93 DATE: 1-21-04

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

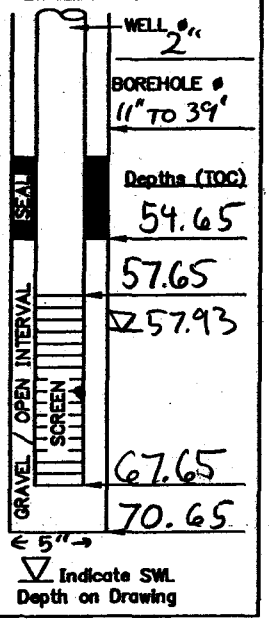
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG 7.7' x 0.1' dia PAGE ..... OF .....

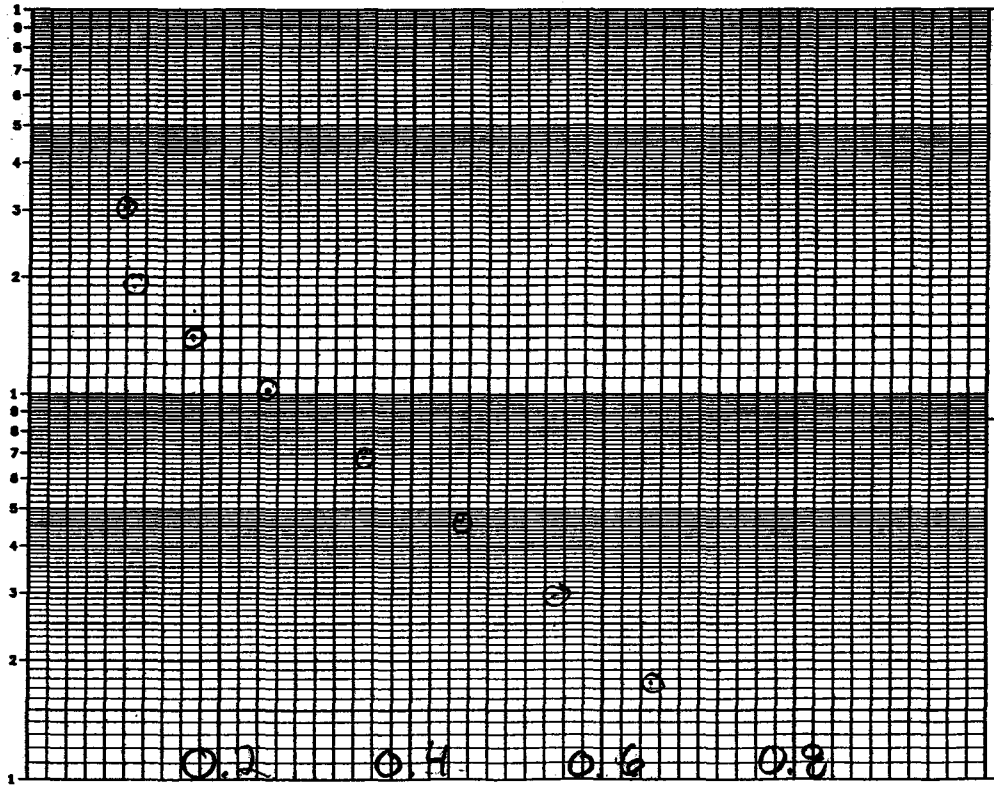
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): WATER SURFACE' 0.00 = REF

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0		0.02			
0.11		3.1			
0.13		1.97			
0.17		1.40			
0.25		1.03			
0.35		0.684			
0.45		0.466			
0.55		0.291			
0.65		0.179			

WELL SCHEMATIC





REMARKS:

STARTED @ 1205

STOPPED @ 1220

CALCS, SKETCH MAPS, ETC.:

In-Situ Inc.	MiniTroll Pro							
Report generated:	1/22/2004	21:39:35						
Report from file:	...\SN08670 2004-01-21 120509 13mwt46t1.bin							
Win-Situ Version	4.41							
Serial number:	8670							
Firmware Version	3.07							
Unit name:								
Test name:		13mwt46t1						
Test defined on:	1/21/2004	9:33:44						
Test started on:	1/21/2004	12:05:09						
Test stopped on:	N/A	N/A						
Test extracted on:	N/A	N/A						
Data gathered using Logarithmic testing								
Maximum time between data p	Minutes.							
Number of data samples:	108							
TOTAL DATA SAMPLES	108							
Channel number [1]								
Measurement type:	Temperature							
Channel name:								
Channel number [2]								
Measurement type:	Pressure							
Channel name:	Water level							
Sensor Range:	100 PSIG.							
Specific gravity:	1							
Mode:	TOC							
User-defined reference:	0	Feet H2O						
Referenced on:	test start							
Pressure head at reference:	9.505	Feet H2O					DATA PLOTTED = ●	
			Chan[1]	Chan[2]				
Date	Time	ET (min)	Fahrenheit	Feet H2O	Adjusted ET. (min)	h/ho	ho =	-1.4
1/21/2004	12:05:09	0	54.3	0				
1/21/2004	12:05:09	0.005	54.32	-0.012				
1/21/2004	12:05:09	0.01	54.32	-0.024				
1/21/2004	12:05:09	0.015	54.34	-0.023				
1/21/2004	12:05:10	0.02	54.34	-0.023				
1/21/2004	12:05:10	0.025	54.34	-0.03				
1/21/2004	12:05:10	0.03	54.34	-0.023				
1/21/2004	12:05:11	0.035	54.37	-0.029				
1/21/2004	12:05:11	0.04	54.37	-0.029				
1/21/2004	12:05:11	0.045	54.37	-0.029				
1/21/2004	12:05:12	0.05	54.37	-0.029				
1/21/2004	12:05:12	0.055	54.37	-0.029				
1/21/2004	12:05:12	0.06	54.37	-0.029				
1/21/2004	12:05:12	0.065	54.37	-0.029				
1/21/2004	12:05:13	0.07	54.37	-0.029				
1/21/2004	12:05:13	0.075	54.37	-0.029				
1/21/2004	12:05:13	0.08	54.37	-0.029				
1/21/2004	12:05:14	0.085	54.37	-0.029				
1/21/2004	12:05:14	0.09	54.37	-0.029				
1/21/2004	12:05:14	0.095	54.39	-0.221				
1/21/2004	12:05:15	0.1	54.39	-1.056				

1/21/2004	12:05:15	0.1058	54.39	-3.088					
1/21/2004	12:05:15	0.112	54.39	-3.212					
1/21/2004	12:05:16	0.1185	54.39	-1.866					
1/21/2004	12:05:16	0.1255	54.39	-0.732					
1/21/2004	12:05:17	0.1328	54.39	-1.972					
1/21/2004	12:05:17	0.1407	54.39	-1.38					
1/21/2004	12:05:18	0.149	54.39	-1.686					
1/21/2004	12:05:18	0.1578	54.39	-1.305					
1/21/2004	12:05:19	0.1672	54.37	-1.4	0.000	1.000			
1/21/2004	12:05:19	0.177	54.37	-1.35	0.010	0.964			
1/21/2004	12:05:20	0.1875	54.37	-1.3	0.020	0.929			
1/21/2004	12:05:20	0.1985	54.37	-1.244	0.031	0.889			
1/21/2004	12:05:21	0.2102	54.37	-1.188	0.043	0.849			
1/21/2004	12:05:22	0.2227	54.37	-1.138	0.056	0.813			
1/21/2004	12:05:23	0.2358	54.37	-1.082	0.069	0.773			
1/21/2004	12:05:24	0.2498	54.34	-1.027	0.083	0.734			
1/21/2004	12:05:24	0.2647	54.34	-0.971	0.098	0.694			
1/21/2004	12:05:25	0.2803	54.34	-0.914	0.113	0.653			
1/21/2004	12:05:26	0.297	54.34	-0.852	0.130	0.609			
1/21/2004	12:05:27	0.3147	54.34	-0.796	0.148	0.569			
1/21/2004	12:05:29	0.3333	54.34	-0.74	0.166	0.529			
1/21/2004	12:05:30	0.3532	54.34	-0.684	0.186	0.489			
1/21/2004	12:05:31	0.3742	54.34	-0.622	0.207	0.444			
1/21/2004	12:05:32	0.3963	54.34	-0.572	0.229	0.409			
1/21/2004	12:05:34	0.4198	54.34	-0.516	0.253	0.369			
1/21/2004	12:05:35	0.4447	54.34	-0.466	0.278	0.333			
1/21/2004	12:05:37	0.4697	54.34	-0.416	0.303	0.297			
1/21/2004	12:05:38	0.4963	54.34	-0.372	0.329	0.266			
1/21/2004	12:05:40	0.5247	54.34	-0.329	0.358	0.235			
1/21/2004	12:05:42	0.5547	54.34	-0.291	0.388	0.208			
1/21/2004	12:05:44	0.5863	54.34	-0.248	0.419	0.177			
1/21/2004	12:05:46	0.6213	54.34	-0.217	0.454	0.155			
1/21/2004	12:05:48	0.658	54.34	-0.179	0.491	0.128			
1/21/2004	12:05:50	0.6963	54.34	-0.154	0.529	0.110			
1/21/2004	12:05:53	0.738	54.34	-0.129	0.571	0.092			
1/21/2004	12:05:55	0.7813	54.34	-0.111	0.614	0.079			
1/21/2004	12:05:58	0.828	54.34	-0.092	0.661	0.066			
1/21/2004	12:06:01	0.8763	54.34	-0.079	0.709	0.056			
1/21/2004	12:06:04	0.928	54.34	-0.073	0.761	0.052			
1/21/2004	12:06:08	0.983	54.34	-0.067	0.816	0.048			
1/21/2004	12:06:11	1.0413	54.32	-0.062	0.874	0.044			
1/21/2004	12:06:15	1.103	54.32	-0.055	0.936	0.039			
1/21/2004	12:06:19	1.168	54.32	-0.049	1.001	0.035			
1/21/2004	12:06:23	1.238	54.32	-0.049	1.071	0.035			
1/21/2004	12:06:27	1.3113	54.32	-0.043	1.144	0.031			
1/21/2004	12:06:32	1.3897	54.32	-0.043	1.223	0.031			
1/21/2004	12:06:37	1.473	54.32	-0.043	1.306	0.031			
1/21/2004	12:06:42	1.5613	54.32	-0.043	1.394	0.031			
1/21/2004	12:06:48	1.6547	54.32	-0.037	1.488	0.026			
1/21/2004	12:06:54	1.753	54.32	-0.037	1.586	0.026			
1/21/2004	12:07:00	1.858	54.32	-0.037	1.691	0.026			
1/21/2004	12:07:07	1.968	54.32	-0.037	1.801	0.026			
1/21/2004	12:07:14	2.0847	54.3	-0.037	1.918	0.026			
1/21/2004	12:07:21	2.2097	54.3	-0.037	2.043	0.026			
1/21/2004	12:07:29	2.3413	54.3	-0.031	2.174	0.022			
1/21/2004	12:07:37	2.4813	54.3	-0.031	2.314	0.022			
1/21/2004	12:07:46	2.6297	54.3	-0.037	2.463	0.026			
1/21/2004	12:07:56	2.7863	54.3	-0.031	2.619	0.022			
1/21/2004	12:08:06	2.953	54.3	-0.031	2.786	0.022			
1/21/2004	12:08:16	3.1297	54.3	-0.031	2.963	0.022			
1/21/2004	12:08:28	3.3163	54.3	-0.031	3.149	0.022			
1/21/2004	12:08:39	3.5147	54.3	-0.031	3.348	0.022			
1/21/2004	12:08:52	3.7247	54.3	-0.031	3.558	0.022			
1/21/2004	12:09:05	3.9463	54.3	-0.031	3.779	0.022			

1/21/2004	12:09:19	4.1813	54.3	-0.031	4.014	0.022		
1/21/2004	12:09:34	4.4297	54.3	-0.025	4.263	0.018		
1/21/2004	12:09:50	4.693	54.3	-0.031	4.526	0.022		
1/21/2004	12:10:07	4.973	54.3	-0.025	4.806	0.018		
1/21/2004	12:10:25	5.2697	54.28	-0.032	5.103	0.023		
1/21/2004	12:10:44	5.583	54.28	-0.026	5.416	0.019		
1/21/2004	12:11:03	5.9147	54.28	-0.026	5.748	0.019		
1/21/2004	12:11:25	6.2663	54.28	-0.032	6.099	0.023		
1/21/2004	12:11:47	6.6397	54.28	-0.026	6.473	0.019		
1/21/2004	12:12:11	7.0347	54.28	-0.032	6.868	0.023		
1/21/2004	12:12:36	7.453	54.28	-0.026	7.286	0.019		
1/21/2004	12:13:02	7.8963	54.28	-0.026	7.729	0.019		
1/21/2004	12:13:31	8.3663	54.28	-0.026	8.199	0.019		
1/21/2004	12:14:00	8.8647	54.25	-0.026	8.698	0.019		
1/21/2004	12:14:32	9.3913	54.25	-0.033	9.224	0.024		
1/21/2004	12:15:06	9.9497	54.25	-0.026	9.783	0.019		
1/21/2004	12:15:41	10.5413	54.25	-0.026	10.374	0.019		
1/21/2004	12:16:19	11.168	54.25	-0.033	11.001	0.024		
1/21/2004	12:16:58	11.8313	54.25	-0.026	11.664	0.019		
1/21/2004	12:17:41	12.5347	54.23	-0.027	12.368	0.019		
1/21/2004	12:18:25	13.2797	54.23	-0.027	13.113	0.019		
1/21/2004	12:19:13	14.0697	54.23	-0.027	13.903	0.019		
1/21/2004	12:20:03	14.9063	54.23	-0.027	14.739	0.019		

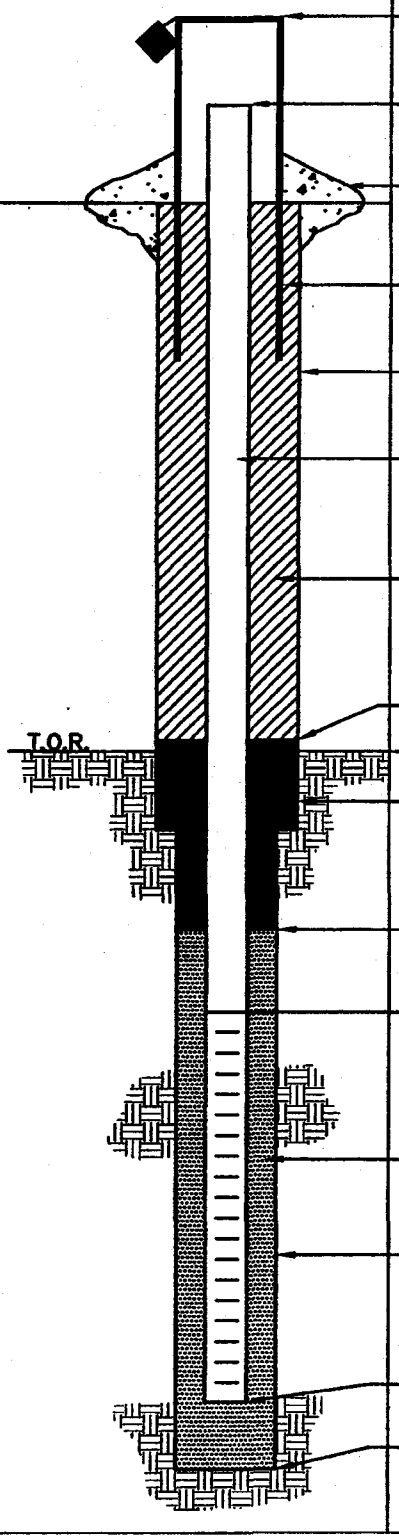
WELL NO.: 13MW196

Tetra Tech NUS, Inc.

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT NSWC CRANE	LOCATION SWMU 13	DRILLER J. KEIFER
PROJECT NO. 9060	BORING	DRILLING METHOD ROTO-SONIC
DATE BEGUN 11/21/03	DATE COMPLETED 11/22/03	
FIELD GEOLOGIST S. GRIER		DEVELOPMENT METHOD
GROUND ELEVATION	DATUM	

ACAD:FORM_MWNBR.dwg 07/29/99 INL



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT TOP OF RISER: /

TYPE OF SURFACE SEAL: CONCRETE

I.D. OF SURFACE CASING: 4" steel

DIAMETER OF HOLE: 11" down to 39'

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: 2.5" PVC

TYPE OF BACKFILL:

ELEVATION/DEPTH TOP OF SEAL: 13'

ELEVATION/DEPTH TOP OF BEDROCK:

TYPE OF SEAL: BENTONITE PURE GOLD GEL CHIPS

ELEVATION/DEPTH TOP OF SAND: 152'

ELEVATION/DEPTH TOP OF SCREEN: 155'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 2"-20 slot
I.D. SCREEN:

TYPE OF SAND PACK:

DIAMETER OF HOLE IN BEDROCK: 4"/5"
CORE/REAM:

ELEVATION/DEPTH BOTTOM SCREEN: 165'
ELEVATION/DEPTH BOTTOM OF SAND: 168'
ELEVATION/DEPTH BOTTOM OF HOLE: /
BACKFILL MATERIAL BELOW SAND: N/A

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT46
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :	12.72	= L
Time for 37% head change (min.) :	0.264	= To

Hydraulic Conductivity (K) :

4.25E-03	ft./min.
7.09E-05	ft./sec.
6.12E+00	ft./day
2.16E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.72/.208)}{2 \times 12.72 \times .264} =$$

4.22×10^{-3} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT46
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

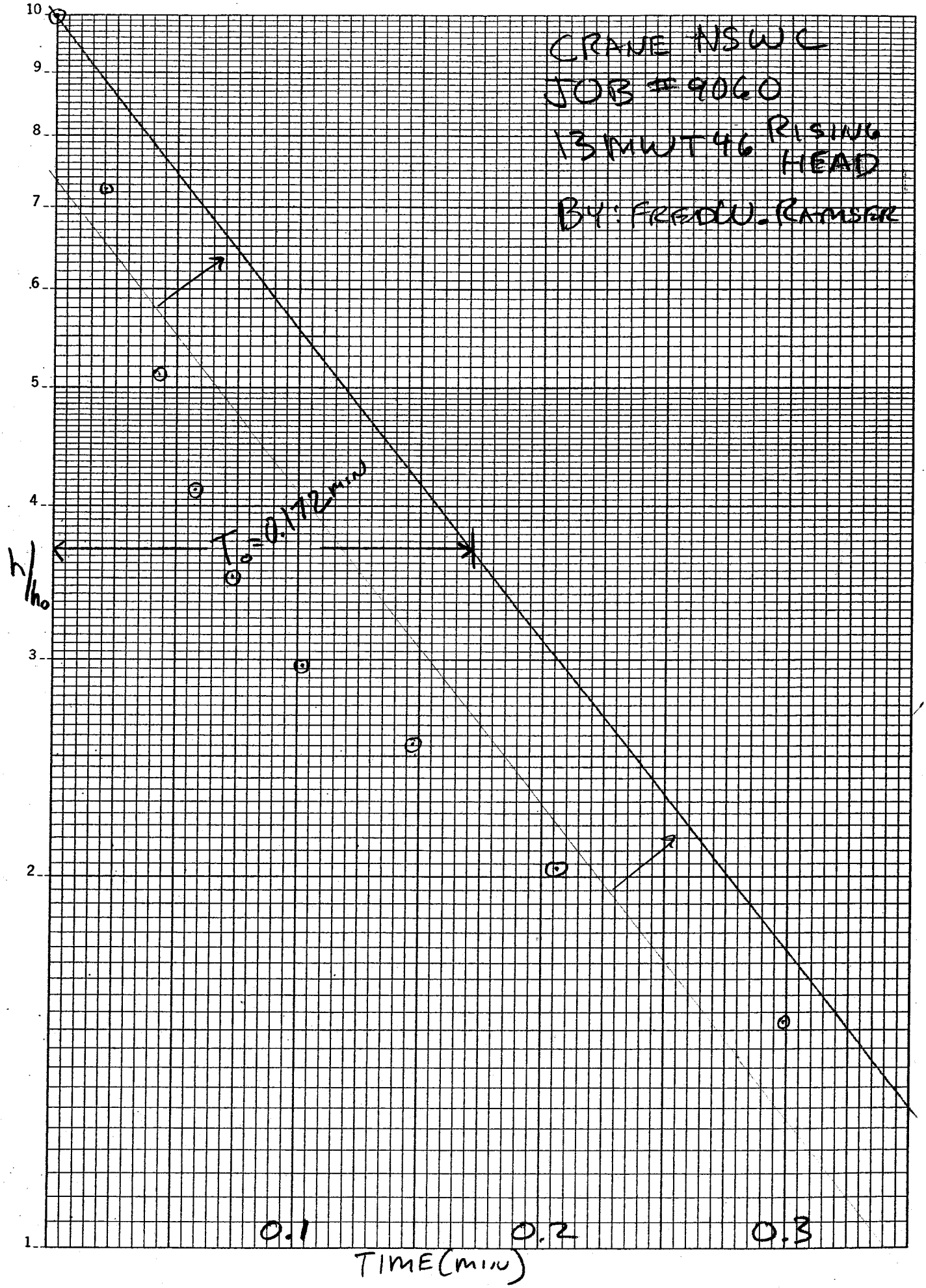
Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2.5 = R
Length of Well Screen (ft.) :	12.72 = L
Time for 37% head change (min.) :	0.172 = To

Hydraulic Conductivity (K) :

6.53E-03	ft./min.
1.09E-04	ft./sec.
9.40E+00	ft./day
3.32E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$


CRANE NSWC
JOB # 9060
13 MWT 96 RISING HEAD
BY: FREDDY RAMSEUR
10
9
8
7
6
5
4
3
2
1
h/h0
T0 = 0.172 (min)
0.1
0.2
0.3
TIME (min)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT46

PROJECT NO.: 9060 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10', 57.65-67.65 TEST NO.: 2

STATIC WATER LEVEL (Depth/Elevation): 57.93 DATE: 1-21-04

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

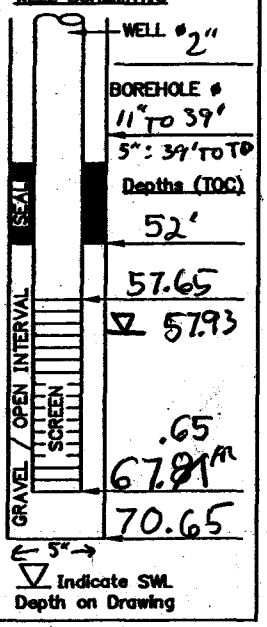
METHOD OF INDUCING WATER LEVEL CHANGE: ~~2+1/2 BAILER 3 0.3' DISPLACEMENT~~ PAGE ..... OF .....

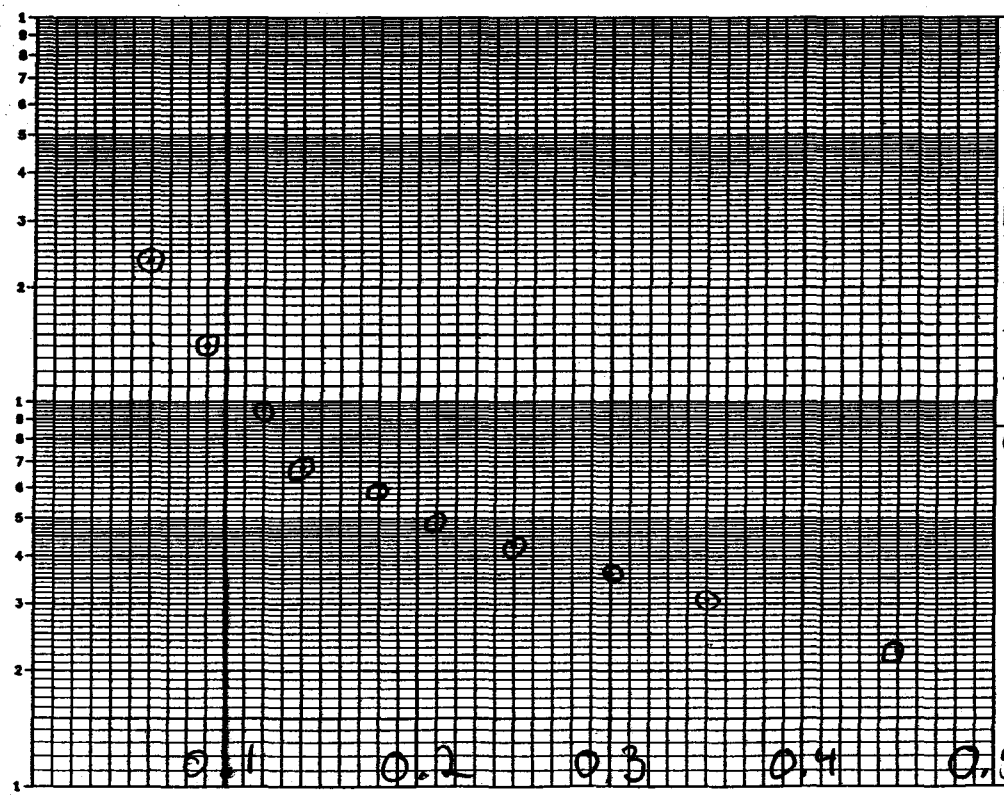
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): WATER SURFACE, 0.00 = REF

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.06		2.34			
0.09		1.43			
0.12		0.938			
0.14		0.689			
0.18		0.544			
0.21		0.488			
0.25		0.426			
0.30		0.364			
0.35		0.307			
0.45		0.226			
0.55		0.157			

WELL SCHEMATIC





REMARKS:

ND H2O =

STARTED TEST @

1225

USED SOLID SLUG

7.7' x ~0.1' dia

STOPPED TEST @

1237

CALCS, SKETCH MAPS, ETC.:

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT46
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	21-Jan-04

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.208'	2.5 = R
Length of Well Screen (ft.) :		12.72 = L
Time for 37% head change (min.) :		0.172 = To

Hydraulic Conductivity (K) :

6.53E-03	ft./min.
1.09E-04	ft./sec.
9.40E+00	ft./day
3.32E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(12.72/.208)}{2 \times 12.72 \times .172}$$

$$6.48 \times 10^{-3}$$

CHECKED

2-18-04

1/21/2004	12:28:19	3.3163	54.23	0.025	3.2413	0.0136		
1/21/2004	12:28:31	3.5147	54.23	0.025	3.4397	0.0136		
1/21/2004	12:28:43	3.7247	54.23	0.025	3.6497	0.0136		
1/21/2004	12:28:57	3.9463	54.23	0.025	3.8713	0.0136		
1/21/2004	12:29:11	4.1813	54.23	0.025	4.1063	0.0136		
1/21/2004	12:29:26	4.4297	54.23	0.025	4.3547	0.0136		
1/21/2004	12:29:42	4.693	54.23	0.025	4.618	0.0136		
1/21/2004	12:29:58	4.973	54.23	0.019	4.898	0.0104		
1/21/2004	12:30:16	5.2697	54.23	0.019	5.1947	0.0104		
1/21/2004	12:30:35	5.583	54.23	0.019	5.508	0.0104		
1/21/2004	12:30:55	5.9147	54.23	0.019	5.8397	0.0104		
1/21/2004	12:31:16	6.2663	54.21	0.018	6.1913	0.0098		
1/21/2004	12:31:38	6.6397	54.23	0.019	6.5647	0.0104		
1/21/2004	12:32:02	7.0347	54.23	0.019	6.9597	0.0104		
1/21/2004	12:32:27	7.453	54.21	0.018	7.378	0.0098		
1/21/2004	12:32:54	7.8963	54.21	0.018	7.8213	0.0098		
1/21/2004	12:33:22	8.3663	54.21	0.018	8.2913	0.0098		
1/21/2004	12:33:52	8.8647	54.21	0.018	8.7897	0.0098		
1/21/2004	12:34:23	9.3913	54.21	0.018	9.3163	0.0098		
1/21/2004	12:34:57	9.9497	54.21	0.018	9.8747	0.0098		
1/21/2004	12:35:32	10.5413	54.21	0.018	10.4663	0.0098		
1/21/2004	12:36:10	11.168	54.21	0.018	11.093	0.0098		

1/21/2004	12:25:06	0.095	54.32	1.33	0.02	0.7248		
1/21/2004	12:25:06	0.1	54.32	1.237	0.025	0.6741		
1/21/2004	12:25:06	0.1058	54.32	1.15	0.0308	0.6267		
1/21/2004	12:25:07	0.112	54.32	1.044	0.037	0.5689		
1/21/2004	12:25:07	0.1185	54.32	0.938	0.0435	0.5112		
1/21/2004	12:25:07	0.1255	54.32	0.844	0.0505	0.4599		
1/21/2004	12:25:08	0.1328	54.32	0.757	0.0578	0.4125		
1/21/2004	12:25:08	0.1407	54.32	0.689	0.0657	0.3755		
1/21/2004	12:25:09	0.149	54.32	0.645	0.074	0.3515		
1/21/2004	12:25:09	0.1578	54.32	0.595	0.0828	0.3243		
1/21/2004	12:25:10	0.1672	54.32	0.57	0.0922	0.3106		
1/21/2004	12:25:11	0.177	54.3	0.544	0.102	0.2965		
1/21/2004	12:25:11	0.1875	54.3	0.526	0.1125	0.2866		
1/21/2004	12:25:12	0.1985	54.3	0.507	0.1235	0.2763		
1/21/2004	12:25:13	0.2102	54.3	0.488	0.1352	0.2659		
1/21/2004	12:25:13	0.2227	54.3	0.47	0.1477	0.2561		
1/21/2004	12:25:14	0.2358	54.3	0.445	0.1608	0.2425		
1/21/2004	12:25:15	0.2498	54.3	0.426	0.1748	0.2322		
1/21/2004	12:25:16	0.2647	54.3	0.401	0.1897	0.2185		
1/21/2004	12:25:17	0.2803	54.3	0.382	0.2053	0.2082		
1/21/2004	12:25:18	0.297	54.3	0.364	0.222	0.1984		
1/21/2004	12:25:19	0.3147	54.28	0.344	0.2397	0.1875		
1/21/2004	12:25:20	0.3333	54.28	0.326	0.2583	0.1777		
1/21/2004	12:25:21	0.3532	54.28	0.307	0.2782	0.1673		
1/21/2004	12:25:22	0.3742	54.28	0.282	0.2992	0.1537		
1/21/2004	12:25:24	0.3963	54.28	0.257	0.3213	0.1401		
1/21/2004	12:25:25	0.4198	54.28	0.238	0.3448	0.1297		
1/21/2004	12:25:27	0.4447	54.28	0.226	0.3697	0.1232		
1/21/2004	12:25:28	0.4697	54.28	0.22	0.3947	0.1199		
1/21/2004	12:25:30	0.4963	54.28	0.207	0.4213	0.1128		
1/21/2004	12:25:31	0.5247	54.28	0.189	0.4497	0.1030		
1/21/2004	12:25:33	0.5547	54.28	0.157	0.4797	0.0856		
1/21/2004	12:25:35	0.5863	54.28	0.139	0.5113	0.0757		
1/21/2004	12:25:37	0.6213	54.28	0.114	0.5463	0.0621		
1/21/2004	12:25:39	0.658	54.28	0.157	0.583	0.0856		
1/21/2004	12:25:42	0.6963	54.28	0.164	0.6213	0.0894		
1/21/2004	12:25:44	0.738	54.28	0.151	0.663	0.0823		
1/21/2004	12:25:47	0.7813	54.28	0.145	0.7063	0.0790		
1/21/2004	12:25:50	0.828	54.28	0.139	0.753	0.0757		
1/21/2004	12:25:53	0.8763	54.28	0.132	0.8013	0.0719		
1/21/2004	12:25:56	0.928	54.28	0.12	0.853	0.0654		
1/21/2004	12:25:59	0.983	54.28	0.114	0.908	0.0621		
1/21/2004	12:26:02	1.0413	54.28	0.108	0.9663	0.0589		
1/21/2004	12:26:06	1.103	54.28	0.101	1.028	0.0550		
1/21/2004	12:26:10	1.168	54.25	0.088	1.093	0.0480		
1/21/2004	12:26:14	1.238	54.25	0.082	1.163	0.0447		
1/21/2004	12:26:19	1.3113	54.25	0.076	1.2363	0.0414		
1/21/2004	12:26:23	1.3897	54.25	0.069	1.3147	0.0376		
1/21/2004	12:26:28	1.473	54.25	0.063	1.398	0.0343		
1/21/2004	12:26:34	1.5613	54.25	0.057	1.4863	0.0311		
1/21/2004	12:26:39	1.6547	54.25	0.057	1.5797	0.0311		
1/21/2004	12:26:45	1.753	54.25	0.051	1.678	0.0278		
1/21/2004	12:26:51	1.858	54.25	0.051	1.783	0.0278		
1/21/2004	12:26:58	1.968	54.25	0.044	1.893	0.0240		
1/21/2004	12:27:05	2.0847	54.25	0.038	2.0097	0.0207		
1/21/2004	12:27:13	2.2097	54.25	0.038	2.1347	0.0207		
1/21/2004	12:27:20	2.3413	54.25	0.038	2.2663	0.0207		
1/21/2004	12:27:29	2.4813	54.25	0.038	2.4063	0.0207		
1/21/2004	12:27:38	2.6297	54.25	0.032	2.5547	0.0174		
1/21/2004	12:27:47	2.7863	54.25	0.032	2.7113	0.0174		
1/21/2004	12:27:57	2.953	54.25	0.032	2.878	0.0174		
1/21/2004	12:28:08	3.1297	54.25	0.026	3.0547	0.0142		

In-Situ Inc.	MiniTroll Pro							
Report generated:	1/22/2004	21:42:21						
Report from file:	...\SN08670 2004-01-21 122500 13mwt46_2.bin							
Win-Situ Version	4.41							
Serial number:	8670							
Firmware Version	3.07							
Unit name:								
Test name:		13mwt46_2						
Test defined on:	1/21/2004	12:23:44						
Test started on:	1/21/2004	12:25:00						
Test stopped on:	N/A	N/A						
Test extracted on:	N/A	N/A						
Data gathered using Logarithmic testing								
Maximum time between da	Minutes.							
Number of data samples:	103							
TOTAL DATA SAMPLES	103							
Channel number [1]								
Measurement type:	Temperature							
Channel name:								
Channel number [2]								
Measurement type:	Pressure							
Channel name:	Water level							
Sensor Range:	100 PSIG.							
Specific gravity:	1							
Mode:	TOC							
User-defined reference:	0	Feet H2O						
Referenced on:	test start							
Pressure head at reference	9.539	Feet H2O						
			Chan[1]	Chan[2]				
Date	Time	ET (min)	Fahrenheit	Feet H2O	Adjusted ET. (min)	h/ho	ho =	1.835
---	---	---	---	---				
1/21/2004	12:25:00	0	54.23	0				
1/21/2004	12:25:00	0.005	54.25	-0.012				
1/21/2004	12:25:01	0.01	54.28	-0.017				
1/21/2004	12:25:01	0.015	54.28	-0.023				
1/21/2004	12:25:01	0.02	54.28	-0.023				
1/21/2004	12:25:01	0.025	54.3	-0.023				
1/21/2004	12:25:02	0.03	54.3	0.133				
1/21/2004	12:25:02	0.035	54.3	1.068				
1/21/2004	12:25:02	0.04	54.3	1.691				
1/21/2004	12:25:03	0.045	54.3	1.436				
1/21/2004	12:25:03	0.05	54.3	1.872				
1/21/2004	12:25:03	0.055	54.3	2.233				
1/21/2004	12:25:04	0.06	54.3	2.339				
1/21/2004	12:25:04	0.065	54.3	2.14				
1/21/2004	12:25:04	0.07	54.3	1.99				
1/21/2004	12:25:04	0.075	54.32	1.835	0	1.0000		
1/21/2004	12:25:05	0.08	54.3	1.685	0.005	0.9183		
1/21/2004	12:25:05	0.085	54.32	1.548	0.01	0.8436		
1/21/2004	12:25:05	0.09	54.32	1.43	0.015	0.7793		

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	15 = L
Time for 37% head change (min.) :	4.00 = To

Hydraulic Conductivity (K) :

2.60E-04	ft./min.
4.34E-06	ft./sec.
3.75E-01	ft./day
1.32E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT47

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.56 DATE: 11-25-03

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

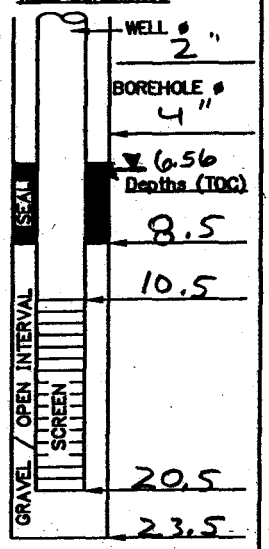
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

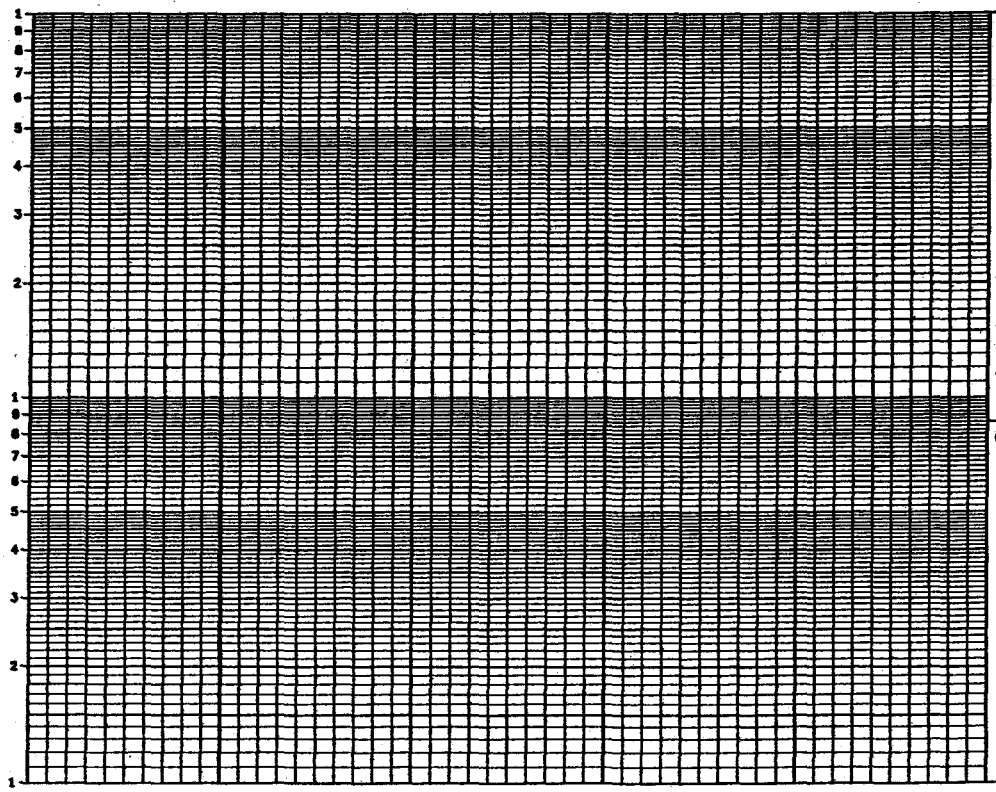
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		3	1.023	
.1	2.649		4	.864	
.2	2.470		5	.743	
.3	2.335		6	.652	
.4	2.218		7	.574	
.5	2.116		8	.503	
.6	2.023		10	.394	
.7	1.940		12	.327	
.8	1.864		15	.257	
.9	1.793		18	.212	
1.0	1.435				
2.0	1.275				

WELL SCHEMATIC

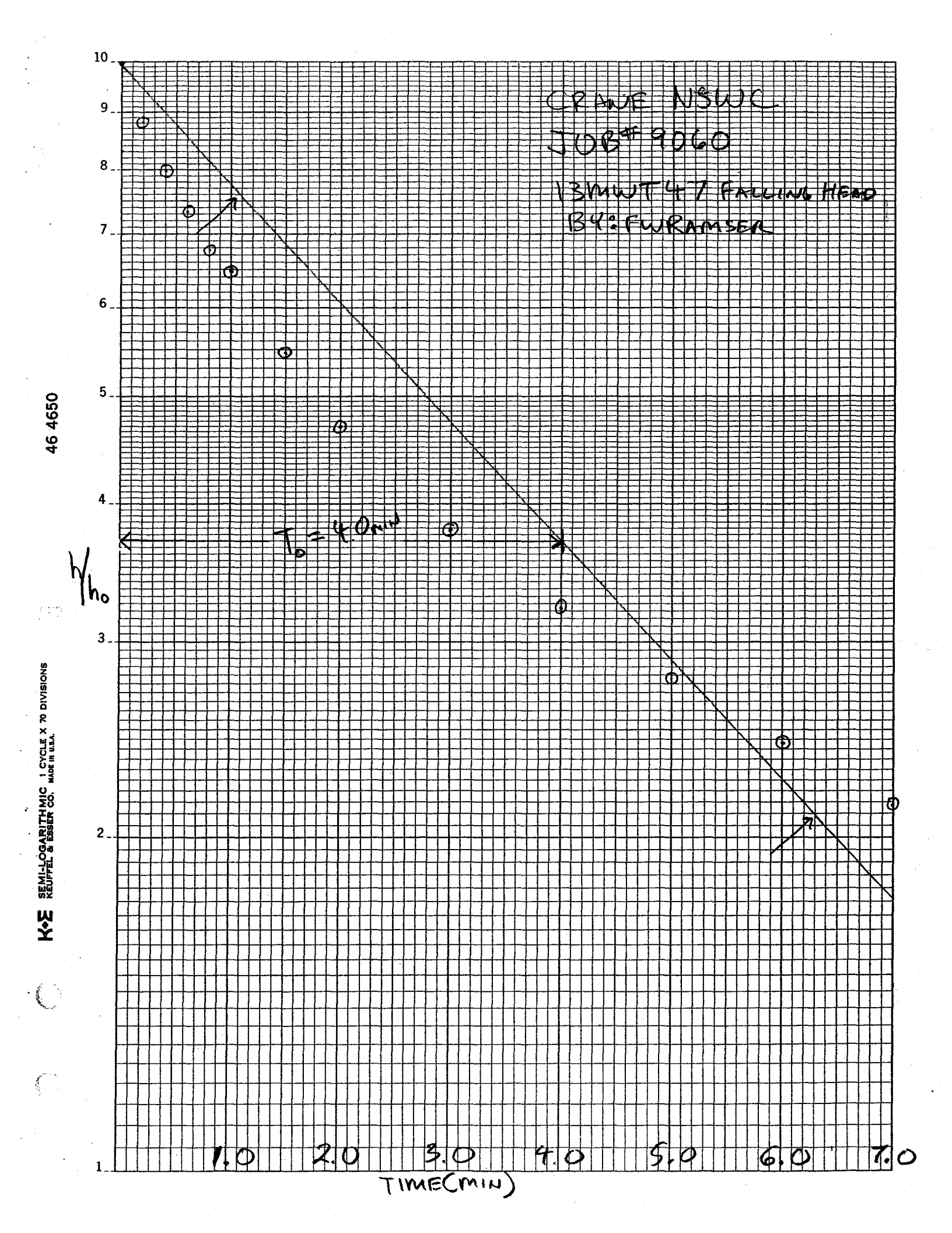


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRREL NSWC
JOB# 9060
13MWT47 FALLING HEAD
BY: FWRAMSEY
$T_D = 40 min$
h/h_0
TIME(MIN)
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 13:56:16
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-25 132823
DataMgr Version 3.68 13MWT47falling#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT47falling#1

Test defined on: 11/25/2003 13:27:57
Test started on: 11/25/2003 13:28:23
Test stopped on: 11/25/2003 15:00:29
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: (Minutes.
Number of data samples: 921

TOTAL DATA SAMPLES 921

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 13.72 Feet H2O

• = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	Adjusted ET. (min)	h/ho	ho = 2.649
	11/25/2003 13:28	0	0			
	11/25/2003 13:28	0.1	2.649	0	1.000	•
	11/25/2003 13:28	0.2	2.47	0.1	0.932	
	11/25/2003 13:28	0.3	2.335	0.2	0.881	•
	11/25/2003 13:28	0.4	2.218	0.3	0.837	
	11/25/2003 13:28	0.5	2.116	0.4	0.799	•
	11/25/2003 13:28	0.6	2.023	0.5	0.764	
	11/25/2003 13:29	0.7	1.94	0.6	0.732	•
	11/25/2003 13:29	0.8	1.864	0.7	0.704	
	11/25/2003 13:29	0.9	1.793	0.8	0.677	•
	11/25/2003 13:29	1	1.435	0.9	0.542	
	11/25/2003 13:29	1.1	1.451	1	0.548	•
	11/25/2003 13:29	1.2	1.455	1.1	0.549	
	11/25/2003 13:29	1.3	1.455	1.2	0.549	
	11/25/2003 13:29	1.4	1.452	1.3	0.548	
	11/25/2003 13:29	1.5	1.45	1.4	0.547	
	11/25/2003 13:29	1.6	1.448	1.5	0.547	•
	11/25/2003 13:30	1.7	1.382	1.6	0.522	
	11/25/2003 13:30	1.8	1.344	1.7	0.507	
	11/25/2003 13:30	1.9	1.31	1.8	0.495	
	11/25/2003 13:30	2	1.275	1.9	0.481	
	11/25/2003 13:30	2.1	1.245	2	0.470	•
	11/25/2003 13:30	2.2	1.215	2.1	0.459	
	11/25/2003 13:30	2.3	1.187	2.2	0.448	
	11/25/2003 13:30	2.4	1.16	2.3	0.438	
	11/25/2003 13:30	2.5	1.134	2.4	0.428	
	11/25/2003 13:30	2.6	1.11	2.5	0.419	
	11/25/2003 13:31	2.7	1.088	2.6	0.411	
	11/25/2003 13:31	2.8	1.066	2.7	0.402	
	11/25/2003 13:31	2.9	1.046	2.8	0.395	
	11/25/2003 13:31	3	1.023	2.9	0.386	
	11/25/2003 13:31	3.1	1.005	3	0.379	•
	11/25/2003 13:31	3.2	0.987	3.1	0.373	
	11/25/2003 13:31	3.3	0.971	3.2	0.367	
	11/25/2003 13:31	3.4	0.953	3.3	0.360	

11/25/2003 13:31	3.5	0.937	3.4	0.354
11/25/2003 13:31	3.6	0.921	3.5	0.348
11/25/2003 13:32	3.7	0.907	3.6	0.342
11/25/2003 13:32	3.8	0.892	3.7	0.337
11/25/2003 13:32	3.9	0.876	3.8	0.331
11/25/2003 13:32	4	0.864	3.9	0.326
11/25/2003 13:32	4.1	0.85	4	0.321 •
11/25/2003 13:32	4.2	0.836	4.1	0.316
11/25/2003 13:32	4.3	0.824	4.2	0.311
11/25/2003 13:32	4.4	0.812	4.3	0.307
11/25/2003 13:32	4.5	0.8	4.4	0.302
11/25/2003 13:32	4.6	0.788	4.5	0.297
11/25/2003 13:33	4.7	0.778	4.6	0.294
11/25/2003 13:33	4.8	0.766	4.7	0.289
11/25/2003 13:33	4.9	0.755	4.8	0.285
11/25/2003 13:33	5	0.743	4.9	0.280
11/25/2003 13:33	5.1	0.733	5	0.277 •
11/25/2003 13:33	5.2	0.725	5.1	0.274
11/25/2003 13:33	5.3	0.715	5.2	0.270
11/25/2003 13:33	5.4	0.705	5.3	0.266
11/25/2003 13:33	5.5	0.695	5.4	0.262
11/25/2003 13:33	5.6	0.687	5.5	0.259
11/25/2003 13:34	5.7	0.677	5.6	0.256
11/25/2003 13:34	5.8	0.669	5.7	0.253
11/25/2003 13:34	5.9	0.661	5.8	0.250
11/25/2003 13:34	6	0.652	5.9	0.246
11/25/2003 13:34	6.1	0.643	6	0.243 •
11/25/2003 13:34	6.2	0.636	6.1	0.240
11/25/2003 13:34	6.3	0.628	6.2	0.237
11/25/2003 13:34	6.4	0.62	6.3	0.234
11/25/2003 13:34	6.5	0.612	6.4	0.231
11/25/2003 13:34	6.6	0.604	6.5	0.228
11/25/2003 13:35	6.7	0.596	6.6	0.225
11/25/2003 13:35	6.8	0.588	6.7	0.222
11/25/2003 13:35	6.9	0.58	6.8	0.219
11/25/2003 13:35	7	0.574	6.9	0.217
11/25/2003 13:35	7.1	0.568	7	0.214
11/25/2003 13:35	7.2	0.56	7.1	0.211
11/25/2003 13:35	7.3	0.552	7.2	0.208
11/25/2003 13:35	7.4	0.544	7.3	0.205
11/25/2003 13:35	7.5	0.535	7.4	0.202
11/25/2003 13:35	7.6	0.532	7.5	0.201
11/25/2003 13:36	7.7	0.523	7.6	0.197
11/25/2003 13:36	7.8	0.517	7.7	0.195
11/25/2003 13:36	7.9	0.509	7.8	0.192
11/25/2003 13:36	8	0.503	7.9	0.190
11/25/2003 13:36	8.1	0.497	8	0.188
11/25/2003 13:36	8.2	0.491	8.1	0.185
11/25/2003 13:36	8.3	0.483	8.2	0.182
11/25/2003 13:36	8.4	0.479	8.3	0.181
11/25/2003 13:36	8.5	0.471	8.4	0.178
11/25/2003 13:36	8.6	0.465	8.5	0.176
11/25/2003 13:37	8.7	0.459	8.6	0.173
11/25/2003 13:37	8.8	0.453	8.7	0.171
11/25/2003 13:37	8.9	0.447	8.8	0.169
11/25/2003 13:37	9	0.443	8.9	0.167
11/25/2003 13:37	9.1	0.437	9	0.165
11/25/2003 13:37	9.2	0.43	9.1	0.162
11/25/2003 13:37	9.3	0.426	9.2	0.161
11/25/2003 13:37	9.4	0.42	9.3	0.159
11/25/2003 13:37	9.5	0.416	9.4	0.157
11/25/2003 13:37	9.6	0.412	9.5	0.156
11/25/2003 13:38	9.7	0.406	9.6	0.153
11/25/2003 13:38	9.8	0.402	9.7	0.152
11/25/2003 13:38	9.9	0.398	9.8	0.150
11/25/2003 13:38	10	0.394	9.9	0.149
11/25/2003 13:38	10.1	0.39	10	0.147
11/25/2003 13:39	11.1	0.354	11	0.134
11/25/2003 13:40	12.1	0.323	12	0.122
11/25/2003 13:41	13.1	0.297	13	0.112
11/25/2003 13:42	14.1	0.275	14	0.104
11/25/2003 13:43	15.1	0.257	15	0.097
11/25/2003 13:44	16.1	0.241	16	0.091
11/25/2003 13:45	17.1	0.226	17	0.085

11/25/2003 13:46	18.1	0.212	18	0.080
11/25/2003 13:47	19.1	0.198	19	0.075
11/25/2003 13:48	20.1	0.188	20	0.071
11/25/2003 13:49	21.1	0.178	21	0.067
11/25/2003 13:50	22.1	0.17	22	0.064
11/25/2003 13:51	23.1	0.165	23	0.062
11/25/2003 13:52	24.1	0.159	24	0.060
11/25/2003 13:53	25.1	0.153	25	0.058
11/25/2003 13:54	26.1	0.149	26	0.056
11/25/2003 13:55	27.1	0.145	27	0.055
11/25/2003 13:56	28.1	0.141	28	0.053
11/25/2003 13:57	29.1	0.139	29	0.052
11/25/2003 13:58	30.1	0.135	30	0.051
11/25/2003 13:59	31.1	0.131	31	0.049
11/25/2003 14:00	32.1	0.129	32	0.049
11/25/2003 14:01	33.1	0.123	33	0.046
11/25/2003 14:02	34.1	0.121	34	0.046
11/25/2003 14:03	35.1	0.114	35	0.043
11/25/2003 14:04	36.1	0.112	36	0.042
11/25/2003 14:05	37.1	0.11	37	0.042
11/25/2003 14:06	38.1	0.108	38	0.041
11/25/2003 14:07	39.1	0.106	39	0.040
11/25/2003 14:08	40.1	0.106	40	0.040
11/25/2003 14:09	41.1	0.104	41	0.039
11/25/2003 14:10	42.1	0.102	42	0.039
11/25/2003 14:11	43.1	0.102	43	0.039
11/25/2003 14:12	44.1	0.1	44	0.038
11/25/2003 14:13	45.1	0.098	45	0.037
11/25/2003 14:14	46.1	0.096	46	0.036
11/25/2003 14:15	47.1	0.094	47	0.035
11/25/2003 14:16	48.1	0.092	48	0.035
11/25/2003 14:17	49.1	0.09	49	0.034
11/25/2003 14:18	50.1	0.09	50	0.034
11/25/2003 14:19	51.1	0.09	51	0.034
11/25/2003 14:20	52.1	0.09	52	0.034
11/25/2003 14:21	53.1	0.087	53	0.033
11/25/2003 14:22	54.1	0.087	54	0.033
11/25/2003 14:23	55.1	0.085	55	0.032
11/25/2003 14:24	56.1	0.085	56	0.032
11/25/2003 14:25	57.1	0.085	57	0.032
11/25/2003 14:26	58.1	0.083	58	0.031
11/25/2003 14:27	59.1	0.083	59	0.031
11/25/2003 14:28	60.1	0.083	60	0.031
11/25/2003 14:29	61.1	0.083	61	0.031
11/25/2003 14:30	62.1	0.083	62	0.031
11/25/2003 14:31	63.1	0.083	63	0.031
11/25/2003 14:32	64.1	0.083	64	0.031
11/25/2003 14:33	65.1	0.083	65	0.031
11/25/2003 14:34	66.1	0.083	66	0.031
11/25/2003 14:35	67.1	0.083	67	0.031
11/25/2003 14:36	68.1	0.083	68	0.031
11/25/2003 14:37	69.1	0.083	69	0.031
11/25/2003 14:38	70.1	0.083	70	0.031
11/25/2003 14:39	71.1	0.083	71	0.031
11/25/2003 14:40	72.1	0.083	72	0.031
11/25/2003 14:41	73.1	0.085	73	0.032
11/25/2003 14:42	74.1	0.083	74	0.031
11/25/2003 14:43	75.1	0.083	75	0.031
11/25/2003 14:44	76.1	0.083	76	0.031
11/25/2003 14:45	77.1	0.083	77	0.031
11/25/2003 14:46	78.1	0.081	78	0.031
11/25/2003 14:47	79.1	0.081	79	0.031
11/25/2003 14:48	80.1	0.081	80	0.031
11/25/2003 14:49	81.1	0.081	81	0.031
11/25/2003 14:50	82.1	0.083	82	0.031
11/25/2003 14:51	83.1	0.083	83	0.031
11/25/2003 14:52	84.1	0.083	84	0.031
11/25/2003 14:53	85.1	0.081	85	0.031
11/25/2003 14:54	86.1	0.081	86	0.031
11/25/2003 14:55	87.1	0.083	87	0.031
11/25/2003 14:56	88.1	0.081	88	0.031
11/25/2003 14:57	89.1	0.083	89	0.031
11/25/2003 14:58	90.1	0.097	90	0.037
11/25/2003 14:59	91.1	0.081	91	0.031

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Falling head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083	1 = r
Effective Radius of Well Screen (in.) :	.166	2 = R
Length of Well Screen (ft.) :	15	= L
Time for 37% head change (min.) :	4.00	= To

Hydraulic Conductivity (K) :

2.60E-04	ft./min.
4.34E-06	ft./sec.
3.75E-01	ft./day
1.32E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(15/.166)}{2 \times 15 \times 4}$$

2.59×10^{-4} Ft/min

CHECKED

2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	15 = L
Time for 37% head change (min.) :	5.45 = To

Hydraulic Conductivity (K) :

1.91E-04	ft./min.
3.19E-06	ft./sec.
2.75E-01	ft./day
9.71E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT47

PROJECT NO.: 9060 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: #1

STATIC WATER LEVEL (Depth/Elevation): 6.56 TOC DATE: 11-25-03

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

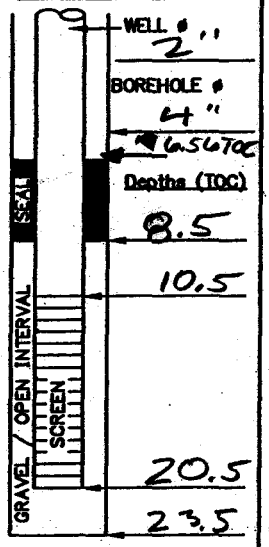
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, ZERO AT SWL + START

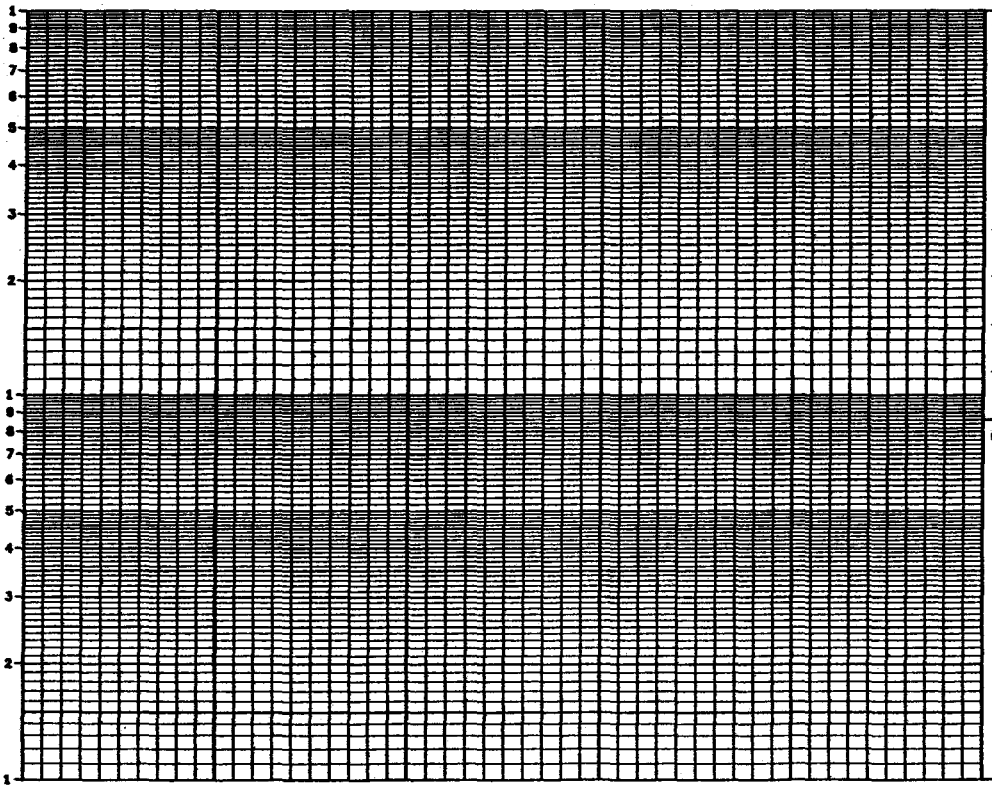
ACAD: FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		2.0	.441	
.1	-.947		3.0	.671	
.2	-.740		4.0	.816	
.3	-.595		5.0	.919	
.4	-.478		6.0	1.000	
.5	-.373		10.0	1.206	
.6	-.282		20	1.409	
.7	-.200		30	1.508	
.8	-.123		40	1.555	
.9	.176		50	1.580	
1.0	.195		60	1.598	
1.5	.264				

WELL SCHEMATIC

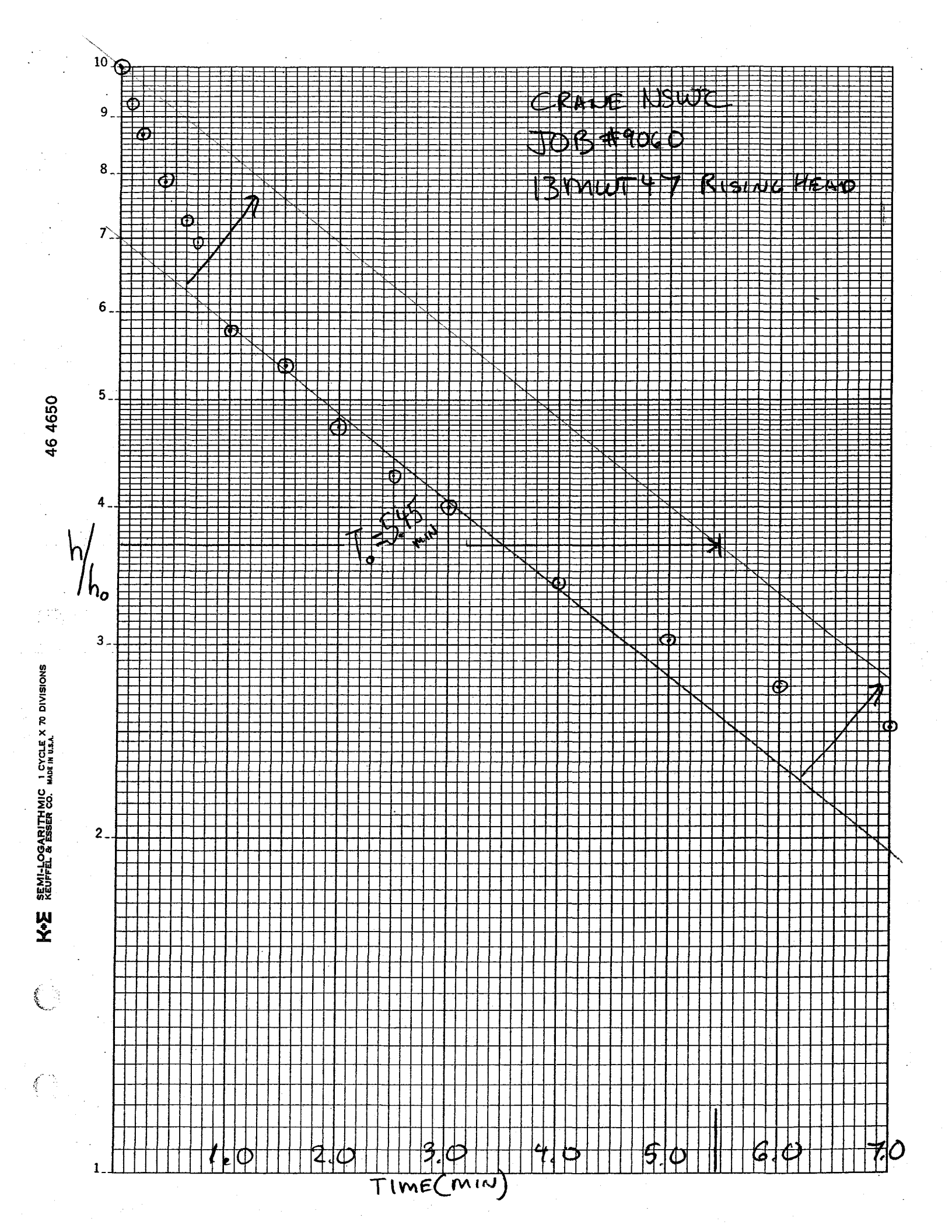


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


CRANE NSWC
JOB #9060
13MW47 RISING HEAD
h/h0
TIME(MIN)
1.0
2.0
3.0
4.0
5.0
6.0
7.0
10
9
8
7
6
5
4
3
2
1
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 13:38:37
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-25 122317
DataMgr Version 3.68 13MWT47rising#1.bin

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT47rising#1

Test defined on: 11/25/2003 12:00:52
Test started on: 11/25/2003 12:23:17
Test stopped on: 11/25/2003 13:26:55
Test extracted on: N/A

Data gathered using Linear testing
Time between data poi Minutes.
Number of data sampl 637

TOTAL DATA SAMPLES 637

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference 0 Feet H2O
Referenced on: test start
Pressure head at refere 12.11 Feet H2O

Date	Time	ET (min)	Chan[2] Feet H2O	feet corrected	Adjusted ET. (min)	h/ho	ho = -2.697
	11/25/2003 12:23	0	0				
	11/25/2003 12:23	0.1	-0.947	-2.697	0	1.000	
	11/25/2003 12:23	0.2	-0.74	-2.49	0.1	0.923	
	11/25/2003 12:23	0.3	-0.595	-2.345	0.2	0.869	
	11/25/2003 12:23	0.4	-0.478	-2.228	0.3	0.826	
	11/25/2003 12:23	0.5	-0.373	-2.123	0.4	0.787	
	11/25/2003 12:23	0.6	-0.282	-2.032	0.5	0.753	
	11/25/2003 12:23	0.7	-0.2	-1.95	0.6	0.723	
	11/25/2003 12:24	0.8	-0.123	-1.873	0.7	0.694	
	11/25/2003 12:24	0.9	0.176	-1.574	0.8	0.584	
	11/25/2003 12:24	1	0.195	-1.555	0.9	0.577	
	11/25/2003 12:24	1.1	0.203	-1.547	1	0.574	
	11/25/2003 12:24	1.2	0.207	-1.543	1.1	0.572	
	11/25/2003 12:24	1.3	0.213	-1.537	1.2	0.570	
	11/25/2003 12:24	1.4	0.222	-1.528	1.3	0.567	
	11/25/2003 12:24	1.5	0.264	-1.486	1.4	0.551	
	11/25/2003 12:24	1.6	0.304	-1.446	1.5	0.536	
	11/25/2003 12:24	1.7	0.343	-1.407	1.6	0.522	
	11/25/2003 12:25	1.8	0.377	-1.373	1.7	0.509	
	11/25/2003 12:25	1.9	0.411	-1.339	1.8	0.496	
	11/25/2003 12:25	2	0.441	-1.309	1.9	0.485	
	11/25/2003 12:25	2.1	0.472	-1.278	2	0.474	
	11/25/2003 12:25	2.2	0.498	-1.252	2.1	0.464	
	11/25/2003 12:25	2.3	0.524	-1.226	2.2	0.455	
	11/25/2003 12:25	2.4	0.548	-1.202	2.3	0.446	
	11/25/2003 12:25	2.5	0.572	-1.178	2.4	0.437	

11/25/2003 12:25	2.6	0.595	-1.155	2.5	0.428
11/25/2003 12:25	2.7	0.615	-1.135	2.6	0.421
11/25/2003 12:26	2.8	0.635	-1.115	2.7	0.413
11/25/2003 12:26	2.9	0.655	-1.095	2.8	0.406
11/25/2003 12:26	3	0.671	-1.079	2.9	0.400
11/25/2003 12:26	3.1	0.689	-1.061	3	0.393
11/25/2003 12:26	3.2	0.705	-1.045	3.1	0.387
11/25/2003 12:26	3.3	0.722	-1.028	3.2	0.381
11/25/2003 12:26	3.4	0.738	-1.012	3.3	0.375
11/25/2003 12:26	3.5	0.75	-1	3.4	0.371
11/25/2003 12:26	3.6	0.766	-0.984	3.5	0.365
11/25/2003 12:26	3.7	0.78	-0.97	3.6	0.360
11/25/2003 12:27	3.8	0.792	-0.958	3.7	0.355
11/25/2003 12:27	3.9	0.804	-0.946	3.8	0.351
11/25/2003 12:27	4	0.816	-0.934	3.9	0.346
11/25/2003 12:27	4.1	0.829	-0.921	4	0.341
11/25/2003 12:27	4.2	0.841	-0.909	4.1	0.337
11/25/2003 12:27	4.3	0.851	-0.899	4.2	0.333
11/25/2003 12:27	4.4	0.863	-0.887	4.3	0.329
11/25/2003 12:27	4.5	0.873	-0.877	4.4	0.325
11/25/2003 12:27	4.6	0.883	-0.867	4.5	0.321
11/25/2003 12:27	4.7	0.893	-0.857	4.6	0.318
11/25/2003 12:28	4.8	0.903	-0.847	4.7	0.314
11/25/2003 12:28	4.9	0.911	-0.839	4.8	0.311
11/25/2003 12:28	5	0.919	-0.831	4.9	0.308
11/25/2003 12:28	5.1	0.929	-0.821	5	0.304
11/25/2003 12:28	5.2	0.938	-0.812	5.1	0.301
11/25/2003 12:28	5.3	0.948	-0.802	5.2	0.297
11/25/2003 12:28	5.4	0.956	-0.794	5.3	0.294
11/25/2003 12:28	5.5	0.964	-0.786	5.4	0.291
11/25/2003 12:28	5.6	0.972	-0.778	5.5	0.288
11/25/2003 12:28	5.7	0.978	-0.772	5.6	0.286
11/25/2003 12:29	5.8	0.986	-0.764	5.7	0.283
11/25/2003 12:29	5.9	0.994	-0.756	5.8	0.280
11/25/2003 12:29	6	1	-0.75	5.9	0.278
11/25/2003 12:29	6.1	1.008	-0.742	6	0.275
11/25/2003 12:29	6.2	1.016	-0.734	6.1	0.272
11/25/2003 12:29	6.3	1.022	-0.728	6.2	0.270
11/25/2003 12:29	6.4	1.028	-0.722	6.3	0.268
11/25/2003 12:29	6.5	1.034	-0.716	6.4	0.265
11/25/2003 12:29	6.6	1.043	-0.707	6.5	0.262
11/25/2003 12:29	6.7	1.049	-0.701	6.6	0.260
11/25/2003 12:30	6.8	1.055	-0.695	6.7	0.258
11/25/2003 12:30	6.9	1.061	-0.689	6.8	0.255
11/25/2003 12:30	7	1.065	-0.685	6.9	0.254
11/25/2003 12:30	7.1	1.071	-0.679	7	0.252
11/25/2003 12:30	7.2	1.077	-0.673	7.1	0.250
11/25/2003 12:30	7.3	1.083	-0.667	7.2	0.247
11/25/2003 12:30	7.4	1.089	-0.661	7.3	0.245
11/25/2003 12:30	7.5	1.095	-0.655	7.4	0.243
11/25/2003 12:30	7.6	1.101	-0.649	7.5	0.241
11/25/2003 12:30	7.7	1.107	-0.643	7.6	0.238
11/25/2003 12:31	7.8	1.111	-0.639	7.7	0.237
11/25/2003 12:31	7.9	1.115	-0.635	7.8	0.235
11/25/2003 12:31	8	1.121	-0.629	7.9	0.233
11/25/2003 12:31	8.1	1.125	-0.625	8	0.232
11/25/2003 12:31	8.2	1.129	-0.621	8.1	0.230
11/25/2003 12:31	8.3	1.135	-0.615	8.2	0.228
11/25/2003 12:31	8.4	1.139	-0.611	8.3	0.227
11/25/2003 12:31	8.5	1.143	-0.607	8.4	0.225
11/25/2003 12:31	8.6	1.148	-0.602	8.5	0.223
11/25/2003 12:31	8.7	1.154	-0.596	8.6	0.221
11/25/2003 12:32	8.8	1.157	-0.593	8.7	0.220
11/25/2003 12:32	8.9	1.161	-0.589	8.8	0.218
11/25/2003 12:32	9	1.165	-0.585	8.9	0.217

11/25/2003 12:32	9.1	1.169	-0.581	9	0.215
11/25/2003 12:32	9.2	1.174	-0.576	9.1	0.214
11/25/2003 12:32	9.3	1.18	-0.57	9.2	0.211
11/25/2003 12:32	9.4	1.182	-0.568	9.3	0.211
11/25/2003 12:32	9.5	1.186	-0.564	9.4	0.209
11/25/2003 12:32	9.6	1.19	-0.56	9.5	0.208
11/25/2003 12:32	9.7	1.194	-0.556	9.6	0.206
11/25/2003 12:33	9.8	1.198	-0.552	9.7	0.205
11/25/2003 12:33	9.9	1.202	-0.548	9.8	0.203
11/25/2003 12:33	10	1.206	-0.544	9.9	0.202
11/25/2003 12:34	11	1.238	-0.512	10.9	0.190
11/25/2003 12:35	12	1.268	-0.482	11.9	0.179
11/25/2003 12:36	13	1.296	-0.454	12.9	0.168
11/25/2003 12:37	14	1.319	-0.431	13.9	0.160
11/25/2003 12:38	15	1.343	-0.407	14.9	0.151
11/25/2003 12:39	16	1.361	-0.389	15.9	0.144
11/25/2003 12:40	17	1.377	-0.373	16.9	0.138
11/25/2003 12:41	18	1.389	-0.361	17.9	0.134
11/25/2003 12:42	19	1.397	-0.353	18.9	0.131
11/25/2003 12:43	20	1.409	-0.341	19.9	0.126
11/25/2003 12:44	21	1.423	-0.327	20.9	0.121
11/25/2003 12:45	22	1.435	-0.315	21.9	0.117
11/25/2003 12:46	23	1.447	-0.303	22.9	0.112
11/25/2003 12:47	24	1.459	-0.291	23.9	0.108
11/25/2003 12:48	25	1.47	-0.28	24.9	0.104
11/25/2003 12:49	26	1.478	-0.272	25.9	0.101
11/25/2003 12:50	27	1.486	-0.264	26.9	0.098
11/25/2003 12:51	28	1.492	-0.258	27.9	0.096
11/25/2003 12:52	29	1.502	-0.248	28.9	0.092
11/25/2003 12:53	30	1.508	-0.242	29.9	0.090
11/25/2003 12:54	31	1.514	-0.236	30.9	0.088
11/25/2003 12:55	32	1.518	-0.232	31.9	0.086
11/25/2003 12:56	33	1.523	-0.227	32.9	0.084
11/25/2003 12:57	34	1.529	-0.221	33.9	0.082
11/25/2003 12:58	35	1.533	-0.217	34.9	0.080
11/25/2003 12:59	36	1.538	-0.212	35.9	0.079
11/25/2003 13:00	37	1.542	-0.208	36.9	0.077
11/25/2003 13:01	38	1.547	-0.203	37.9	0.075
11/25/2003 13:02	39	1.551	-0.199	38.9	0.074
11/25/2003 13:03	40	1.555	-0.195	39.9	0.072
11/25/2003 13:04	41	1.557	-0.193	40.9	0.072
11/25/2003 13:05	42	1.561	-0.189	41.9	0.070
11/25/2003 13:06	43	1.563	-0.187	42.9	0.069
11/25/2003 13:07	44	1.567	-0.183	43.9	0.068
11/25/2003 13:08	45	1.571	-0.179	44.9	0.066
11/25/2003 13:09	46	1.573	-0.177	45.9	0.066
11/25/2003 13:10	47	1.573	-0.177	46.9	0.066
11/25/2003 13:11	48	1.575	-0.175	47.9	0.065
11/25/2003 13:12	49	1.577	-0.173	48.9	0.064
11/25/2003 13:13	50	1.58	-0.17	49.9	0.063
11/25/2003 13:14	51	1.584	-0.166	50.9	0.062
11/25/2003 13:15	52	1.586	-0.164	51.9	0.061
11/25/2003 13:16	53	1.588	-0.162	52.9	0.060
11/25/2003 13:17	54	1.59	-0.16	53.9	0.059
11/25/2003 13:18	55	1.59	-0.16	54.9	0.059
11/25/2003 13:19	56	1.59	-0.16	55.9	0.059
11/25/2003 13:20	57	1.592	-0.158	56.9	0.059
11/25/2003 13:21	58	1.594	-0.156	57.9	0.058
11/25/2003 13:22	59	1.596	-0.154	58.9	0.057
11/25/2003 13:23	60	1.598	-0.152	59.9	0.056
11/25/2003 13:24	61	1.6	-0.15	60.9	0.056
11/25/2003 13:25	62	1.6	-0.15	61.9	0.056
11/25/2003 13:26	63	1.606	-0.144	62.9	0.053

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083'	1 = r
Effective Radius of Well Screen (in.) :	.166"	2 = R
Length of Well Screen (ft.) :		15 = L
Time for 37% head change (min.) :		5.45 = To

Hydraulic Conductivity (K) :

1.91E-04	ft./min.
3.19E-06	ft./sec.
2.75E-01	ft./day
9.71E-05	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(15/.166)}{2 \times 15 \times 5.45} =$$

1.90×10^{-4} Ft/min

CHECKED
MK
2-18-04

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	2 = R
Length of Well Screen (ft.) :	15 = L
Time for 37% head change (min.) :	3.55 = To

Hydraulic Conductivity (K) :

2.93E-04	ft./min.
4.89E-06	ft./sec.
4.23E-01	ft./day
1.49E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times \mathrm{Ln}(L/R)}{2 \times L \times To}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT47

PROJECT NO.: 90610 GEOLOGIST: M. G. COCHRAN

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' TEST NO.: 2

STATIC WATER LEVEL (Depth/Elevation): 6.56 TOC DATE: 11-25-03

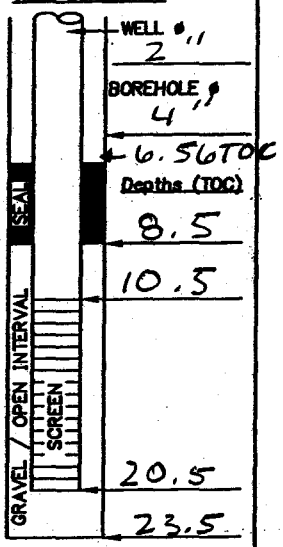
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF 1

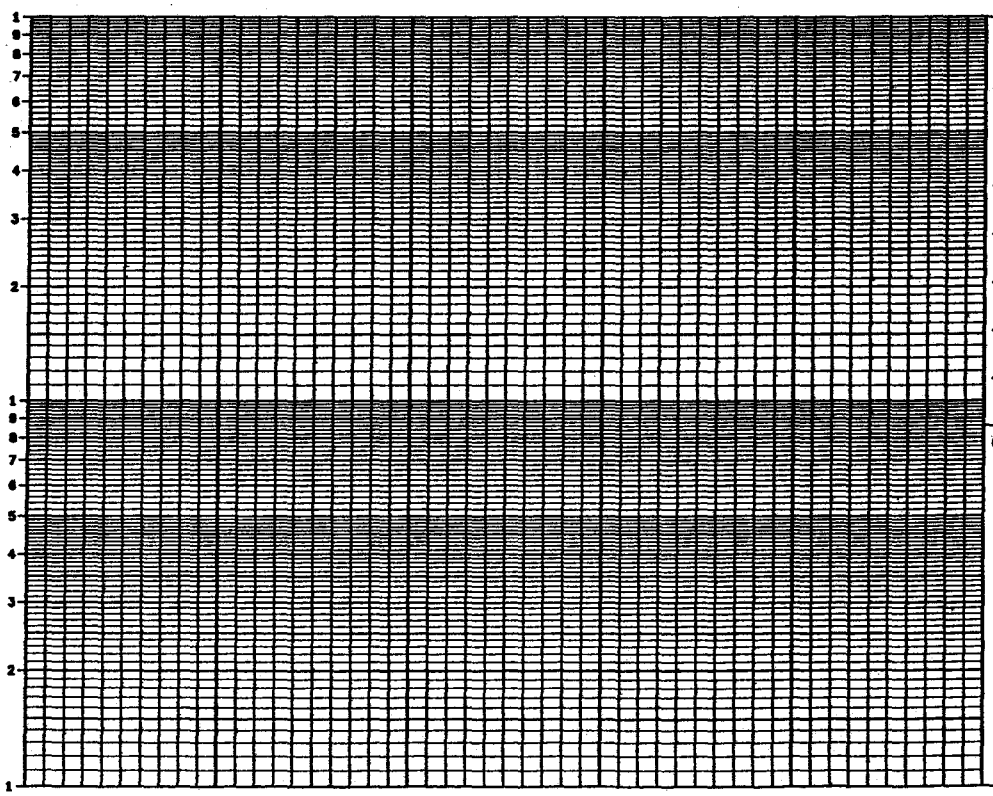
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC. ZERO AT SWL + START

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0		2	3.229	
.1	1.762		3	3.465	
.2	1.980		4	3.616	
.3	2.135		5	3.723	
.4	2.266		6	3.806	
.5	2.375		10	4.013	
.6	2.473		20	4.229	
.7	2.560		30	4.319	
.8	2.641		40	4.359	
.9	2.714				
1.0	2.782				
1.5	3.046				

WELL SCHEMATIC



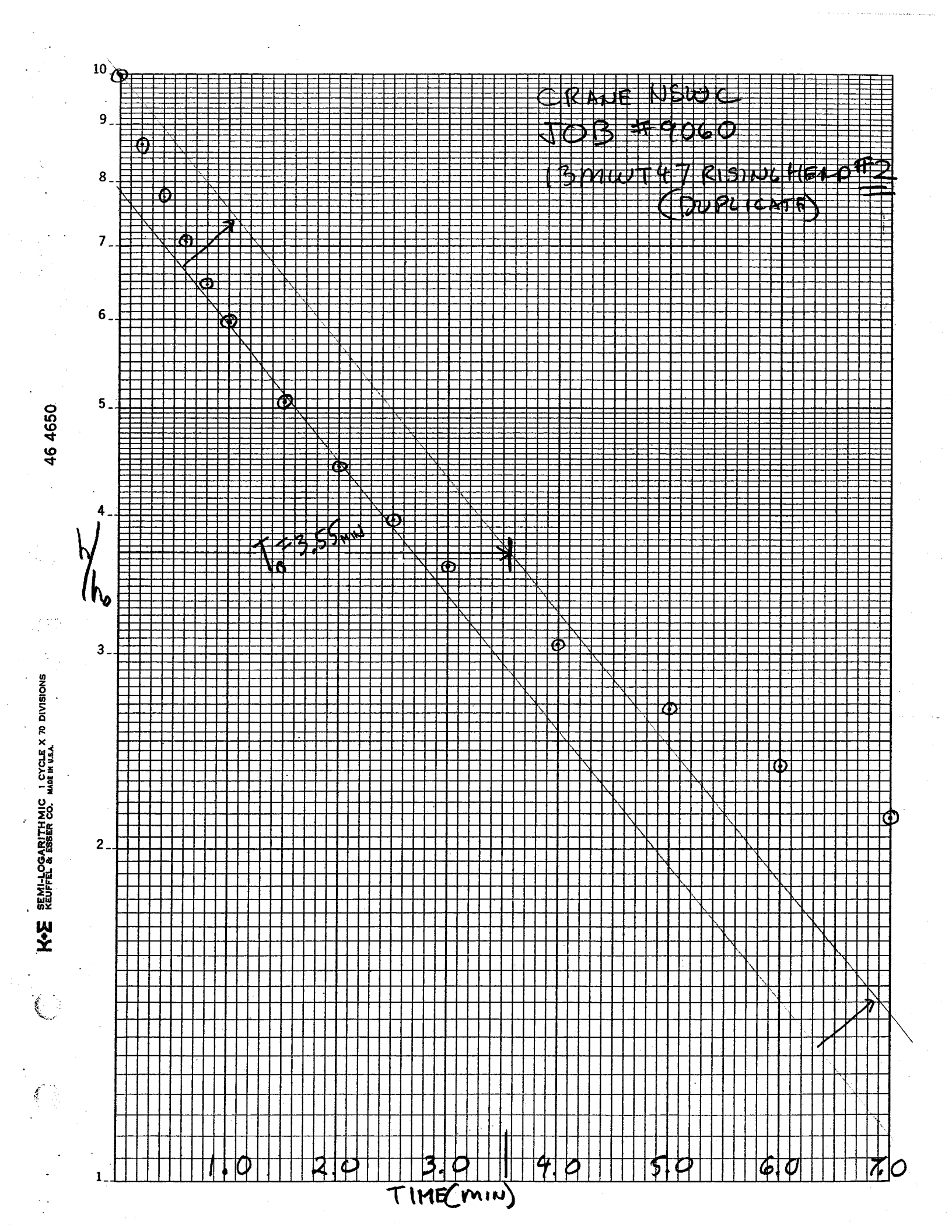
▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL


CRANE NSWC
JOB #9060
13MWT47 RISING HEAD #2
(DUPLICATE)
T_{90} = 3.5 Min
h/h₀
TIME (MIN)
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 12/9/2003 14:11:30
Report from file: H:\Crane IN\SWMU13_16\MGC slug tests 03\site 13\SN06899 2003-11-25 150151 13MWT47rising#2.bin
DataMgr Version 3.68

Serial number: 6899
Firmware Version 3.07
Unit name:

Test name: 13MWT47rising#2

Test defined on: 11/25/2003 15:01:28
Test started on: 11/25/2003 15:01:51
Test stopped on: 11/25/2003 15:46:35
Test extracted on: N/A

Data gathered using Linear testing
Time between data points: Minutes.
Number of data samples: 448

TOTAL DATA SAMPLES 448

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 9.337 Feet H2O

● = PLOTTED DATA

Date	Time	ET (min)	Chan[2] Feet H2O	corrected feet h20	Adjusted ET. (min)	h/ho	ho = -2.688
	11/25/2003 15:01	0	0				
	11/25/2003 15:01	0.1	1.762	-2.688	0	1.000	●
	11/25/2003 15:02	0.2	1.98	-2.47	0.1	0.919	
	11/25/2003 15:02	0.3	2.135	-2.315	0.2	0.861	●
	11/25/2003 15:02	0.4	2.266	-2.184	0.3	0.813	
	11/25/2003 15:02	0.5	2.375	-2.075	0.4	0.772	●
	11/25/2003 15:02	0.6	2.473	-1.977	0.5	0.735	
	11/25/2003 15:02	0.7	2.56	-1.89	0.6	0.703	●
	11/25/2003 15:02	0.8	2.641	-1.809	0.7	0.673	
	11/25/2003 15:02	0.9	2.714	-1.736	0.8	0.646	●
	11/25/2003 15:02	1	2.782	-1.668	0.9	0.621	
	11/25/2003 15:02	1.1	2.843	-1.607	1	0.598	●
	11/25/2003 15:03	1.2	2.901	-1.549	1.1	0.576	
	11/25/2003 15:03	1.3	2.951	-1.499	1.2	0.558	
	11/25/2003 15:03	1.4	3	-1.45	1.3	0.539	
	11/25/2003 15:03	1.5	3.046	-1.404	1.4	0.522	
	11/25/2003 15:03	1.6	3.088	-1.362	1.5	0.507	●
	11/25/2003 15:03	1.7	3.127	-1.323	1.6	0.492	
	11/25/2003 15:03	1.8	3.161	-1.289	1.7	0.480	
	11/25/2003 15:03	1.9	3.197	-1.253	1.8	0.466	
	11/25/2003 15:03	2	3.229	-1.221	1.9	0.454	
	11/25/2003 15:03	2.1	3.258	-1.192	2	0.443	●
	11/25/2003 15:04	2.2	3.288	-1.162	2.1	0.432	
	11/25/2003 15:04	2.3	3.326	-1.124	2.2	0.418	
	11/25/2003 15:04	2.4	3.34	-1.11	2.3	0.413	
	11/25/2003 15:04	2.5	3.362	-1.088	2.4	0.405	

11/25/2003 15:04	2.6	3.385	-1.065	2.5	0.396
11/25/2003 15:04	2.7	3.409	-1.041	2.6	0.387
11/25/2003 15:04	2.8	3.427	-1.023	2.7	0.381
11/25/2003 15:04	2.9	3.447	-1.003	2.8	0.373
11/25/2003 15:04	3	3.465	-0.985	2.9	0.366
11/25/2003 15:04	3.1	3.483	-0.967	3	0.360
11/25/2003 15:05	3.2	3.504	-0.946	3.1	0.352
11/25/2003 15:05	3.3	3.518	-0.932	3.2	0.347
11/25/2003 15:05	3.4	3.534	-0.916	3.3	0.341
11/25/2003 15:05	3.5	3.548	-0.902	3.4	0.336
11/25/2003 15:05	3.6	3.562	-0.888	3.5	0.330
11/25/2003 15:05	3.7	3.576	-0.874	3.6	0.325
11/25/2003 15:05	3.8	3.59	-0.86	3.7	0.320
11/25/2003 15:05	3.9	3.604	-0.846	3.8	0.315
11/25/2003 15:05	4	3.616	-0.834	3.9	0.310
11/25/2003 15:05	4.1	3.628	-0.822	4	0.306
11/25/2003 15:06	4.2	3.641	-0.809	4.1	0.301
11/25/2003 15:06	4.3	3.651	-0.799	4.2	0.297
11/25/2003 15:06	4.4	3.663	-0.787	4.3	0.293
11/25/2003 15:06	4.5	3.673	-0.777	4.4	0.289
11/25/2003 15:06	4.6	3.683	-0.767	4.5	0.285
11/25/2003 15:06	4.7	3.693	-0.757	4.6	0.282
11/25/2003 15:06	4.8	3.703	-0.747	4.7	0.278
11/25/2003 15:06	4.9	3.713	-0.737	4.8	0.274
11/25/2003 15:06	5	3.723	-0.727	4.9	0.270
11/25/2003 15:06	5.1	3.731	-0.719	5	0.267
11/25/2003 15:07	5.2	3.743	-0.707	5.1	0.263
11/25/2003 15:07	5.3	3.751	-0.699	5.2	0.260
11/25/2003 15:07	5.4	3.759	-0.691	5.3	0.257
11/25/2003 15:07	5.5	3.768	-0.682	5.4	0.254
11/25/2003 15:07	5.6	3.776	-0.674	5.5	0.251
11/25/2003 15:07	5.7	3.784	-0.666	5.6	0.248
11/25/2003 15:07	5.8	3.792	-0.658	5.7	0.245
11/25/2003 15:07	5.9	3.798	-0.652	5.8	0.243
11/25/2003 15:07	6	3.806	-0.644	5.9	0.240
11/25/2003 15:07	6.1	3.814	-0.636	6	0.237
11/25/2003 15:08	6.2	3.82	-0.63	6.1	0.234
11/25/2003 15:08	6.3	3.828	-0.622	6.2	0.231
11/25/2003 15:08	6.4	3.834	-0.616	6.3	0.229
11/25/2003 15:08	6.5	3.842	-0.608	6.4	0.226
11/25/2003 15:08	6.6	3.85	-0.6	6.5	0.223
11/25/2003 15:08	6.7	3.854	-0.596	6.6	0.222
11/25/2003 15:08	6.8	3.862	-0.588	6.7	0.219
11/25/2003 15:08	6.9	3.868	-0.582	6.8	0.217
11/25/2003 15:08	7	3.872	-0.578	6.9	0.215
11/25/2003 15:08	7.1	3.878	-0.572	7	0.213
11/25/2003 15:09	7.2	3.884	-0.566	7.1	0.211
11/25/2003 15:09	7.3	3.89	-0.56	7.2	0.208
11/25/2003 15:09	7.4	3.899	-0.551	7.3	0.205
11/25/2003 15:09	7.5	3.903	-0.547	7.4	0.203
11/25/2003 15:09	7.6	3.909	-0.541	7.5	0.201
11/25/2003 15:09	7.7	3.915	-0.535	7.6	0.199
11/25/2003 15:09	7.8	3.919	-0.531	7.7	0.198
11/25/2003 15:09	7.9	3.921	-0.529	7.8	0.197
11/25/2003 15:09	8	3.929	-0.521	7.9	0.194
11/25/2003 15:09	8.1	3.933	-0.517	8	0.192
11/25/2003 15:10	8.2	3.939	-0.511	8.1	0.190
11/25/2003 15:10	8.3	3.943	-0.507	8.2	0.189
11/25/2003 15:10	8.4	3.949	-0.501	8.3	0.186
11/25/2003 15:10	8.5	3.951	-0.499	8.4	0.186
11/25/2003 15:10	8.6	3.957	-0.493	8.5	0.183
11/25/2003 15:10	8.7	3.961	-0.489	8.6	0.182
11/25/2003 15:10	8.8	3.965	-0.485	8.7	0.180
11/25/2003 15:10	8.9	3.971	-0.479	8.8	0.178
11/25/2003 15:10	9	3.975	-0.475	8.9	0.177

11/25/2003 15:10	9.1	3.979	-0.471	9	0.175
11/25/2003 15:11	9.2	3.983	-0.467	9.1	0.174
11/25/2003 15:11	9.3	3.985	-0.465	9.2	0.173
11/25/2003 15:11	9.4	3.991	-0.459	9.3	0.171
11/25/2003 15:11	9.5	3.993	-0.457	9.4	0.170
11/25/2003 15:11	9.6	3.999	-0.451	9.5	0.168
11/25/2003 15:11	9.7	4.003	-0.447	9.6	0.166
11/25/2003 15:11	9.8	4.005	-0.445	9.7	0.166
11/25/2003 15:11	9.9	4.011	-0.439	9.8	0.163
11/25/2003 15:11	10	4.013	-0.437	9.9	0.163
11/25/2003 15:12	11	4.05	-0.4	10.9	0.149
11/25/2003 15:13	12	4.08	-0.37	11.9	0.138
11/25/2003 15:14	13	4.108	-0.342	12.9	0.127
11/25/2003 15:15	14	4.13	-0.32	13.9	0.119
11/25/2003 15:16	15	4.152	-0.298	14.9	0.111
11/25/2003 15:17	16	4.17	-0.28	15.9	0.104
11/25/2003 15:18	17	4.186	-0.264	16.9	0.098
11/25/2003 15:19	18	4.203	-0.247	17.9	0.092
11/25/2003 15:20	19	4.217	-0.233	18.9	0.087
11/25/2003 15:21	20	4.229	-0.221	19.9	0.082
11/25/2003 15:22	21	4.241	-0.209	20.9	0.078
11/25/2003 15:23	22	4.253	-0.197	21.9	0.073
11/25/2003 15:24	23	4.263	-0.187	22.9	0.070
11/25/2003 15:25	24	4.273	-0.177	23.9	0.066
11/25/2003 15:26	25	4.283	-0.167	24.9	0.062
11/25/2003 15:27	26	4.291	-0.159	25.9	0.059
11/25/2003 15:28	27	4.299	-0.151	26.9	0.056
11/25/2003 15:29	28	4.305	-0.145	27.9	0.054
11/25/2003 15:30	29	4.311	-0.139	28.9	0.052
11/25/2003 15:31	30	4.319	-0.131	29.9	0.049
11/25/2003 15:32	31	4.324	-0.126	30.9	0.047
11/25/2003 15:33	32	4.33	-0.12	31.9	0.045
11/25/2003 15:34	33	4.336	-0.114	32.9	0.042
11/25/2003 15:35	34	4.338	-0.112	33.9	0.042
11/25/2003 15:36	35	4.344	-0.106	34.9	0.039
11/25/2003 15:37	36	4.346	-0.104	35.9	0.039
11/25/2003 15:38	37	4.351	-0.099	36.9	0.037
11/25/2003 15:39	38	4.351	-0.099	37.9	0.037
11/25/2003 15:40	39	4.355	-0.095	38.9	0.035
11/25/2003 15:41	40	4.359	-0.091	39.9	0.034
11/25/2003 15:42	41	4.359	-0.091	40.9	0.034
11/25/2003 15:43	42	4.362	-0.088	41.9	0.033
11/25/2003 15:44	43	4.366	-0.084	42.9	0.031
11/25/2003 15:45	44	4.393	-0.057	43.9	0.021

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	Crane NSWC	**Well/Boring No.:**	13MWT47
Project No.:	9060	**Aquifer Type:**	Bedrock
Test Type:	Rising head	**Test Date:**	25-Nov-03

Done By: FWRamser
Checked By:

Radius of Well Casing (in.) :	.083	1 = r
Effective Radius of Well Screen (in.) :	.166	2 = R
Length of Well Screen (ft.) :	15	= L
Time for 37% head change (min.) :	3.55	= To

Hydraulic Conductivity (K) :

2.93E-04	ft./min.
4.89E-06	ft./sec.
4.23E-01	ft./day
1.49E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

$$\frac{.083^2 \times LN(15/.166)}{2 \times 15 \times 3.55}$$

2.91×10^{-4} Ft/min

CHECKED

2-18-04

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	Crane SWMU13/16
Project No.:	N7448
Method of Inducing Water Level Change:	Solid Slug
Reference Pt (Top of Casing, Transducer, etc):	TOC
Test Type (Rising Head / Falling Head):	Rising Head

Well / Boring No.:	13MWT49-R
Test No.:	1
Date:	12/30/2004
Geologist:	Colin Doolan
Checked by / Date:	BWR / 1-3-05

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.0833
Screened / Monitored Interval Below Water Table, L (ft):	4.74
Static Water Level (Depth/ Elevation) (ft.):	7.21
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0.00	2.68	0.00	-2.68	1.00	0.0000	0.00
x	0.01	1.59	0.00			0.0000	
	0.01	1.83	0.01	-1.83	0.68	-0.3813	-0.32
	0.02	1.62	0.02	-1.62	0.60	-0.5031	-0.48
	0.02	1.41	0.02	-1.41	0.53	-0.6412	-0.64
	0.03	1.25	0.03	-1.25	0.47	-0.7622	-0.80
	0.03	1.09	0.03	-1.09	0.41	-0.9028	-0.96
	0.04	0.94	0.04	-0.94	0.35	-1.0534	-1.12
	0.04	0.79	0.04	-0.79	0.30	-1.2206	-1.29
	0.05	0.66	0.05	-0.66	0.24	-1.4093	-1.45
	0.05	0.53	0.05	-0.53	0.20	-1.6248	-1.61
	0.06	0.41	0.06	-0.41	0.15	-1.8681	-1.77
x	0.06	0.29	0.00			0.0000	
x	0.07	0.17	0.00			0.0000	
x	0.07	0.08	0.00			0.0000	
x	0.08	0.04	0.00			0.0000	
x	0.09	0.03	0.00			0.0000	
x	0.10	0.02	0.00			0.0000	
x	0.10	0.02	0.00			0.0000	
x	0.11	0.02	0.00			0.0000	
x	0.1222	0.011	0.00			0.0000	
x	0.132	0.011	0.00			0.0000	
x	0.1425	0.011	0.00			0.0000	
x	0.1535	0.011	0.00			0.0000	
x	0.1652	0.009	0.00			0.0000	
x	0.1777	0.009	0.00			0.0000	

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT49

PROJECT NO.: N7448 GEOLOGIST: CONTI

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 7.21' TPVC DATE: 11/14/04

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

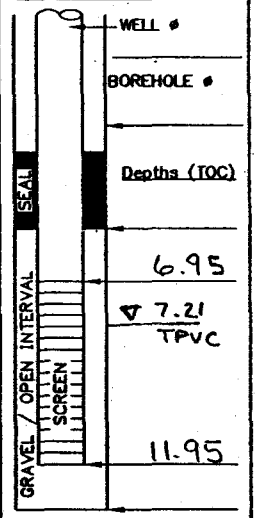
METHOD OF INDUCING WATER LEVEL CHANGE: 2 SEC SLUG 3.2' LONG PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

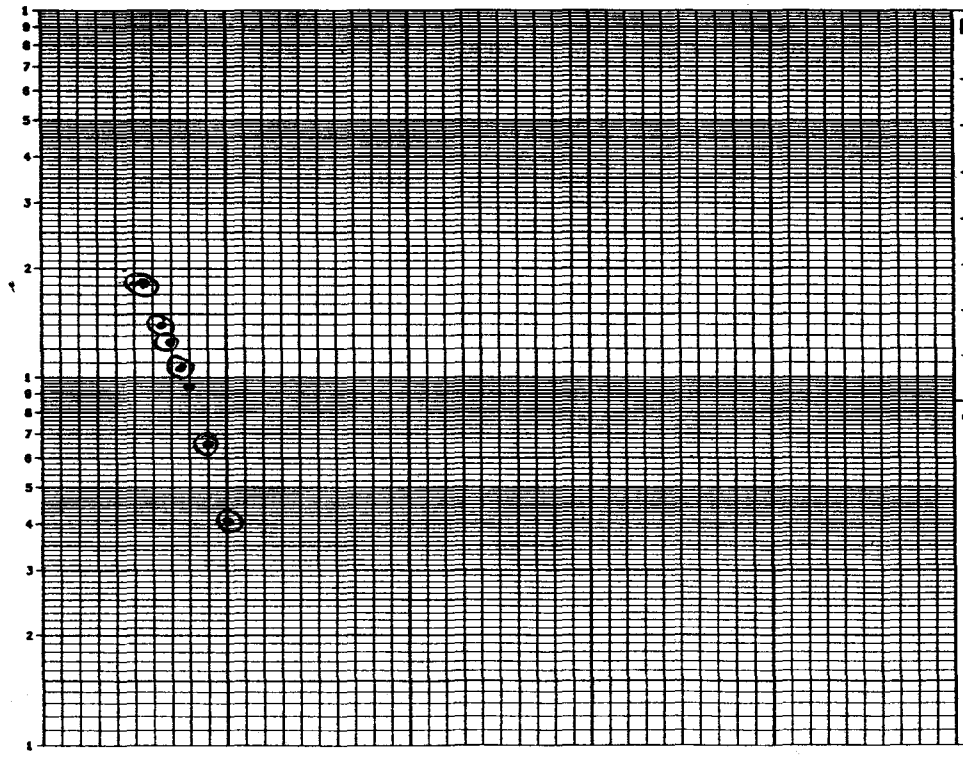
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
.055	1.83				
.065	1.41				
.07	1.25				
.075	1.09				
.08	.94				
.09	.65				
.10	.914				
.106	.286				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

1045 START

Graph Looks Good

Save as Txt file

13MWT49-R

RE DO

Start @ 1410 HR

Txt file

13MWT49-R

CALCS, SKETCH MAPS, ETC.:

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	11
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	-32.132
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	0.007
Actual Y-intercept is set to 0.	0.000
T_0 (min):	0.031
K (ft/min):	9.50E-02
K (ft/day):	**136.872**

$$m = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{n\left(\sum (x^2)\right) - \left(\sum x\right)^2}$$

$$b = \frac{\left(\sum y\right)\left(\sum (x^2)\right) - \left(\sum x\right)\left(\sum xy\right)}{n\left(\sum (x^2)\right) - \left(\sum x\right)^2}$$

T_0: Time at which ln(H/H0)=-1

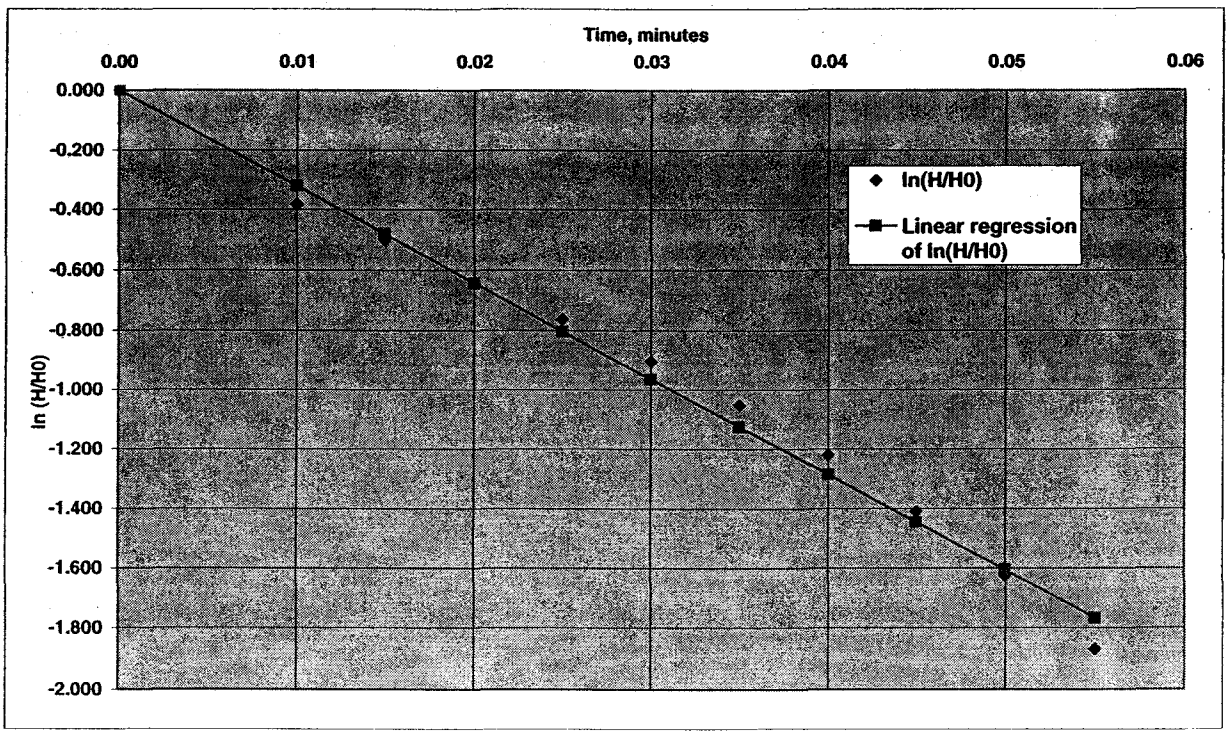
$K = r^2 * \ln(L/R)/(2LT_0)$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

In-Situ Inc. MiniTroll Pro

Report generated: 11/14/2004 14:15:39
Report from file: ...\SN08927 2004-11-14 141000 13MWT49-R.bin
Win-Situ Version 4.47

Serial number: 8927
Firmware Version 3.09
Unit name:

Test name: 13MWT49-R

Test defined on: 11/14/2004 14:02:11
Test scheduled for: 11/14/2004 14:10:00
Test started on: 11/14/2004 14:10:00
Test stopped on: 11/14/2004 14:15:06
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between data points: Minutes.
Number of data samples: 89

TOTAL DATA SAMPLES 89

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 4.691 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O		Adjusted ET (min)	Adjusted Feet H2O
11/14/2004	14:10:00	0	14.24	0			
11/14/2004	14:10:00	0.005	14.26	-0.002			
11/14/2004	14:10:00	0.01	14.26	-0.002			
11/14/2004	14:10:00	0.015	14.26	-0.002			
11/14/2004	14:10:01	0.02	14.27	-0.002			
11/14/2004	14:10:01	0.025	14.27	-0.002			
11/14/2004	14:10:01	0.03	14.27	-0.002			
11/14/2004	14:10:02	0.035	14.27	-0.002			
11/14/2004	14:10:02	0.04	14.27	-0.12			
11/14/2004	14:10:02	0.045	14.27	-2.681	T=0	0	2.681
11/14/2004	14:10:03	0.05	14.27	-1.588		0.005	1.588
11/14/2004	14:10:03	0.055	14.27	-1.831		0.01	1.831
11/14/2004	14:10:03	0.06	14.28	-1.621		0.015	1.621
11/14/2004	14:10:03	0.065	14.28	-1.412		0.02	1.412
11/14/2004	14:10:04	0.07	14.28	-1.251		0.025	1.251
11/14/2004	14:10:04	0.075	14.28	-1.087		0.03	1.087
11/14/2004	14:10:04	0.08	14.28	-0.935		0.035	0.935
11/14/2004	14:10:05	0.085	14.28	-0.791		0.04	0.791
11/14/2004	14:10:05	0.09	14.28	-0.655		0.045	0.655
11/14/2004	14:10:05	0.095	14.28	-0.528		0.05	0.528
11/14/2004	14:10:06	0.1	14.28	-0.414		0.055	0.414
11/14/2004	14:10:06	0.1058	14.28	-0.286		0.0608	0.286
11/14/2004	14:10:06	0.112	14.28	-0.173		0.067	0.173
11/14/2004	14:10:07	0.1185	14.28	-0.084		0.0735	0.084
11/14/2004	14:10:07	0.1255	14.3	-0.037		0.0805	0.037

11/14/2004	14:10:07	0.1328	14.3	-0.027	0.0878	0.027
11/14/2004	14:10:08	0.1407	14.3	-0.019	0.0957	0.019
11/14/2004	14:10:08	0.149	14.3	-0.017	0.104	0.017
11/14/2004	14:10:09	0.1578	14.3	-0.015	0.1128	0.015
11/14/2004	14:10:10	0.1672	14.3	-0.011	0.1222	0.011
11/14/2004	14:10:10	0.177	14.28	-0.011	0.132	0.011
11/14/2004	14:10:11	0.1875	14.28	-0.011	0.1425	0.011
11/14/2004	14:10:11	0.1985	14.28	-0.011	0.1535	0.011
11/14/2004	14:10:12	0.2102	14.28	-0.009	0.1652	0.009
11/14/2004	14:10:13	0.2227	14.28	-0.009	0.1777	0.009
11/14/2004	14:10:14	0.2358	14.28	-0.009	0.1908	0.009
11/14/2004	14:10:15	0.2498	14.28	-0.009	0.2048	0.009
11/14/2004	14:10:15	0.2647	14.28	-0.009	0.2197	0.009
11/14/2004	14:10:16	0.2803	14.28	-0.009	0.2353	0.009
11/14/2004	14:10:17	0.297	14.28	-0.009	0.252	0.009
11/14/2004	14:10:18	0.3147	14.28	-0.011	0.2697	0.011
11/14/2004	14:10:20	0.3333	14.28	-0.009	0.2883	0.009
11/14/2004	14:10:21	0.3532	14.28	-0.011	0.3082	0.011
11/14/2004	14:10:22	0.3742	14.28	-0.009	0.3292	0.009
11/14/2004	14:10:23	0.3963	14.28	-0.011	0.3513	0.011
11/14/2004	14:10:25	0.4198	14.28	-0.011	0.3748	0.011
11/14/2004	14:10:26	0.4447	14.28	-0.011	0.3997	0.011
11/14/2004	14:10:28	0.4697	14.28	-0.009	0.4247	0.009
11/14/2004	14:10:29	0.4963	14.28	-0.011	0.4513	0.011
11/14/2004	14:10:31	0.5247	14.28	-0.011	0.4797	0.011
11/14/2004	14:10:33	0.5547	14.28	-0.009	0.5097	0.009
11/14/2004	14:10:35	0.5863	14.28	-0.011	0.5413	0.011
11/14/2004	14:10:37	0.6213	14.28	-0.011	0.5763	0.011
11/14/2004	14:10:39	0.658	14.28	-0.011	0.613	0.011
11/14/2004	14:10:41	0.6963	14.28	-0.011	0.6513	0.011
11/14/2004	14:10:44	0.738	14.28	-0.011	0.693	0.011
11/14/2004	14:10:46	0.7813	14.28	-0.009	0.7363	0.009
11/14/2004	14:10:49	0.828	14.28	-0.011	0.783	0.011
11/14/2004	14:10:52	0.8763	14.28	-0.011	0.8313	0.011
11/14/2004	14:10:55	0.928	14.28	-0.009	0.883	0.009
11/14/2004	14:10:58	0.983	14.28	-0.011	0.938	0.011
11/14/2004	14:11:02	1.0413	14.28	-0.011	0.9963	0.011
11/14/2004	14:11:06	1.103	14.27	-0.009	1.058	0.009
11/14/2004	14:11:10	1.168	14.27	-0.011	1.123	0.011
11/14/2004	14:11:14	1.238	14.27	-0.009	1.193	0.009
11/14/2004	14:11:18	1.3113	14.27	-0.011	1.2663	0.011
11/14/2004	14:11:23	1.3897	14.27	-0.009	1.3447	0.009
11/14/2004	14:11:28	1.473	14.27	-0.011	1.428	0.011
11/14/2004	14:11:33	1.5613	14.27	-0.011	1.5163	0.011
11/14/2004	14:11:39	1.6547	14.27	-0.011	1.6097	0.011
11/14/2004	14:11:45	1.753	14.27	-0.009	1.708	0.009
11/14/2004	14:11:51	1.858	14.27	-0.011	1.813	0.011
11/14/2004	14:11:58	1.968	14.27	-0.009	1.923	0.009
11/14/2004	14:12:05	2.0847	14.27	-0.011	2.0397	0.011
11/14/2004	14:12:12	2.2097	14.27	-0.011	2.1647	0.011
11/14/2004	14:12:20	2.3413	14.26	-0.01	2.2963	0.01
11/14/2004	14:12:28	2.4813	14.26	-0.01	2.4363	0.01
11/14/2004	14:12:37	2.6297	14.26	-0.008	2.5847	0.008
11/14/2004	14:12:47	2.7863	14.26	-0.01	2.7413	0.01
11/14/2004	14:12:57	2.953	14.26	-0.01	2.908	0.01
11/14/2004	14:13:07	3.1297	14.26	-0.008	3.0847	0.008
11/14/2004	14:13:18	3.3163	14.26	-0.008	3.2713	0.008
11/14/2004	14:13:30	3.5147	14.26	-0.008	3.4697	0.008
11/14/2004	14:13:43	3.7247	14.26	-0.01	3.6797	0.01
11/14/2004	14:13:56	3.9463	14.26	-0.01	3.9013	0.01
11/14/2004	14:14:10	4.1813	14.26	-0.008	4.1363	0.008
11/14/2004	14:14:25	4.4297	14.26	-0.01	4.3847	0.01
11/14/2004	14:14:41	4.693	14.26	-0.008	4.648	0.008
11/14/2004	14:14:58	4.973	14.26	-0.01	4.928	0.01

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	Crane SWMU13/16
Project No.:	N7448
Method of Inducing Water Level Change:	Solid Slug
Reference Pt (Top of Casing, Transducer, etc):	TOC
Test Type (Rising Head / Falling Head):	Falling Head

Well / Boring No.:	13MWT50
Test No.:	1
Date:	12/30/2004
Geologist:	Colin Doolan
Checked by / Date:	JMR / 1-3-05

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.354
Screened / Monitored Interval Below Water Table, L (ft):	14
Static Water Level (Depth/ Elevation) (ft.):	7.21
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0.00	1.55	0.00	-1.55	1.00	0.0000	0.00
	0.07	1.44	0.07	-1.44	0.93	-0.0716	0.00
	0.17	1.44	0.17	-1.44	0.93	-0.0744	0.00
	0.33	1.43	0.33	-1.43	0.92	-0.0827	0.00
	0.58	1.43	0.58	-1.43	0.92	-0.0785	0.00
	0.99	1.43	0.99	-1.43	0.92	-0.0827	0.00
	1.64	1.42	1.64	-1.42	0.92	-0.0855	-0.01
	2.67	1.42	2.67	-1.42	0.92	-0.0884	-0.01
	4.32	1.41	4.32	-1.41	0.91	-0.0954	-0.01
	6.92	1.39	6.92	-1.39	0.90	-0.1054	-0.02
	11.06	1.37	11.06	-1.37	0.89	-0.1213	-0.04
	17.61	1.34	17.61	-1.34	0.87	-0.1449	-0.06
	28.01	1.29	28.01	-1.29	0.83	-0.1837	-0.09
	44.48	1.22	44.48	-1.22	0.79	-0.2404	-0.15
	70.61	1.12	70.61	-1.12	0.72	-0.3288	-0.24
	112.01	0.97	112.01	-0.97	0.63	-0.4670	-0.38
	177.63	0.78	177.63	-0.78	0.51	-0.6822	-0.59
	281.63	0.56	281.63	-0.56	0.36	-1.0192	-0.94
	446.47	0.33	446.47	-0.33	0.21	-1.5402	-1.50
	680.66	0.15	680.66	-0.15	0.10	-2.3084	-2.28
	920.6643	0.063	920.66	-0.06	0.04	-3.2022	-3.08
x	1160.6643	0	0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT50

PROJECT NO.: N7448 GEOLOGIST: CONTI

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 / 28.27 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 7.21 TPVC DATE: 11-14-04

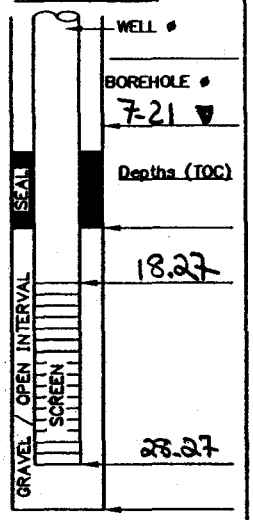
TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2 SEC SLUG 3.2' PAGE 1 OF

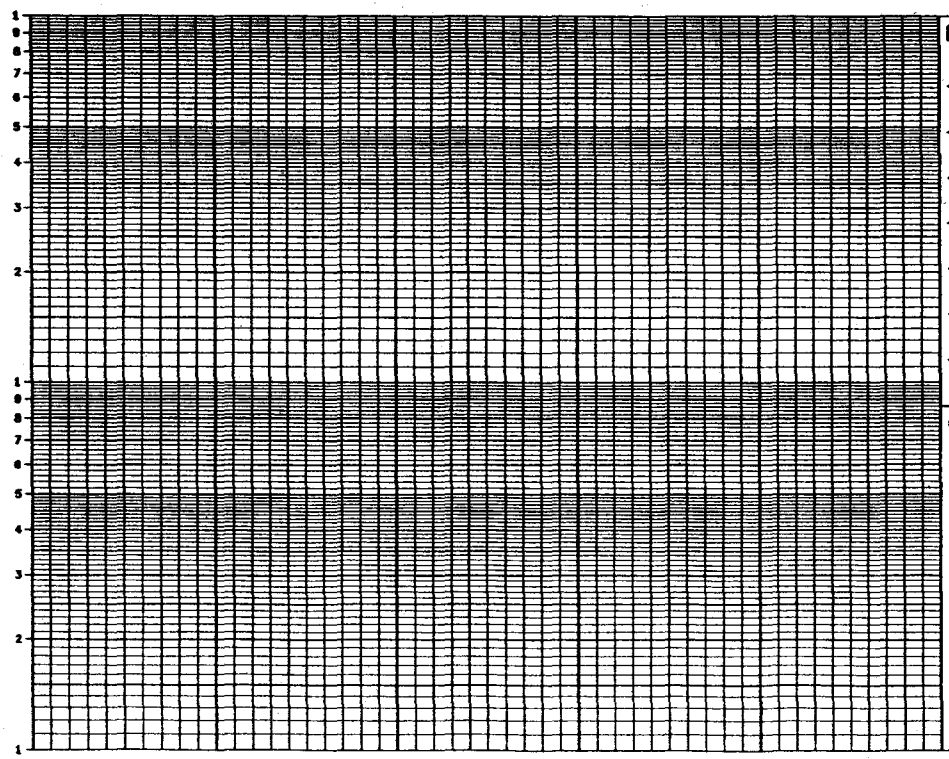
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC.

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
.085	1.037		334	.049	
1	1.007		375	-.008	
5	.983				
10	.959				
20	.906				
30	.862				
60	.736				
125	.508				
149	.437				
188	.336				
237	.227				
298	.109				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD - 14.079

V. SLOW REC - WILL RUN FH OVERNITE

7.21' WL @ 11-15-04 @ 1055 HRS

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	21
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	-0.003
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	-0.076
Actual Y-intercept is set to 0.	0.000
T_0 (min):	298.611
K (ft/min):	3.05E-06
K (ft/day):	**0.004**

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum (x^2)) - (\sum x)^2}$$

$$b = \frac{(\sum y)(\sum (x^2)) - (\sum x)(\sum xy)}{n(\sum (x^2)) - (\sum x)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

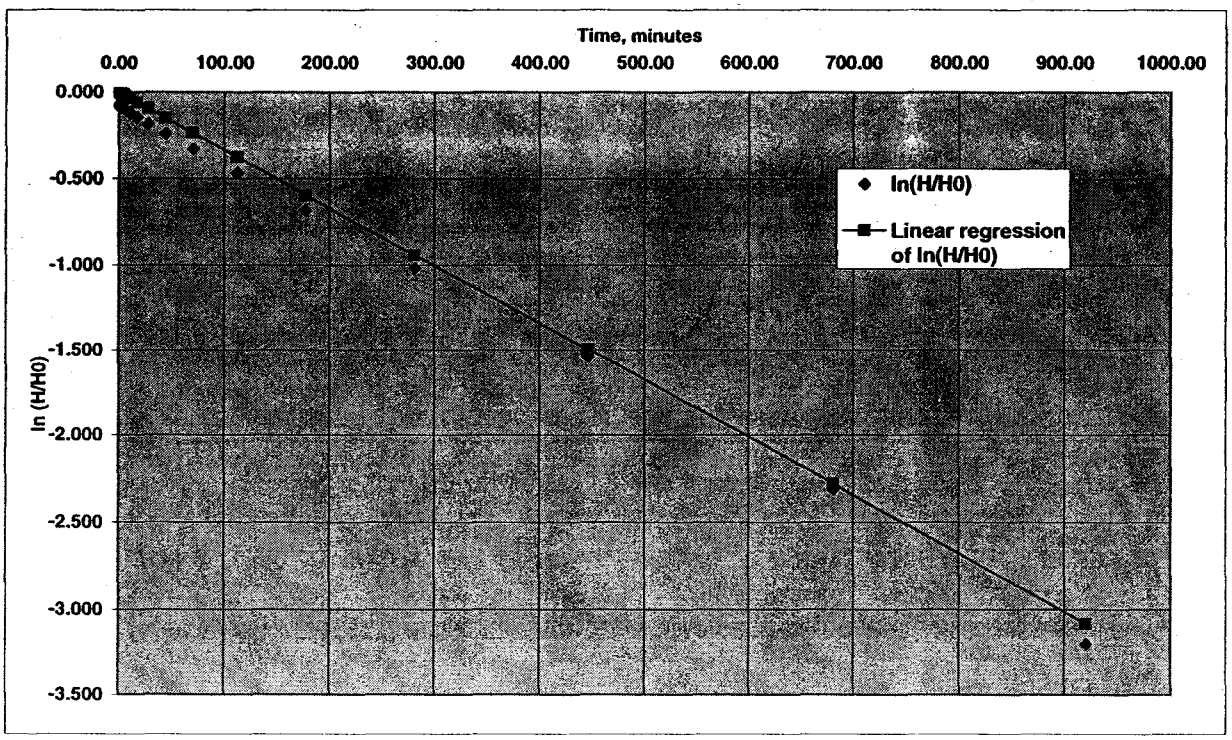
T_0: Time at which ln(H/H0)=-1

$K = r^2 * \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

In-Situ Inc. MiniTroll Pro

Report generated: 11/15/2004 11:09:00
Report from file: ...\SN08927 2004-11-14 153500 13MWT50-F.bin
Win-Situ Version 4.47

Serial number: 8927
Firmware Version 3.09
Unit name:

Test name: 13MWT50-F

Test defined on: 11/14/2004 15:27:21
Test scheduled for: 11/14/2004 15:35:00
Test started on: 11/14/2004 15:35:00
Test stopped on: 11/15/2004 11:02:39
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between data points: Minutes.
Number of data samples: 191

TOTAL DATA SAMPLES 191

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 19.263 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O		Adjusted ET (min)	Adjusted Feet H2O
11/14/2004	15:35:00	0	13.2	0			
11/14/2004	15:35:00	0.005	13.22	0.006			
11/14/2004	15:35:00	0.01	13.22	0.008			
11/14/2004	15:35:00	0.015	13.23	0.009			
11/14/2004	15:35:01	0.02	13.23	0.009			
11/14/2004	15:35:01	0.025	13.23	0.011			
11/14/2004	15:35:01	0.03	13.23	0.011			
11/14/2004	15:35:02	0.035	13.25	0.011			
11/14/2004	15:35:02	0.04	13.25	0.011			
11/14/2004	15:35:02	0.045	13.25	0.181			
11/14/2004	15:35:03	0.05	13.25	0.819			
11/14/2004	15:35:03	0.055	13.25	1.252			
11/14/2004	15:35:03	0.06	13.25	1.219			
11/14/2004	15:35:03	0.065	13.25	1.173			
11/14/2004	15:35:04	0.07	13.25	0.946			
11/14/2004	15:35:04	0.075	13.25	1.245			
11/14/2004	15:35:04	0.08	13.25	1.262			
11/14/2004	15:35:05	0.085	13.26	1.037			
11/14/2004	15:35:05	0.09	13.26	1.172			
11/14/2004	15:35:05	0.095	13.26	1.257			
11/14/2004	15:35:06	0.1	13.26	1.075			
11/14/2004	15:35:06	0.1058	13.26	1.045			
11/14/2004	15:35:06	0.112	13.26	1.128	T=0	0	1.549
11/14/2004	15:35:07	0.1185	13.26	0.873		0.0065	1.294
11/14/2004	15:35:07	0.1255	13.26	1.091		0.0135	1.512

11/14/2004	15:35:07	0.1328	13.26	0.97	0.0208	1.391
11/14/2004	15:35:08	0.1407	13.26	1.069	0.0287	1.49
11/14/2004	15:35:08	0.149	13.26	1.007	0.037	1.428
11/14/2004	15:35:09	0.1578	13.26	1.033	0.0458	1.454
11/14/2004	15:35:10	0.1672	13.25	1.023	0.0552	1.444
11/14/2004	15:35:10	0.177	13.25	1.021	0.065	1.442
11/14/2004	15:35:11	0.1875	13.25	1.021	0.0755	1.442
11/14/2004	15:35:11	0.1985	13.25	1.023	0.0865	1.444
11/14/2004	15:35:12	0.2102	13.23	1.015	0.0982	1.436
11/14/2004	15:35:13	0.2227	13.23	1.021	0.1107	1.442
11/14/2004	15:35:14	0.2358	13.23	1.017	0.1238	1.438
11/14/2004	15:35:15	0.2498	13.23	1.017	0.1378	1.438
11/14/2004	15:35:15	0.2647	13.23	1.017	0.1527	1.438
11/14/2004	15:35:16	0.2803	13.23	1.017	0.1683	1.438
11/14/2004	15:35:17	0.297	13.23	1.017	0.185	1.438
11/14/2004	15:35:18	0.3147	13.23	1.015	0.2027	1.436
11/14/2004	15:35:20	0.3333	13.23	1.015	0.2213	1.436
11/14/2004	15:35:21	0.3532	13.23	1.013	0.2412	1.434
11/14/2004	15:35:22	0.3742	13.23	1.013	0.2622	1.434
11/14/2004	15:35:23	0.3963	13.23	1.015	0.2843	1.436
11/14/2004	15:35:25	0.4198	13.23	1.015	0.3078	1.436
11/14/2004	15:35:26	0.4447	13.23	1.005	0.3327	1.426
11/14/2004	15:35:28	0.4697	13.23	1.015	0.3577	1.436
11/14/2004	15:35:29	0.4963	13.23	1.013	0.3843	1.434
11/14/2004	15:35:31	0.5247	13.23	1.013	0.4127	1.434
11/14/2004	15:35:33	0.5547	13.23	1.011	0.4427	1.432
11/14/2004	15:35:35	0.5863	13.23	1.011	0.4743	1.432
11/14/2004	15:35:37	0.6213	13.23	1.011	0.5093	1.432
11/14/2004	15:35:39	0.658	13.23	1.011	0.546	1.432
11/14/2004	15:35:41	0.6963	13.22	1.011	0.5843	1.432
11/14/2004	15:35:44	0.738	13.22	1.009	0.626	1.43
11/14/2004	15:35:46	0.7813	13.22	1.009	0.6693	1.43
11/14/2004	15:35:49	0.828	13.22	1.009	0.716	1.43
11/14/2004	15:35:52	0.8763	13.22	1.009	0.7643	1.43
11/14/2004	15:35:55	0.928	13.22	1.005	0.816	1.426
11/14/2004	15:35:58	0.983	13.22	1.009	0.871	1.43
11/14/2004	15:36:02	1.0413	13.22	1.007	0.9293	1.428
11/14/2004	15:36:06	1.103	13.22	1.005	0.991	1.426
11/14/2004	15:36:10	1.168	13.22	1.007	1.056	1.428
11/14/2004	15:36:14	1.238	13.22	1.005	1.126	1.426
11/14/2004	15:36:18	1.3113	13.22	1.005	1.1993	1.426
11/14/2004	15:36:23	1.3897	13.22	1.011	1.2777	1.432
11/14/2004	15:36:28	1.473	13.22	1.005	1.361	1.426
11/14/2004	15:36:33	1.5613	13.22	1.003	1.4493	1.424
11/14/2004	15:36:39	1.6547	13.22	1.003	1.5427	1.424
11/14/2004	15:36:45	1.753	13.21	1.001	1.641	1.422
11/14/2004	15:36:51	1.858	13.21	1.001	1.746	1.422
11/14/2004	15:36:58	1.968	13.21	1.001	1.856	1.422
11/14/2004	15:37:05	2.0847	13.21	1.001	1.9727	1.422
11/14/2004	15:37:12	2.2097	13.21	1.001	2.0977	1.422
11/14/2004	15:37:20	2.3413	13.21	0.999	2.2293	1.42
11/14/2004	15:37:28	2.4813	13.21	0.999	2.3693	1.42
11/14/2004	15:37:37	2.6297	13.21	0.997	2.5177	1.418
11/14/2004	15:37:47	2.7863	13.21	0.997	2.6743	1.418
11/14/2004	15:37:57	2.953	13.21	0.995	2.841	1.416
11/14/2004	15:38:07	3.1297	13.21	0.995	3.0177	1.416
11/14/2004	15:38:18	3.3163	13.21	0.993	3.2043	1.414
11/14/2004	15:38:30	3.5147	13.21	0.991	3.4027	1.412
11/14/2004	15:38:43	3.7247	13.21	0.991	3.6127	1.412
11/14/2004	15:38:56	3.9463	13.21	0.991	3.8343	1.412
11/14/2004	15:39:10	4.1813	13.21	0.989	4.0693	1.41
11/14/2004	15:39:25	4.4297	13.21	0.987	4.3177	1.408
11/14/2004	15:39:41	4.693	13.21	0.985	4.581	1.406
11/14/2004	15:39:58	4.973	13.21	0.983	4.861	1.404
11/14/2004	15:40:16	5.2697	13.2	0.981	5.1577	1.402
11/14/2004	15:40:34	5.583	13.21	0.981	5.471	1.402
11/14/2004	15:40:54	5.9147	13.2	0.979	5.8027	1.4
11/14/2004	15:41:15	6.2663	13.2	0.977	6.1543	1.398

11/14/2004	15:41:38	6.6397	13.21	0.975	6.5277	1.396
11/14/2004	15:42:02	7.0347	13.2	0.973	6.9227	1.394
11/14/2004	15:42:27	7.453	13.2	0.971	7.341	1.392
11/14/2004	15:42:53	7.8963	13.2	0.969	7.7843	1.39
11/14/2004	15:43:21	8.3663	13.2	0.965	8.2543	1.386
11/14/2004	15:43:51	8.8647	13.2	0.963	8.7527	1.384
11/14/2004	15:44:23	9.3913	13.2	0.961	9.2793	1.382
11/14/2004	15:44:56	9.9497	13.2	0.959	9.8377	1.38
11/14/2004	15:45:32	10.5413	13.2	0.955	10.4293	1.376
11/14/2004	15:46:10	11.168	13.2	0.951	11.056	1.372
11/14/2004	15:46:49	11.8313	13.2	0.949	11.7193	1.37
11/14/2004	15:47:32	12.5347	13.2	0.945	12.4227	1.366
11/14/2004	15:48:16	13.2797	13.2	0.941	13.1677	1.362
11/14/2004	15:49:04	14.0697	13.2	0.937	13.9577	1.358
11/14/2004	15:49:54	14.9063	13.2	0.933	14.7943	1.354
11/14/2004	15:50:47	15.7913	13.2	0.929	15.6793	1.35
11/14/2004	15:51:43	16.7297	13.2	0.923	16.6177	1.344
11/14/2004	15:52:43	17.723	13.2	0.919	17.611	1.34
11/14/2004	15:53:46	18.7763	13.2	0.915	18.6643	1.336
11/14/2004	15:54:53	19.8913	13.2	0.906	19.7793	1.327
11/14/2004	15:56:04	21.073	13.2	0.902	20.961	1.323
11/14/2004	15:57:19	22.3247	13.2	0.896	22.2127	1.317
11/14/2004	15:58:38	23.6497	13.2	0.89	23.5377	1.311
11/14/2004	16:00:03	25.0547	13.2	0.884	24.9427	1.305
11/14/2004	16:01:32	26.543	13.2	0.876	26.431	1.297
11/14/2004	16:03:07	28.118	13.2	0.868	28.006	1.289
11/14/2004	16:04:47	29.7863	13.2	0.862	29.6743	1.283
11/14/2004	16:06:33	31.5547	13.2	0.856	31.4427	1.277
11/14/2004	16:08:25	33.428	13.2	0.848	33.316	1.269
11/14/2004	16:10:24	35.4113	13.2	0.838	35.2993	1.259
11/14/2004	16:12:30	37.513	13.2	0.83	37.401	1.251
11/14/2004	16:14:44	39.7397	13.2	0.819	39.6277	1.24
11/14/2004	16:17:05	42.098	13.2	0.809	41.986	1.23
11/14/2004	16:19:35	44.5963	13.2	0.797	44.4843	1.218
11/14/2004	16:22:14	47.243	13.2	0.785	47.131	1.206
11/14/2004	16:25:02	50.0463	13.2	0.775	49.9343	1.196
11/14/2004	16:28:00	53.0147	13.2	0.763	52.9027	1.184
11/14/2004	16:31:09	56.1597	13.2	0.749	56.0477	1.17
11/14/2004	16:34:29	59.4913	13.2	0.736	59.3793	1.157
11/14/2004	16:38:01	63.0197	13.2	0.722	62.9077	1.143
11/14/2004	16:41:45	66.758	13.2	0.71	66.646	1.131
11/14/2004	16:45:43	70.718	13.2	0.694	70.606	1.115
11/14/2004	16:49:54	74.9113	13.2	0.678	74.7993	1.099
11/14/2004	16:54:21	79.3547	13.2	0.662	79.2427	1.083
11/14/2004	16:59:03	84.0613	13.2	0.645	83.9493	1.066
11/14/2004	17:04:02	89.0463	13.2	0.627	88.9343	1.048
11/14/2004	17:09:19	94.3263	13.2	0.611	94.2143	1.032
11/14/2004	17:14:55	99.9197	13.2	0.591	99.8077	1.012
11/14/2004	17:20:50	105.8447	13.2	0.571	105.7327	0.992
11/14/2004	17:27:07	112.1197	13.2	0.55	112.0077	0.971
11/14/2004	17:33:46	118.768	13.2	0.528	118.656	0.949
11/14/2004	17:40:48	125.8097	13.2	0.508	125.6977	0.929
11/14/2004	17:48:16	133.268	13.2	0.486	133.156	0.907
11/14/2004	17:56:10	141.168	13.2	0.461	141.056	0.882
11/14/2004	18:04:32	149.5363	13.2	0.437	149.4243	0.858
11/14/2004	18:13:24	158.4013	13.2	0.413	158.2893	0.834
11/14/2004	18:22:47	167.7913	13.2	0.386	167.6793	0.807
11/14/2004	18:32:44	177.738	13.2	0.362	177.626	0.783
11/14/2004	18:43:16	188.2747	13.2	0.336	188.1627	0.757
11/14/2004	18:54:26	199.4347	13.2	0.31	199.3227	0.731
11/14/2004	19:06:15	211.2563	13.2	0.279	211.1443	0.7
11/14/2004	19:18:46	223.778	13.2	0.251	223.666	0.672
11/14/2004	19:32:02	237.043	13.2	0.227	236.931	0.648
11/14/2004	19:46:05	251.093	13.2	0.196	250.981	0.617
11/14/2004	20:00:58	265.9763	13.2	0.166	265.8643	0.587
11/14/2004	20:16:44	281.7413	13.2	0.138	281.6293	0.559
11/14/2004	20:33:26	298.4397	13.2	0.109	298.3277	0.53
11/14/2004	20:51:07	316.128	13.2	0.079	316.016	0.5

11/14/2004	21:09:51	334.8647	13.2	0.049	334.7527	0.47
11/14/2004	21:29:42	354.7113	13.2	0.02	354.5993	0.441
11/14/2004	21:50:44	375.7347	13.2	-0.008	375.6227	0.413
11/14/2004	22:13:00	398.003	13.2	-0.036	397.891	0.385
11/14/2004	22:36:35	421.5913	13.2	-0.063	421.4793	0.358
11/14/2004	23:01:34	446.578	13.2	-0.089	446.466	0.332
11/14/2004	23:28:02	473.0447	13.2	-0.117	472.9327	0.304
11/14/2004	23:56:04	501.0797	13.2	-0.144	500.9677	0.277
11/15/2004	0:25:46	530.7763	13.2	-0.168	530.6643	0.253
11/15/2004	0:55:46	560.7763	13.2	-0.192	560.6643	0.229
11/15/2004	1:25:46	590.7763	13.2	-0.212	590.6643	0.209
11/15/2004	1:55:46	620.7763	13.2	-0.231	620.6643	0.19
11/15/2004	2:25:46	650.7763	13.2	-0.251	650.6643	0.17
11/15/2004	2:55:46	680.7763	13.2	-0.267	680.6643	0.154
11/15/2004	3:25:46	710.7763	13.2	-0.281	710.6643	0.14
11/15/2004	3:55:46	740.7763	13.2	-0.295	740.6643	0.126
11/15/2004	4:25:46	770.7763	13.2	-0.308	770.6643	0.113
11/15/2004	4:55:46	800.7763	13.2	-0.318	800.6643	0.103
11/15/2004	5:25:46	830.7763	13.2	-0.328	830.6643	0.093
11/15/2004	5:55:46	860.7763	13.2	-0.34	860.6643	0.081
11/15/2004	6:25:46	890.7763	13.2	-0.35	890.6643	0.071
11/15/2004	6:55:46	920.7763	13.2	-0.358	920.6643	0.063
11/15/2004	7:25:46	950.7763	13.2	-0.368	950.6643	0.053
11/15/2004	7:55:46	980.7763	13.2	-0.378	980.6643	0.043
11/15/2004	8:25:46	1010.776	13.2	-0.384	1010.664	0.037
11/15/2004	8:55:46	1040.776	13.2	-0.395	1040.664	0.026
11/15/2004	9:25:46	1070.776	13.2	-0.401	1070.664	0.02
11/15/2004	9:55:46	1100.776	13.2	-0.407	1100.664	0.014
11/15/2004	10:25:46	1130.776	13.21	-0.413	1130.664	0.008
11/15/2004	10:55:46	1160.776	13.2	-0.421	1160.664	0

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	Crane SWMU13/16
Project No.:	N7448
Method of Inducing Water Level Change:	Solid Slug
Reference Pt (Top of Casing, Transducer, etc):	TOC
Test Type (Rising Head / Falling Head):	Falling Head

Well / Boring No.:	**13MWT51**
Test No.:	**1**
Date:	**12/29/2004**
Geologist:	Colin Doolan
Checked by / Date:	SWM / 12-30-04

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.0833
Screened / Monitored Interval Below Water Table, L (ft):	10
Static Water Level (Depth/ Elevation) (ft.):	3.77
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0.00	2.48	0.00	-2.48	1.00	0.0000	0.00
x	0.03	1.27	0.00			0.0000	
	0.06	1.52	0.06	-1.52	0.61	-0.4866	-0.11
	0.10	1.41	0.10	-1.41	0.57	-0.5652	-0.20
	0.15	1.27	0.15	-1.27	0.51	-0.6716	-0.31
	0.23	1.09	0.23	-1.09	0.44	-0.8177	-0.47
	0.33	0.90	0.33	-0.90	0.36	-1.0087	-0.67
	0.45	0.71	0.45	-0.71	0.29	-1.2505	-0.94
	0.63	0.51	0.63	-0.51	0.21	-1.5722	-1.29
	0.86	0.34	0.86	-0.34	0.14	-1.9855	-1.77
x	1.17	0.21	0.00			0.0000	
x	1.58	0.13	0.00			0.0000	
x	2.14	0.09	0.00			0.0000	
x	2.88	0.06	0.00			0.0000	
x	3.88	0.04	0.00			0.0000	
x	5.20	0.03	0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	
			0.00			0.0000	

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWTS1

PROJECT NO.: N7448 GEOLOGIST: CONTI

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 17.80 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 3.77' TPVC DATE: 11-14-04

TEST TYPE (Rising/Falling/Constant Head): FALLING CHECKED:

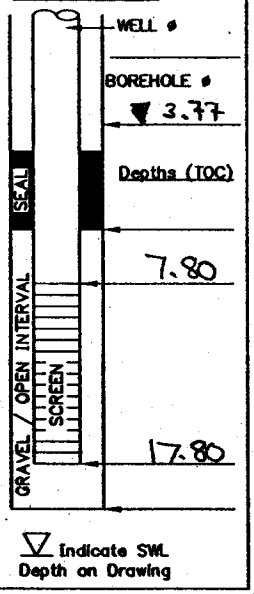
METHOD OF INDUCING WATER LEVEL CHANGE: 2 SECTION SLUG 3.2' LONG PAGE 1 OF 2

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

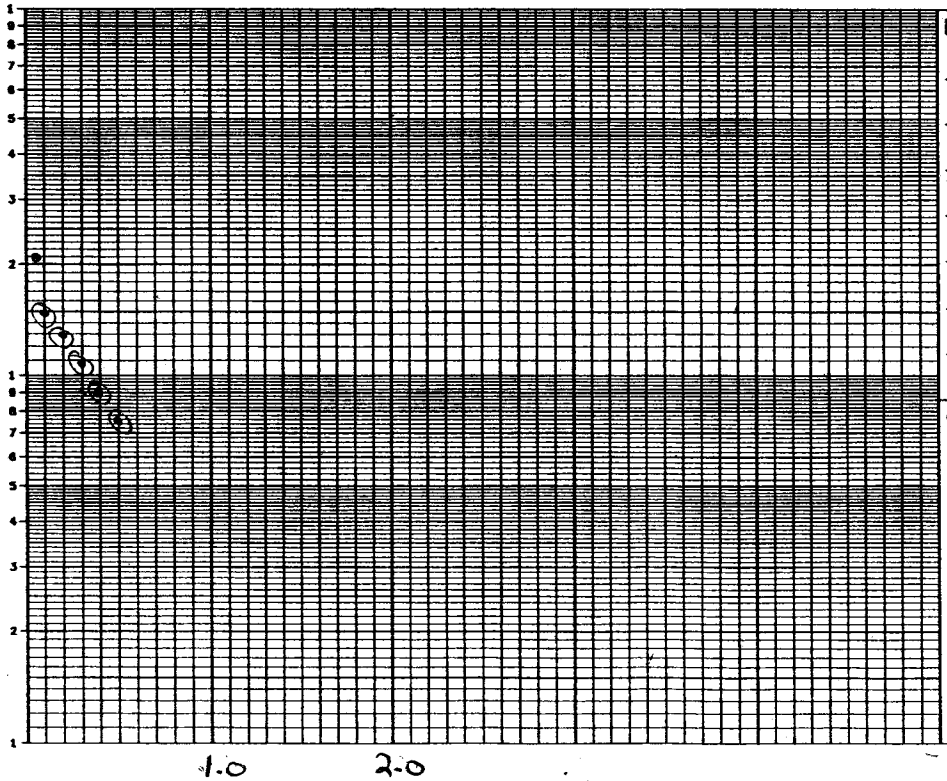
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
:06	2.10				
:10	1.48				
:20	1.32				
:30	1.09				
:40	.90				
:50	.75				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

FALLING

CALCS,SKETCH MAPS, ETC.:

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	9
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	-2.060
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	-0.288
Actual Y-intercept is set to 0.	0.000
T_0 (min):	0.486
K (ft/min):	3.42E-03
K (ft/day):	**4.927**

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum (x^2)) - (\sum x)^2}$$

$$b = \frac{(\sum y)(\sum (x^2)) - (\sum x)(\sum xy)}{n(\sum (x^2)) - (\sum x)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

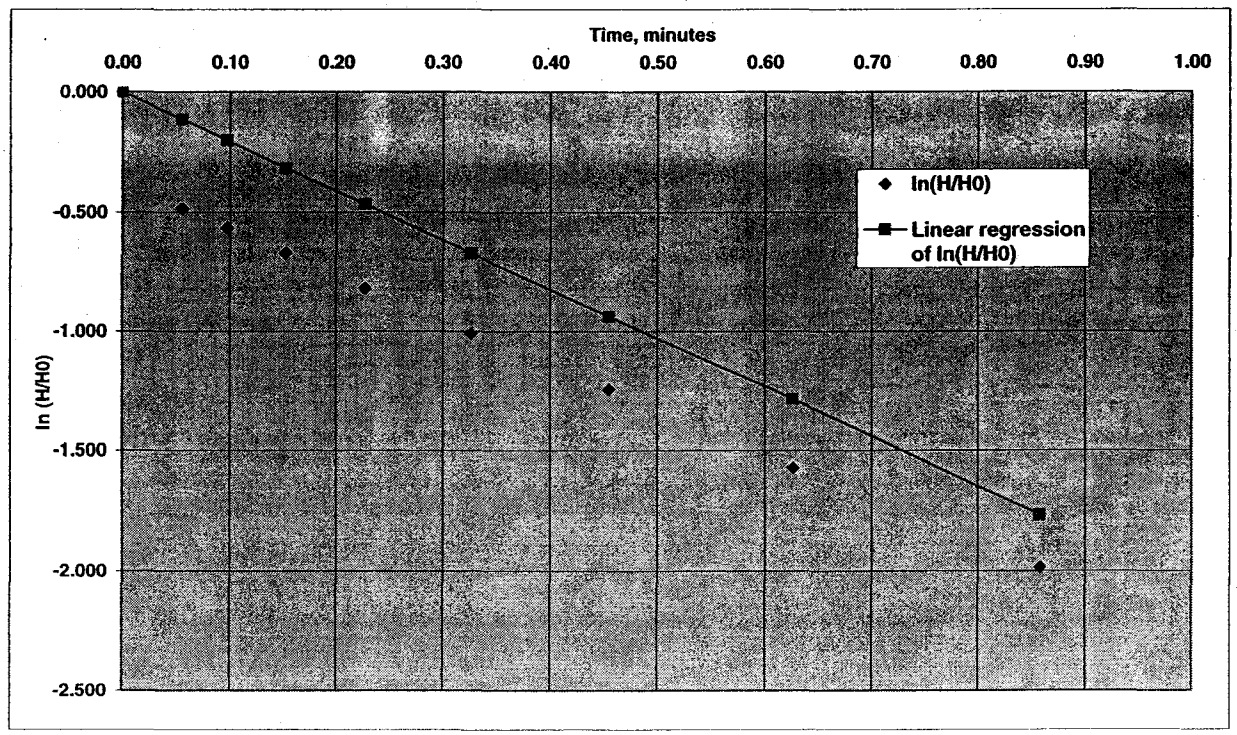
T_0: Time at which ln(H/H0)=-1

$K = r^2 * \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

In-Situ Inc. MiniTroll Pro

Report gener 11/14/2004 13:48:50
Report from I...\SN08927 2004-11-14 134200 13WT51-F.bin
Win-Situ Ver 4.47

Serial numbe 8927
Firmware Ve 3.09
Unit name:

Test name: 13WT51-F

Test defined 11/14/2004 13:40:10
Test schedul 11/14/2004 13:42:00
Test started 11/14/2004 13:42:00
Test stopped 11/14/2004 13:48:11
Test extracte N/A N/A

Data gathered using Logarithmic testing
Maximum t Minutes.
Number of 92

TOTAL DAT/ 92

Channel number [1]
Measureme Temperature
Channel name:

Channel number [2]
Measureme Pressure
Channel name:
Sensor Ran 30 PSIG.
Specific gra 1
Mode: Surface
User-define 0 Feet H2O
Referenced test start
Pressure he 9.427 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O		Adjusted ET (min)	Feet H2O
11/14/2004	13:42:00	0	14.5	0			
11/14/2004	13:42:00	0.005	14.51	0			
11/14/2004	13:42:00	0.01	14.51	0.002			
11/14/2004	13:42:00	0.015	14.52	0.002			
11/14/2004	13:42:01	0.02	14.52	0.004			
11/14/2004	13:42:01	0.025	14.52	0.002			
11/14/2004	13:42:01	0.03	14.54	0.003			
11/14/2004	13:42:02	0.035	14.52	0.004			
11/14/2004	13:42:02	0.04	14.54	0.003			
11/14/2004	13:42:02	0.045	14.54	0.125			
11/14/2004	13:42:03	0.05	14.54	1.097			
11/14/2004	13:42:03	0.055	14.54	1.911			
11/14/2004	13:42:03	0.06	14.54	2.112			
11/14/2004	13:42:03	0.065	14.54	2.304			
11/14/2004	13:42:04	0.07	14.54	2.476	T=0	0	2.476
11/14/2004	13:42:04	0.075	14.54	2.098		0.005	2.098
11/14/2004	13:42:04	0.08	14.55	1.757		0.01	1.757
11/14/2004	13:42:05	0.085	14.54	1.84		0.015	1.84
11/14/2004	13:42:05	0.09	14.54	1.508		0.02	1.508
11/14/2004	13:42:05	0.095	14.55	1.271		0.025	1.271
11/14/2004	13:42:06	0.1	14.54	1.476		0.03	1.476
11/14/2004	13:42:06	0.1058	14.55	1.788		0.0358	1.788
11/14/2004	13:42:06	0.112	14.55	1.674		0.042	1.674
11/14/2004	13:42:07	0.1185	14.55	1.464		0.0485	1.464
11/14/2004	13:42:07	0.1255	14.55	1.522		0.0555	1.522

11/14/2004	13:42:07	0.1328	14.55	1.577	0.0628	1.577
11/14/2004	13:42:08	0.1407	14.55	1.476	0.0707	1.476
11/14/2004	13:42:08	0.149	14.55	1.459	0.079	1.459
11/14/2004	13:42:09	0.1578	14.55	1.459	0.0878	1.459
11/14/2004	13:42:10	0.1672	14.55	1.407	0.0972	1.407
11/14/2004	13:42:10	0.177	14.54	1.391	0.107	1.391
11/14/2004	13:42:11	0.1875	14.54	1.358	0.1175	1.358
11/14/2004	13:42:11	0.1985	14.54	1.328	0.1285	1.328
11/14/2004	13:42:12	0.2102	14.54	1.298	0.1402	1.298
11/14/2004	13:42:13	0.2227	14.54	1.265	0.1527	1.265
11/14/2004	13:42:14	0.2358	14.54	1.233	0.1658	1.233
11/14/2004	13:42:15	0.2498	14.54	1.2	0.1798	1.2
11/14/2004	13:42:15	0.2647	14.54	1.164	0.1947	1.164
11/14/2004	13:42:16	0.2803	14.54	1.13	0.2103	1.13
11/14/2004	13:42:17	0.297	14.54	1.093	0.227	1.093
11/14/2004	13:42:18	0.3147	14.54	1.057	0.2447	1.057
11/14/2004	13:42:20	0.3333	14.54	1.02	0.2633	1.02
11/14/2004	13:42:21	0.3532	14.54	0.982	0.2832	0.982
11/14/2004	13:42:22	0.3742	14.54	0.943	0.3042	0.943
11/14/2004	13:42:23	0.3963	14.54	0.903	0.3263	0.903
11/14/2004	13:42:25	0.4198	14.54	0.862	0.3498	0.862
11/14/2004	13:42:26	0.4447	14.54	0.824	0.3747	0.824
11/14/2004	13:42:28	0.4697	14.54	0.785	0.3997	0.785
11/14/2004	13:42:29	0.4963	14.52	0.747	0.4263	0.747
11/14/2004	13:42:31	0.5247	14.52	0.709	0.4547	0.709
11/14/2004	13:42:33	0.5547	14.54	0.67	0.4847	0.67
11/14/2004	13:42:35	0.5863	14.54	0.629	0.5163	0.629
11/14/2004	13:42:37	0.6213	14.54	0.591	0.5513	0.591
11/14/2004	13:42:39	0.658	14.52	0.553	0.588	0.553
11/14/2004	13:42:41	0.6963	14.54	0.514	0.6263	0.514
11/14/2004	13:42:44	0.738	14.52	0.476	0.668	0.476
11/14/2004	13:42:46	0.7813	14.52	0.441	0.7113	0.441
11/14/2004	13:42:49	0.828	14.52	0.405	0.758	0.405
11/14/2004	13:42:52	0.8763	14.52	0.372	0.8063	0.372
11/14/2004	13:42:55	0.928	14.52	0.34	0.858	0.34
11/14/2004	13:42:58	0.983	14.52	0.31	0.913	0.31
11/14/2004	13:43:02	1.0413	14.52	0.281	0.9713	0.281
11/14/2004	13:43:06	1.103	14.52	0.255	1.033	0.255
11/14/2004	13:43:10	1.168	14.52	0.231	1.098	0.231
11/14/2004	13:43:14	1.238	14.52	0.21	1.168	0.21
11/14/2004	13:43:18	1.3113	14.52	0.19	1.2413	0.19
11/14/2004	13:43:23	1.3897	14.52	0.172	1.3197	0.172
11/14/2004	13:43:28	1.473	14.52	0.156	1.403	0.156
11/14/2004	13:43:33	1.5613	14.52	0.141	1.4913	0.141
11/14/2004	13:43:39	1.6547	14.52	0.131	1.5847	0.131
11/14/2004	13:43:45	1.753	14.52	0.121	1.683	0.121
11/14/2004	13:43:51	1.858	14.52	0.109	1.788	0.109
11/14/2004	13:43:58	1.968	14.51	0.101	1.898	0.101
11/14/2004	13:44:05	2.0847	14.51	0.093	2.0147	0.093
11/14/2004	13:44:12	2.2097	14.51	0.087	2.1397	0.087
11/14/2004	13:44:20	2.3413	14.51	0.081	2.2713	0.081
11/14/2004	13:44:28	2.4813	14.51	0.075	2.4113	0.075
11/14/2004	13:44:37	2.6297	14.5	0.071	2.5597	0.071
11/14/2004	13:44:47	2.7863	14.5	0.065	2.7163	0.065
11/14/2004	13:44:57	2.953	14.5	0.061	2.883	0.061
11/14/2004	13:45:07	3.1297	14.5	0.057	3.0597	0.057
11/14/2004	13:45:18	3.3163	14.48	0.051	3.2463	0.051
11/14/2004	13:45:30	3.5147	14.48	0.049	3.4447	0.049
11/14/2004	13:45:43	3.7247	14.48	0.047	3.6547	0.047
11/14/2004	13:45:56	3.9463	14.48	0.043	3.8763	0.043
11/14/2004	13:46:10	4.1813	14.48	0.041	4.1113	0.041
11/14/2004	13:46:25	4.4297	14.5	0.038	4.3597	0.038
11/14/2004	13:46:41	4.693	14.5	0.038	4.623	0.038
11/14/2004	13:46:58	4.973	14.5	0.036	4.903	0.036
11/14/2004	13:47:16	5.2697	14.5	0.034	5.1997	0.034
11/14/2004	13:47:34	5.583	14.51	0.032	5.513	0.032
11/14/2004	13:47:54	5.9147	14.51	0.03	5.8447	0.03

HYDRAULIC CONDUCTIVITY TEST DATA / CALCULATIONS

Note: Yellow cells are input cells, blue cells are automatically calculated

Project Name:	Crane SWMU13/16
Project No.:	N7448
Method of Inducing Water Level Change:	Solid Slug
Reference Pt (Top of Casing, Transducer, etc):	TPVC
Test Type (Rising Head / Falling Head):	Rising Head

Well / Boring No.:	**13MWT51**
Test No.:	**2**
Date:	**12/30/2004**
Geologist:	Colin Doolan
Checked by / Date:	SWR / 1-3-05

Well Radius, r (ft.):	0.0833
Radius of Sand/Gravel Pack Interval, R (ft):	0.0833
Screened / Monitored Interval Below Water Table, L (ft):	10
Static Water Level (Depth/ Elevation) (ft.):	3.77
Baseline Reading for Test Data (SWL, Transducer Reading, etc):	0.00

TEST DATA

Note: To exclude a data point from the regression, place an "x" in the "exclude" column / data point's row. The first row cannot be excluded.

Exclude	Elapsed Time (min)	Measured Water Level (feet)	Elapsed Time (min)	Drawdown or Head (H) (feet)	H/H_0	$\ln(H/H_0)$	Linear Regression of ln(H/H0) (b=0)
	0.00	1.68	0.00	-1.68	1.00	0.0000	0.00
	0.02	1.65	0.02	-1.65	0.98	-0.0168	-0.02
	0.04	1.52	0.04	-1.52	0.91	-0.0975	-0.06
	0.06	1.46	0.06	-1.46	0.87	-0.1383	-0.09
	0.09	1.39	0.09	-1.39	0.83	-0.1866	-0.14
	0.12	1.32	0.12	-1.32	0.78	-0.2450	-0.19
	0.16	1.23	0.16	-1.23	0.73	-0.3150	-0.25
	0.21	1.13	0.21	-1.13	0.67	-0.3939	-0.32
	0.26	1.03	0.26	-1.03	0.61	-0.4873	-0.41
	0.33	0.92	0.33	-0.92	0.55	-0.5978	-0.51
	0.41	0.82	0.41	-0.82	0.49	-0.7234	-0.63
	0.50	0.71	0.50	-0.71	0.42	-0.8684	-0.77
	0.61	0.59	0.61	-0.59	0.35	-1.0397	-0.94
	0.74	0.49	0.74	-0.49	0.29	-1.2424	-1.15
	0.89	0.39	0.89	-0.39	0.23	-1.4681	-1.39
	1.08	0.30	1.08	-0.30	0.18	-1.7228	-1.68
	1.30	0.23	1.30	-0.23	0.14	-2.0016	-2.03
x	1.56	0.17	0.00			0.0000	
x	1.88	0.13	0.00			0.0000	
x	2.25	0.10	0.00			0.0000	
x	2.6963	0.079	0.00			0.0000	
x	3.2263	0.065	0.00			0.0000	
x	3.8563	0.059	0.00			0.0000	
x	4.603	0.05	0.00			0.0000	
x	5.493	0.047	0.00			0.0000	
			0.00			0.0000	

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: NSWC CRANE WELL/BORING NO.: 13MWT51

PROJECT NO.: N7448 GEOLOGIST: CONTI

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/17.80 TEST NO.: 2

STATIC WATER LEVEL (Depth/Elevation): 3.77 TPVC DATE: 11-14-04

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

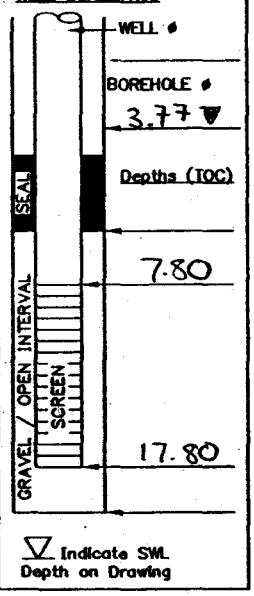
METHOD OF INDUCING WATER LEVEL CHANGE: 2 SECT SLUG 3.2'L PAGE 2 OF 2

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TPVC

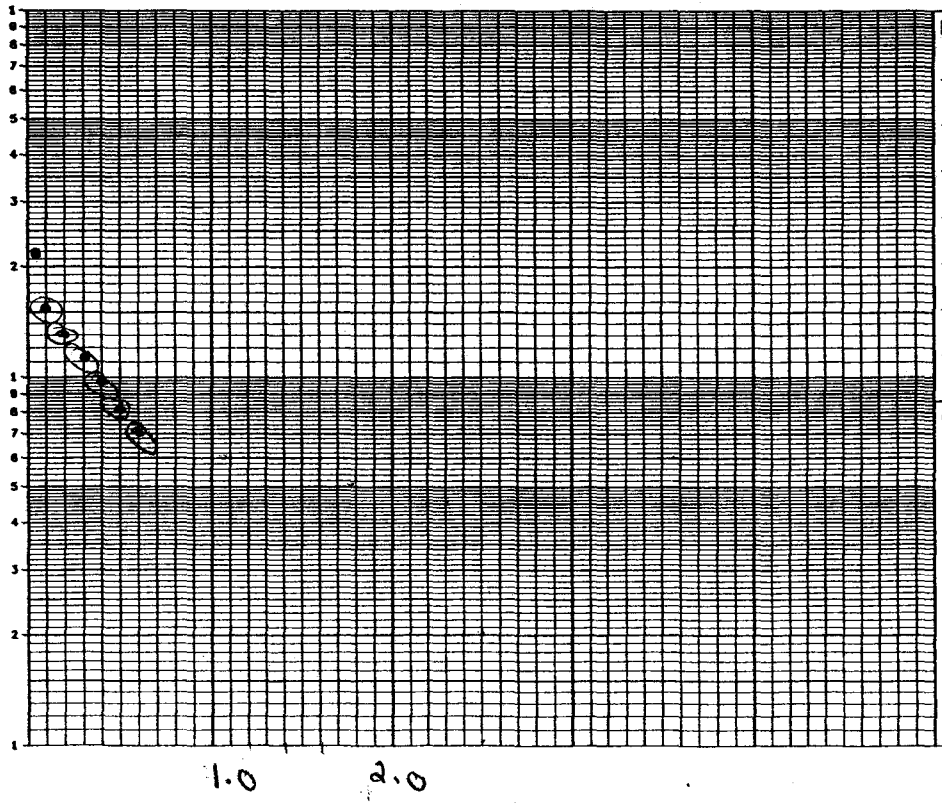
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
.055	2.30				
.08	1.86				
.10	1.56				
.20	1.34				
.30	1.13				
.40	.96				
.50	.82				
.60	.70				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

RISING

CALCS, SKETCH MAPS, ETC.:

CALCULATION OF HYDRAULIC CONDUCTIVITY (K)[1]

Number of data points in the slug test:	17
Slope of the line that linearly approximates ln(h/h0) (m in y=mx+b):	-1.558
Y-intercept of the line that linearly approximates ln(h/h0) (b in y=mx+b):	-0.056
Actual Y-intercept is set to 0.	0.000
T_0 (min):	0.642
K (ft/min):	2.59E-03
K (ft/day):	**3.727**

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum (x^2)) - (\sum x)^2}$$

$$b = \frac{(\sum y)(\sum (x^2)) - (\sum x)(\sum xy)}{n(\sum (x^2)) - (\sum x)^2}$$

n: Number of data points. x: Elapsed time point. y: ln(H/H0) point

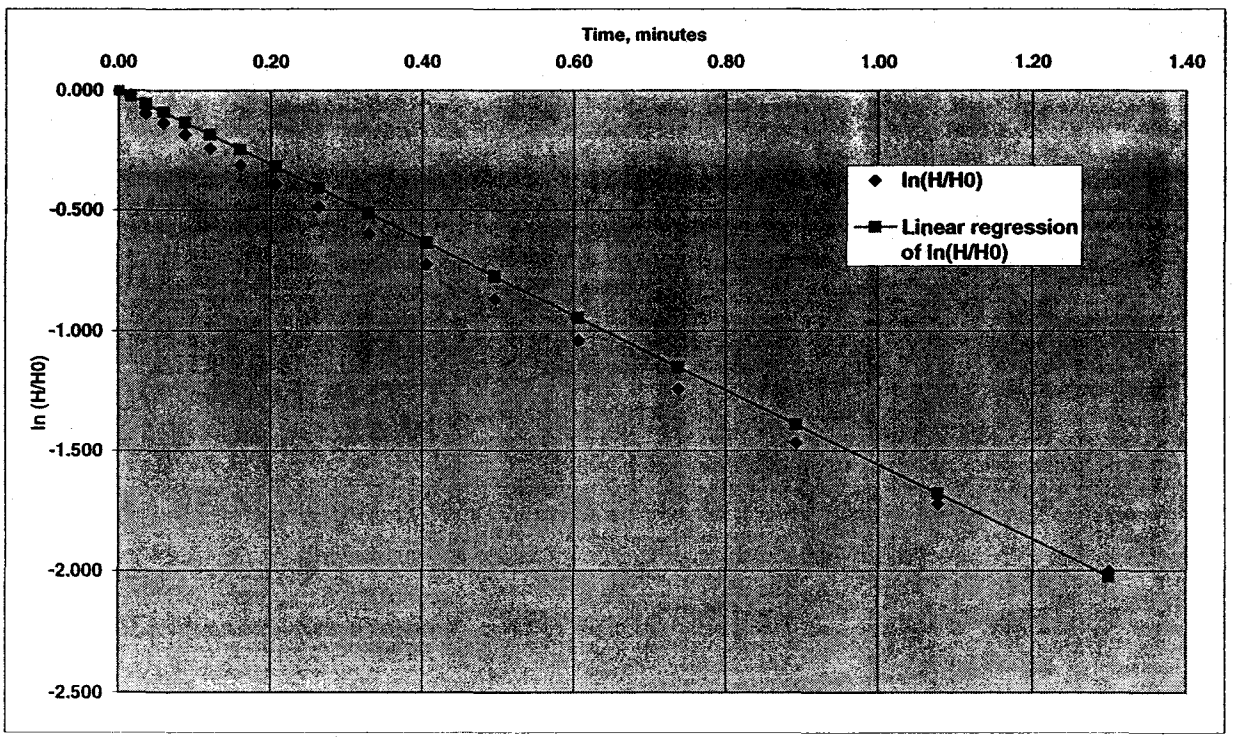
T_0: Time at which ln(H/H0)=-1

$K = r^2 \ln(L/R)/(2LT_0)$

L: Screened/monitored interval below water table (ft)

r: Well radius (ft)

R: Gravel pack radius (ft)



1. HVORSLEV, M.J. 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Arrmy Corps of Engineers. Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

In-Situ Inc. MiniTroll Pro

Report generated: 11/14/2004 13:38:14
Report from file: ...\SN08927 2004-11-14 133000 3MW51-R.bin
Win-Situ Version 4.47

Serial number: 8927
Firmware Version 3.09
Unit name:

Test name: 3MW51-R

Test defined on: 11/14/2004 13:24:53
Test scheduled for: 11/14/2004 13:30:00
Test started on: 11/14/2004 13:30:00
Test stopped on: 11/14/2004 13:36:26
Test extracted on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between data points: Minutes.
Number of data samples: 93

TOTAL DATA SAMPLES 93

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name:
Sensor Range: 30 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 9.465 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O		Adjusted ET (min)	Adjusted Feet H2O
11/14/2004	13:30:00	0	14.52	0			
11/14/2004	13:30:00	0.005	14.54	0			
11/14/2004	13:30:00	0.01	14.54	0			
11/14/2004	13:30:00	0.015	14.55	0.002			
11/14/2004	13:30:01	0.02	14.55	0.002			
11/14/2004	13:30:01	0.025	14.55	0.002			
11/14/2004	13:30:01	0.03	14.55	0.002			
11/14/2004	13:30:02	0.035	14.55	0.002			
11/14/2004	13:30:02	0.04	14.56	-0.766			
11/14/2004	13:30:02	0.045	14.56	-2.796			
11/14/2004	13:30:03	0.05	14.56	-1.121			
11/14/2004	13:30:03	0.055	14.56	-2.33			
11/14/2004	13:30:03	0.06	14.56	-1.591			
11/14/2004	13:30:03	0.065	14.56	-1.777			
11/14/2004	13:30:04	0.07	14.56	-1.885			
11/14/2004	13:30:04	0.075	14.56	-1.528			
11/14/2004	13:30:04	0.08	14.56	-1.86			
11/14/2004	13:30:05	0.085	14.56	-1.587			
11/14/2004	13:30:05	0.09	14.56	-1.68	T=0	0	1.68
11/14/2004	13:30:05	0.095	14.56	-1.674		0.005	1.674
11/14/2004	13:30:06	0.1	14.56	-1.565		0.01	1.565
11/14/2004	13:30:06	0.1058	14.56	-1.652		0.0158	1.652
11/14/2004	13:30:06	0.112	14.56	-1.544		0.022	1.544
11/14/2004	13:30:07	0.1185	14.57	-1.589		0.0285	1.589
11/14/2004	13:30:07	0.1255	14.56	-1.524		0.0355	1.524

11/14/2004	13:30:07	0.1328	14.57	-1.52	0.0428	1.52
11/14/2004	13:30:08	0.1407	14.56	-1.5	0.0507	1.5
11/14/2004	13:30:08	0.149	14.57	-1.463	0.059	1.463
11/14/2004	13:30:09	0.1578	14.57	-1.445	0.0678	1.445
11/14/2004	13:30:10	0.1672	14.56	-1.423	0.0772	1.423
11/14/2004	13:30:10	0.177	14.56	-1.394	0.087	1.394
11/14/2004	13:30:11	0.1875	14.56	-1.368	0.0975	1.368
11/14/2004	13:30:11	0.1985	14.56	-1.342	0.1085	1.342
11/14/2004	13:30:12	0.2102	14.56	-1.315	0.1202	1.315
11/14/2004	13:30:13	0.2227	14.56	-1.287	0.1327	1.287
11/14/2004	13:30:14	0.2358	14.56	-1.259	0.1458	1.259
11/14/2004	13:30:15	0.2498	14.56	-1.226	0.1598	1.226
11/14/2004	13:30:15	0.2647	14.55	-1.198	0.1747	1.198
11/14/2004	13:30:16	0.2803	14.56	-1.165	0.1903	1.165
11/14/2004	13:30:17	0.297	14.55	-1.133	0.207	1.133
11/14/2004	13:30:18	0.3147	14.55	-1.1	0.2247	1.1
11/14/2004	13:30:20	0.3333	14.55	-1.066	0.2433	1.066
11/14/2004	13:30:21	0.3532	14.55	-1.032	0.2632	1.032
11/14/2004	13:30:22	0.3742	14.55	-0.995	0.2842	0.995
11/14/2004	13:30:23	0.3963	14.55	-0.961	0.3063	0.961
11/14/2004	13:30:25	0.4198	14.55	-0.924	0.3298	0.924
11/14/2004	13:30:26	0.4447	14.55	-0.888	0.3547	0.888
11/14/2004	13:30:28	0.4697	14.55	-0.851	0.3797	0.851
11/14/2004	13:30:29	0.4963	14.55	-0.815	0.4063	0.815
11/14/2004	13:30:31	0.5247	14.55	-0.778	0.4347	0.778
11/14/2004	13:30:33	0.5547	14.55	-0.742	0.4647	0.742
11/14/2004	13:30:35	0.5863	14.55	-0.705	0.4963	0.705
11/14/2004	13:30:37	0.6213	14.55	-0.669	0.5313	0.669
11/14/2004	13:30:39	0.658	14.55	-0.63	0.568	0.63
11/14/2004	13:30:41	0.6963	14.55	-0.594	0.6063	0.594
11/14/2004	13:30:44	0.738	14.55	-0.557	0.648	0.557
11/14/2004	13:30:46	0.7813	14.55	-0.521	0.6913	0.521
11/14/2004	13:30:49	0.828	14.55	-0.485	0.738	0.485
11/14/2004	13:30:52	0.8763	14.55	-0.45	0.7863	0.45
11/14/2004	13:30:55	0.928	14.55	-0.42	0.838	0.42
11/14/2004	13:30:58	0.983	14.55	-0.387	0.893	0.387
11/14/2004	13:31:02	1.0413	14.55	-0.357	0.9513	0.357
11/14/2004	13:31:06	1.103	14.55	-0.327	1.013	0.327
11/14/2004	13:31:10	1.168	14.55	-0.3	1.078	0.3
11/14/2004	13:31:14	1.238	14.55	-0.274	1.148	0.274
11/14/2004	13:31:18	1.3113	14.55	-0.25	1.2213	0.25
11/14/2004	13:31:23	1.3897	14.55	-0.227	1.2997	0.227
11/14/2004	13:31:28	1.473	14.55	-0.207	1.383	0.207
11/14/2004	13:31:33	1.5613	14.55	-0.189	1.4713	0.189
11/14/2004	13:31:39	1.6547	14.55	-0.173	1.5647	0.173
11/14/2004	13:31:45	1.753	14.55	-0.156	1.663	0.156
11/14/2004	13:31:51	1.858	14.55	-0.142	1.768	0.142
11/14/2004	13:31:58	1.968	14.55	-0.13	1.878	0.13
11/14/2004	13:32:05	2.0847	14.55	-0.118	1.9947	0.118
11/14/2004	13:32:12	2.2097	14.55	-0.108	2.1197	0.108
11/14/2004	13:32:20	2.3413	14.55	-0.1	2.2513	0.1
11/14/2004	13:32:28	2.4813	14.54	-0.091	2.3913	0.091
11/14/2004	13:32:37	2.6297	14.54	-0.083	2.5397	0.083
11/14/2004	13:32:47	2.7863	14.54	-0.079	2.6963	0.079
11/14/2004	13:32:57	2.953	14.54	-0.075	2.863	0.075
11/14/2004	13:33:07	3.1297	14.54	-0.069	3.0397	0.069
11/14/2004	13:33:18	3.3163	14.54	-0.065	3.2263	0.065
11/14/2004	13:33:30	3.5147	14.54	-0.063	3.4247	0.063
11/14/2004	13:33:43	3.7247	14.52	-0.061	3.6347	0.061
11/14/2004	13:33:56	3.9463	14.52	-0.059	3.8563	0.059
11/14/2004	13:34:10	4.1813	14.51	-0.057	4.0913	0.057
11/14/2004	13:34:25	4.4297	14.51	-0.052	4.3397	0.052
11/14/2004	13:34:41	4.693	14.51	-0.05	4.603	0.05
11/14/2004	13:34:58	4.973	14.52	-0.049	4.883	0.049
11/14/2004	13:35:16	5.2697	14.52	-0.049	5.1797	0.049
11/14/2004	13:35:34	5.583	14.54	-0.047	5.493	0.047
11/14/2004	13:35:54	5.9147	14.54	-0.045	5.8247	0.045
11/14/2004	13:36:15	6.2663	14.55	-0.043	6.1763	0.043

APPENDIX E.2
SWMU 13
HYDRAULIC GRADIENT AND GROUND WATER VELOCITY CALCULATIONS

CLIENT	JOB NUMBER
NSWC CRANE	9060
SUBJECT: GW FLOW GRADIENTS AND SEEPAGE VELOCITY - SWMU 13	
BASED ON	DRAWING NUMBER
BY: FWR / CHECKED BY: FCW	APPROVED BY / DATE

SEEPAGE VELOCITY (V_s) - SOUTHWESTERN PORTION OF SWMU 13
SHALLOW BEDROCK

$$\text{GRADIENT } (i) = \left[\left(\frac{20}{390}\right) + \left(\frac{5}{65}\right) + \left(\frac{15}{70}\right) + \left(\frac{5}{160}\right)\right] \cdot \frac{1}{4}$$

$i = 0.094$ ✓

$K = 0.212$ ft/day (from table 1-2 AVE. K SWMU 13)

$n = 0.005$ (ASSUME FRACTURE VOLUME PER UNIT VOLUME OF BEDROCK)

$$V_s = Ki/n$$

$$= (0.212 \text{ ft/day})(0.094)/.005$$

$$= 3.99 \text{ ft/day}$$ ✓

EASTERN PORTION OF SWMU 13:

$$\text{GRADIENT } i = \left[\frac{5}{100} + \frac{5}{150} + \frac{5}{60} + \frac{5}{110} + \frac{5}{170} + \frac{5}{110}\right] \cdot \frac{1}{6}$$

$= 0.0478$ ✓

K, n AS ABOVE

$$V_s = (0.212 \text{ ft/day})(0.0478)/0.005$$

$V_s = 2.0$ ft/day ✓

CLIENT	JOB NUMBER
NSWC CRANE	9060

SUBJECT: GW FLOW GRADIENTS + SEEPAGE VELOCITY - SWMU 13

BASED ON | DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
FWR	FCW		

SEEPAGE VELOCITY (V_s)

DEEP BEDROCK

$$\text{GRADIENT}(i) = \left[\frac{5}{390} + \frac{5}{240} + \frac{5}{190} + \frac{5}{100} + \frac{5}{60}\right] \cdot \frac{1}{5}$$

$i = 0.0387$

$n = 0.005$

$K = 0.00896$ ft/day

$V = Ki/n$

$= (0.00896 \text{ ft/day})(0.0387)/0.005$

$V = 0.069$ ft/day

P:\GIS\CRANE_NSWC\MAPDOCS\APR\RFI_SWMU13&16.APR SWMU 13 SHALLOW CONTOUR LAYOUT 3/17/04 AJ

N

Unnamed Tributary to Boggs Creek

13MWT39 640.19
13MWT40 646.65
13MWT42 649.17
13MWT16 654.34
13MWT17 655.12
13SG09 671.15
13MWT27 688.82
13MWT09 697.13
13MWT21 694.62
13SG03 694.37
13MWT13 697.05
13SG04 686.54
13MWT47 669.91
13SG11 672.52
13MWT30 687.22
13MWT14 691.53
13SG06 * 702.53
13MWT19 694.86
13MWT33 691.34
13MWT31 685.56
13MWT32 686.52
13MWT37 647.92
13MWT23 681.65
13MWT34 690.51
13MWT18 682.71
13MWT36 647.95
13MWT22 669.78
13SG08 660.87
13MWT25 674.52
13MWT24 681.88
13SG07 678.83
13MWT20 697.07
13MWT23 692.64
13SG10 671.26
13MWT43 682.40
13MWT07 683.01
13MWT12 679.53
13MWT11 678.37
13MWT42 694.07
13MWT10 685.19
13SG01 696.58
13MWT15 688.43
13MWT08 696.66
13SG02 698.27
13MWT04 698.75
13MWT01 707.79
13MWT03 731.12
13MWT05 708.02
13MWT28 696.68

5/110 5/120 5/150 5/140 5/100 5/150 5/150 5/70 5/70 5/70 5/70

Shallow Monitoring Well with Ground Water Elevation in Feet Above Mean Sea Level
Staff Gauge with Ground Water Elevation in Feet Above Mean Sea Level
Flow Direction
Potentiometric Contour
Inferred Potentiometric Contour
SWMU Boundary
Road
Railroad
Wall
Fence
Vegetation
Stream
Topographic Contour
Building

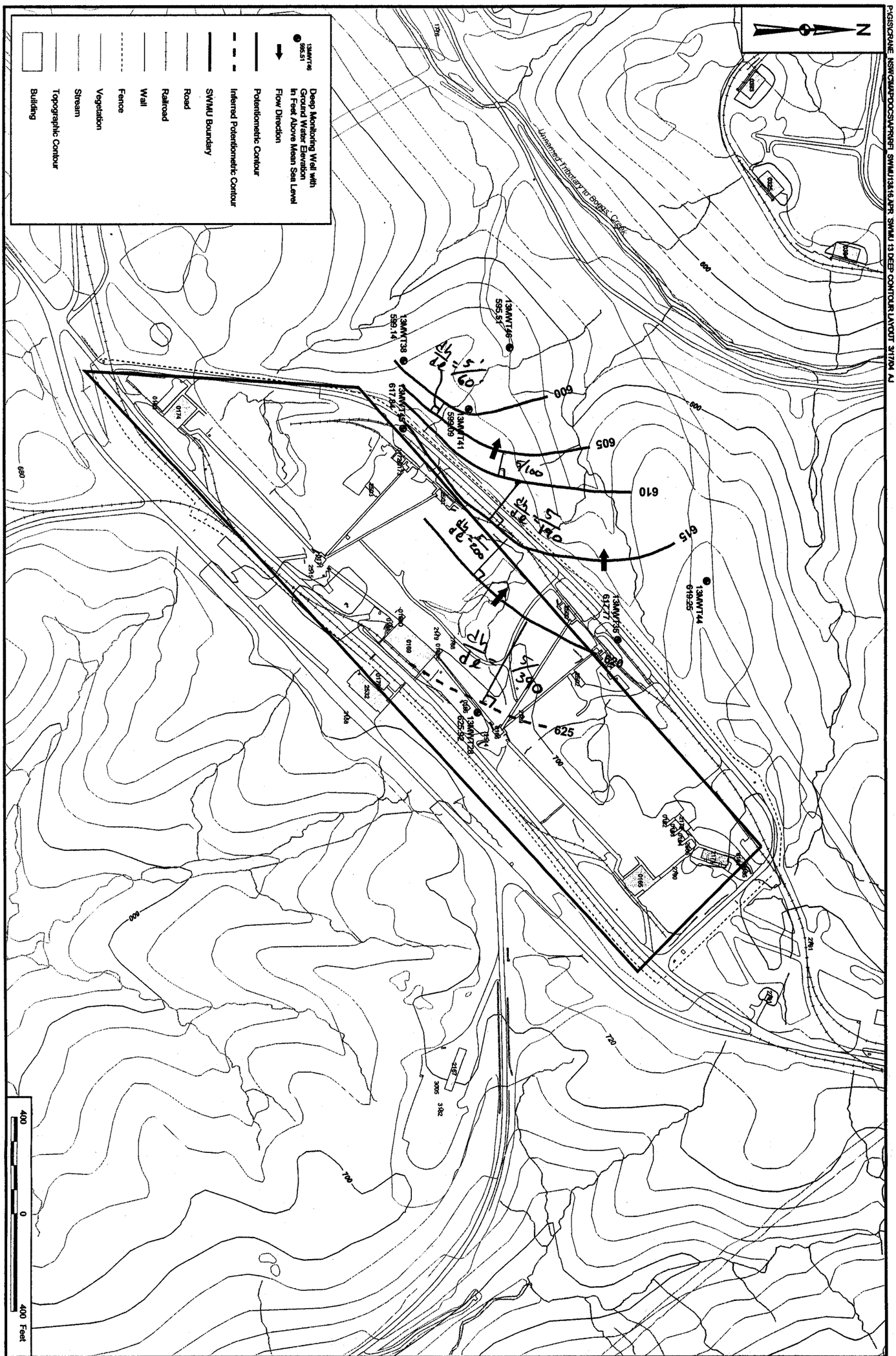
* Staff gauges 13SG01 and 13SG06 not used for contouring.

400 0 400 Feet

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR SHALLOW WELLS - JANUARY 24, 2004
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0279
APPROVED BY ___ DATE ___
APPROVED BY ___ DATE ___
DRAWING NO. FIGURE 1 - 12
REV 0

DRAWN BY A. JANOCHA DATE 2/23/04
CHECKED BY F. RAMSER DATE 3/17/04
COST/SCHED-AREA
SCALE AS NOTED



P:\GIS\CRANE_NSWC\MXD\DOCS\APR\RFI_SWMU13&16.APR SWMU 13 DEEP CONTOUR LAYOUT 3/17/04 AJ

DRAWN BY: A. JANOCHA	DATE: 2/23/04
CHECKED BY: F. RAMSER	DATE: 3/17/04
COST/SCHED-AREA	
SCALE: AS NOTED	

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR DEEP WELLS - JANUARY 24, 2004
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

CONTRACT NO. CTO 0279	
APPROVED BY ___	DATE ___
APPROVED BY ___	DATE ___
DRAWING NO. FIGURE 1 - 13	REV 0

APPENDIX F
SWMU 13
HEALTH AND SAFETY DOCUMENTATION
ROUND 1, ROUND 2, ROUND 3

APPENDIX F.1
SWMU 13
HEALTH AND SAFETY DOCUMENTATION
ROUND 1

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.11.1, C.11.2 & C.11.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
ROBERT BALKOVEC Robert Balkovec	3/24/03	11/1992	5/24/02	~~5/24/02~~	9/2001
MATT COLTRAN [signature]	3/24/03	5/1983	10/02	10/02	8/02
Chad Mahaffy Chad Mahaffy	3/24/03	10/02	12/02	12/02	8/29/02
Jon Keitz [signature]	3/24/03	6/1992	1/03	—	11/23/02
TONY MAYBERRY [signature]	3-24-03	6/2000	12/02 ~~1/03~~	12/02	3/28/02
Dave Schwarzkopf Dave Schmidt	3-24-03	8/90	1/03	12/02	11/23/02
Tim Bellinger [signature]	3-24-03	9/87	12/02	12/02	11/20/02
TERRY ROSACHU [signature]	3-24-03	10/05	1/03	1/03	11/15/02
Jeff S. Akers [signature]	3-25-03	9-87	12-02	12-02	11-23-02
DENNIS A. SINK [signature]	4-23-03	1-90	12-02	—	

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
Matt Cooper Matt Cooper	4/8/03	NA	Surveyor	→	→
Corey Allen Corey D. Allen	4/8/03	NA	Surveyor	→	→

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Jones M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Bob Balkovec

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 24, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Balkovec, Robert	**COMPANY:**	TT/NUS
SSN:	181-66-7235	**POSITION:**	Geologist
DATE OF EXAM:	07/15/2002	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	07/15/2003	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
3. ☐ **NOT QUALIFIED**
4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 07/22/02

Signature: Peter Wald

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**

EMPLOYEE:	**Cochran, Matt**	**COMPANY:**	**TT/NUS**
SSN:	**174-54-3686**	**POSITION:**	**Project Manager**
DATE OF EXAM:	**03/17/00**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**03/17/02**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/21/00

Signature: _____

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Matt Cochran

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 18, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

Mr. Gary G. Cochran

has successfully completed a course of instruction on

SUPERVISOR TRAINING CLASS

presented and conducted by the

NUS Corporation, Pittsburgh, Pennsylvania

May 9 thru 13, 1983

Date of Award

Gary F. Kadrich
Manager, Health & Safety

E. Dennis Escher, P.E.
General Manager

Medwork
Occupational Health Care
725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/13/02

To: _____

From: _____

Re: David Schreengost

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____. I HAVE REVIEWED THEIR MEDICAL HISTORY, THEIR CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Ken N Kuns
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Certificate of Training

This Document Certifies That

DAVID SCHRECENGOST

Has Successfully Completed The OSHA Required 40 Hour

HEALTH AND SAFETY TRAINING

Complying with OSHA STANDARD 29CFR 1910.120

INITIAL TRAINING

B. F. Stuart CSP

Course Director

EPT inc.

Environmental Protection Training, inc.

AUGUST 30, 1990

Date of Completion

001150

MAR. 18. 2003 10:31AM BOWSER MORNER NO. 2930 P. 3/29

MAR. 18. 2003 3:23PM BOWSER MORNER NO. 2958 P. 4

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

DAVE SCHRECENGOST

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 003

Br Bernt 23Dec02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 DR. 205
FINDLAY, OHIO 45840
419-427-0255

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/23/02

To: _____

From: _____

Re: Tom Reiter

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____ I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECER701-50.doc

MAR. 18. 2003 10:32AM BOWSER MORNER NO. 2930 P. 6/29

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JON KEIFER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

16TH DAY OF JANUARY 2003

TRAINING CERTIFICATE NO.

16JAN03 D13

Bud L Bernt — 1 Jan 03

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840

MAR. 18. 2003 10:33AM BOWSER MORNER NO. 2930 P. 7/29

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Jon Keifer

Has Completed

the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Forty (40) Hour Course
This 6th Day of June, 1992

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

S
M C
INC.

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
5082 Worley Road
Troy, Ohio 45373

COES 680-1/2

LITHO IN U.S.A.

12:27:2001

LAST NAME KEIFER
FIRST NAME JON

FIT TEST REPORT

Fit test information

ID NUMBER 269-52-9158
LAST NAME KEIFER
FIRST NAME JON
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/27/2001
TEST TIME 10:05
DUE DATE 12/27/2002

PORTACOUNT S/N 15561
N95 COMPANION N

RESPIRATOR
MANUFACTURER [illegible]
MODEL 4000 SERIES
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
[illegible]

PROTOCOL DEFAULT 29CFR1910.134
PASS LEVEL [illegible]

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12400	Y
DEEP BREATHING	60	19200	Y
TURN HEAD SIDE TO SIDE	60	49500	Y
[illegible]	60	34700	Y
TALKING	60	30600	Y
GRIMACE	60	6700	Y
BEND AND TOUCH TOES	60	12700	Y
NORMAL BREATHING	60	12900	Y

OVERALL FF [illegible] FACTOR [illegible] P

FIT TEST ADMINISTRATOR [signature] DATE 12-27-01
DIANE SNYDER

SUBJECT [signature] DATE 12-27-01
JON KEIFER

Medwork
Occupational Health Care

725 S. Ludlow Street. Dayton. Ohio 45402

Date: 11-13-02

To: _____

From: _____

Re: Jeff Bowser

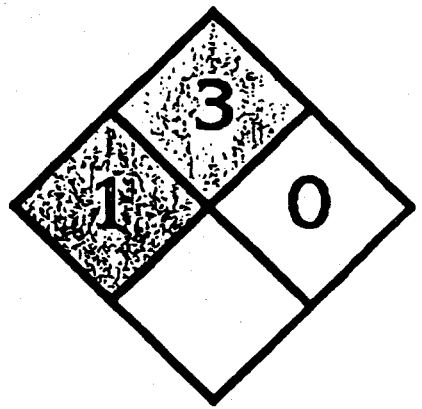
THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kenneth Thurman
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

NO. 2930 P. 10/29
MAR. 18. 2003 10:35AM BOWSER MORNER



Certificate of Completion

This Certifies That

JEFF AKERS

has completed the 40 *hour course:*

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Boldt
Training Director

NO. 2958 P. 3
MAR. 18. 2003 3:23PM BOWSER MORNER

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JEFF S. AKERS

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 005

Bl S Bernt — 23 Dec. 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14555 CR. 203
FINDLAY, OHIO 45840
419-427-0256

[illegible]

LAST NAME [illegible]
FIRST NAME [illegible]

[illegible]

[illegible]

ID NUMBER [illegible]
LAST NAME AKERS
FIRST NAME JEFF
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE [illegible]
TEST TIME [illegible]
DUE DATE [illegible]

PORTACOUNT S/N [illegible]
N95 COMPANION [illegible]

RESPIRATOR
MANUFACTURER [illegible]
MODEL [illegible]
MASK STYLE FULL FACE
MASK SIZE MED/LARGE
APPROVAL
[illegible]

PROTOCOL [illegible]
PASS LEVEL [illegible]

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	[illegible]	[illegible]	[illegible]
DEEP BREATHING	[illegible]	[illegible]	[illegible]
HEAD SIDE TO SIDE	[illegible]	[illegible]	
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	
GRIMACE	[illegible]	[illegible]	
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	

[illegible] [illegible]

[illegible]

[illegible]

[illegible]

Medwork

Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 8/20/02

To: _____

From: _____

Re: Chad Mcduffee

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 8-20-02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kenneth Hines MD

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

MAR. 18. 2003 10:36AM BOWSER MORNER NO. 2930 P. 14/29

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

CHAD MAHAFFY

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 021

Brad L Berndt — 23 Dec 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14695 CR. 205
FINDLAY, OHIO 45840
419-427-0326

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14633 County Road 205
Findlay, Ohio 45840

CERTIFIES
THAT

CHAD R. MAHAFFY

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE No: 020CT02 02

ON THE
2ND DAY OF OCTOBER 2002

Scott Berndt, CHMM — Date

12/27/2002

LAST NAME [illegible]
FIRST NAME [illegible]

[illegible]

ID NUMBER 22-76-2300
LAST NAME MAHAFFEY
FIRST NAME CLINT
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/27/2002
TEST TIME 11:30
DUE DATE 12/26/2003

PORTACOUNT S/N 4236
PRS COMPANION N

RESPIRATOR
MANUFACTURER SURVIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/LARGE
APPROVAL
EFF. < 25% N

PROTOCOL OSHA SUPPLEMENTAL
PASS LEVEL 100

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	[illegible]	[illegible]
DEEP BREATHING	30	[illegible]	[illegible]
HEAD SIDE TO SIDE	[illegible]	[illegible]	[illegible]
HEAD UP AND DOWN	[illegible]	[illegible]	[illegible]
TALKING	[illegible]	[illegible]	[illegible]
GRIMACE	[illegible]	[illegible]	[illegible]
BEND AND TOUCH TOES	[illegible]	[illegible]	[illegible]
NORMAL BREATHING	[illegible]	[illegible]	[illegible]

OVERALL FF [illegible]

FIT TEST OPERATOR [illegible]
PRINT NAME

NAME [illegible]
PASS [illegible]

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Anthony Mayer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 3-28-03. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X RAY~~, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

MAR. 18. 2003 10:36AM BOWSER MORNER NO. 2930 P. 18/29

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TONY MAYRER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 001

SCOTT BERNOT, CHMM — DATE 23 Dec. 02

OCCUPATIONAL HAZARD MANAGEMENT
14685 CR. 205
FINDLAY, OHIO 45840
419-427-0338

MAR. 18. 2003 10:36AM BOWSER MORNER NO. 2930 P. 19/29

Certificate of Completion

presented to

Anthony G. Mayrer

has completed

Hazardous Waste Operations and Emergency Response

40 Hour OSHA 29CFR 1910.120

Sinclair Community College

Presented by Franklin E. Clay
Chair, Safety Risk Management

Given this 16th day of June 2000

Instructor H. David Hylton

Certificate No.: SCC-HAZ-250

LAST NAME
FIRST NAME

ID NUMBER			
LAST NAME			
FIRST NAME			
COMPANY			
LOCATION			
NOTE			

TEST DATE	
TEST TIME	
DUE DATE	
PORTACOUNT S/N	
26 COMPANION	N

RESPIRATOR	
MANUFACTURER	
MODEL	
HEAD STYLE	FULL FACE
SIZE	
APPROVAL	
	N

PROTOCOL	
PASS LEVEL	

EXERCISE	DURATION (SEC)	EXERCISE	PASS
NORMAL BREATHING	30		
DEEP BREATHING	30		
HEAD SIDE TO SIDE	30		
HEAD UP AND DOWN	30		
TALKING	30		
GRIMACE	15		
BEND AND TOUCH TOES	30		
NORMAL BREATHING	30		

OVERALL

TEST OPERATOR

SIGNATURE

NAME

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Tim Bechner

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11/22/02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THEIR CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kevin Keene
PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECERT03-00.doc

MAR. 18. 2003 10:37AM BOWSER MORNER NO. 2930 P. 22/29

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TIM BOEHMER

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 006

Scott Bernot 23 Dec 02

SCOTT BERNOT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14858 CR. 508
FINDLAY, OHIO 45840
419-427-0258

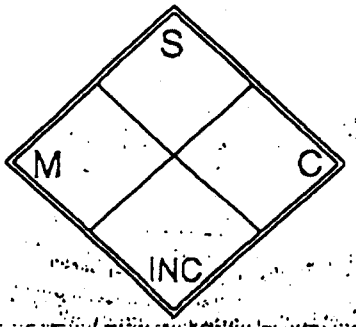
MAR. 18. 2003 10:37AM BOWSER MORNER NO. 2930 P. 23/29

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Tim Boehmer

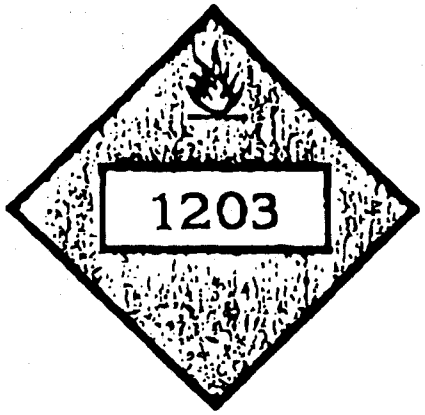
Has Completed
the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Eight (8) Hour Supervisors Course
This 5th Day of April, 1991.



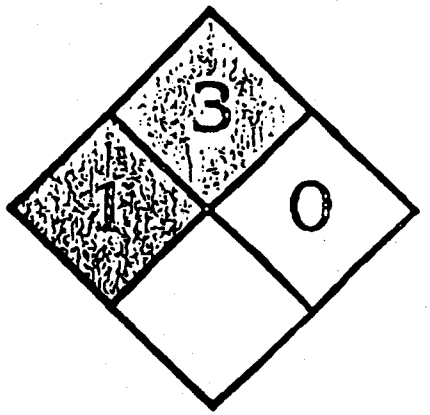
Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

NO. 2930 P. 24/29



Certificate of Completion



This Certifies That

TIM BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1997
Date

Pete Boldt
Training Director

MAR. 18. 2003 10:38AM BOWSER MORNER

Certificate of Completion

This is to certify that

TIM BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

122800002
Certificate Identification Number

Henry M. Butcher, REM, CEA

NO. 2930 P. 26/29

The State of Ohio
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene

TIM BOEHMER

has satisfactorily completed 6 hours

Teaching the Safe Operations of Powered Industrial Trucks

of _____

Sponsored By
BWC - Southwest Regional Office

Superintendent

April 11, 1995
Date

Bob Heater & Mona Weiss
Instructor

BWC-1580 (3/90)
CERT-6

MAR. 18. 2003 10:38AM BOWSER MORNER

MAR. 18. 2003 10:38AM BOWSER MORNER NO. 2930 P. 27/29

DUPONT

Certificate of Completion

this is to certify that

Tim Boehmer

has successfully completed the

DuPont Corporate Remediation Group

Training Program on

Safety Audit Skills

on this 30th day of November 1998

Lisa S. Edwin

Lisa S. Edwin, CSP

MAR. 18. 2003 10:39AM BOWSER MORNER NO. 2930 P. 28/29

CERTIFICATE OF ACHIEVEMENT

This certificate has been awarded by the Ohio Chamber of Commerce and the Manufacturers' Education Council to

TIM BOEHMER

For a demonstrated commitment to sound safety management practices.

Certified for the successful completion of all requirements in the OSHA Recordkeeping course conducted April 29, 1998 in Columbus, Ohio.

Andrew E. Doehrel

Andrew E. Doehrel, President
Ohio Chamber of Commerce, Columbus

Mark W. Ulber

Mark W. Ulber, President
Manufacturers' Education Council, Columbus

12/20/2002

LAST NAME GOERNER
FIRST NAME TIMOTHY

FIT TEST REPORT

For 3M Corporation

ID NUMBER 377-21-0552
LAST NAME GOERNER
FIRST NAME TIMOTHY
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/20/2002
TEST TIME 08:14
DUE DATE 12/20/2003

PORTACOUNT SN 0264
NBS COMPANION N

RESPIRATOR
MANUFACTURER SURVIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM/REG
APPROVAL
REF # 8514

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 100

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	1000	
DEEP BREATHING	60	1000	Y
HEAD SIDE TO SIDE	60	2000	
HEAD UP AND DOWN	60	2000	
TALKING	60	1000	Y
GRIMACE	15	2000	Y
BEND AND TOUCH TOES	60	1000	
NORMAL BREATHING	60	1000	Y

OVERALL FF 1000

FIT TEST OPERATOR ERIC HORSTMAN DATE 12/20/02

USER GOERNER DATE 12/20/02

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

DENNIS A. SINK

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 002

Bl Bernt — 23 Dec 02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14858 CR. 209
FINDLAY, OHIO 45840
419-427-0398

NO. 4299 P. 2
APR. 23. 2003 2:55PM BOWSER MORNER

Certificate of Completion

This Certifies That

DENNIS SINK

has completed the course

"FORTY HOUR PERSONNEL PROTECTION & SAFETY COURSE"

(In compliance with Federal Regulation 29 CFR 1910.120)

Presented by

SPRINGFIELD SAFETY COUNCIL 50 years

Providing you a . . . key to cost containment

January 29, 1990
Date

J.C. Schaffner
Director Marketing - Training

TETRA TECH NUS, INC.
661 Andersen Drive ▪ Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

PITT-03-3-038

March 21, 2003

Project Number 9060

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number [redacted]

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888 The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include DPT; drilling; and surface and subsurface soils, sediments, ground water, and surface water sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from March 24-May 31, 2003. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Mine Fill A, Mine Fill B, Cast High Explosive Fill/Incinerator, Pyrotechnic Test Area dated October 2002 prepared under CTO 0166. These individuals are as follows:

Bob Balkovec
Matt Cochran
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

APPENDIX F.2
SWMU 13
HEALTH AND SAFETY DOCUMENTATION
ROUND 2

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.11.1, C.11.2 & C.11.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
DENNIS A. SINK	10-21-03	1-90?	12-02		3-03
TIM BOEHMER	10-21-03	1-90	12-02	?	11-02
Todd Wollenhaupt	10-21-03	1-90	12-02		12-02
Jon Keifer	10-21-03	3-92	12-02		12-02
FRED CRAMSEK	10-21-03	7-91	5-03	5-03	12-03
FRANK GWOKWYCH	10-21-03	5-97	5-03	2-98	5-03
MATT COCHRAN	10-21-03	5-83	10-03		
TERRY ROSAMM	10-21-03	10-95	1-03	1-03	11-02
ALICK POST	10-24-03	4-15-94	12-23-02	12-23-02	10-10-03
Josh Deer	11-3-03	4-08	9-03		8-03

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
JAMES R WALSH	11-3-03	5/87	12/23/02		2/17/03
MAYNARD LAHTI	11-4-03	10/90	12/23/02		10/6/03
SCOTT GEIER	11/17/03	3/8/02	3/21/03		3/7/02
JIM GOERDT	11/17/03	8/91 40	10/10/03		11/11/03

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Jones M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	**Wudkwych, Frank**	**COMPANY:**	**TT/NUS**
SSN:	**181-64-7566**	**POSITION:**	**Geologist**
DATE OF EXAM:	**05/01/2003**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**05/01/2005**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

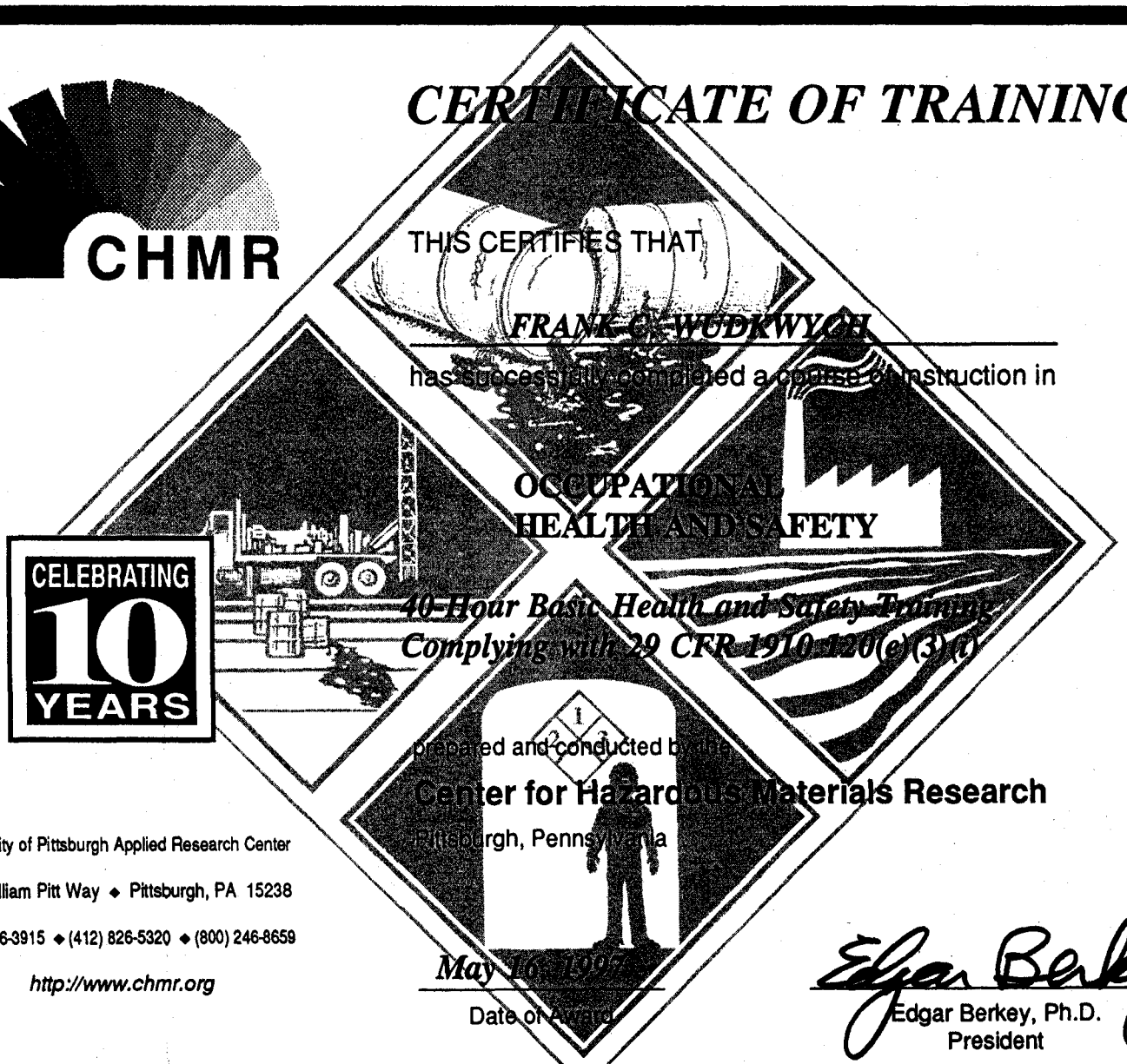
Name of Physician: Peter P. Greaney, M.D. Date: 05/06/03

Signature: Peter P Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

CERTIFICATE OF TRAINING

CHMR



THIS CERTIFIES THAT

FRANK C. WUDKWYCH

has successfully completed a course of instruction in

OCCUPATIONAL HEALTH AND SAFETY

40-Hour Basic Health and Safety Training
Complying with 29 CFR 1910.120(e)(3)(i)

prepared and conducted by the

Center for Hazardous Materials Research

Pittsburgh, Pennsylvania

CELEBRATING 10 YEARS

May 16, 1997

Date of Award

Edgar Berkey

Edgar Berkey, Ph.D.
President

University of Pittsburgh Applied Research Center

320 William Pitt Way ◆ Pittsburgh, PA 15238

(412) 826-3915 ◆ (412) 826-5320 ◆ (800) 246-8659

http://www.chmr.org

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Frank C. Wudkwych

has successfully completed a course of instruction in

HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE MANAGEMENT/SUPERVISOR TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

February 27, 1998

Date of Award

Clyde Snyder
Senior Instructor
Hazardous Materials Training

Matthew M. Soltis, CIH, CSP
Corporate Health and Safety
Manager

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Frank Wudkwych

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 23, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**

EMPLOYEE:	**Cochran, Matthew**	**COMPANY:**	**TT/NUS**
SSN:	**174-54-3686**	**POSITION:**	**Geologist**
DATE OF EXAM:	**03/01/2002**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**03/01/2004**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/07/02

Signature: Peter Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Matt Cochran

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

Michael G. Cochran

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

presented and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

May 9 thru 13, 1983

Date of Award

Gary J. Smith, CSP
Manager, Health & Safety

E. Dennis Escher, P.E.
General Manager

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Fred Ramser

Office Location: tetra tech

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134.

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: _____ M.D.

Date: 12-12-12

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Fred W. Ramser

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 23, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HALLIBURTON NUS
Environmental Corporation

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

FRED W. RAMSER

has successfully completed a 40 hour course of instruction in
OSHA 29 CFR 1910.120

HAZARDOUS WASTE HEALTH AND SAFETY TRAINING

prepared and conducted by the
HALLIBURTON NUS Environmental Corporation,
Pittsburgh, Pennsylvania

JULY 15 - 19, 1991
Date of Award

Dana R. Irvin
Principal Instructor, Project Manager
Environmental Management Group

James K. Laffey
Director, Hazardous Materials Training
Environmental Management Group

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**

EMPLOYEE:	**Goerdt, James**	**COMPANY:**	**TT/NUS**
SSN:	**481-86-2691**	**POSITION:**	**Environmental Scientist**
DATE OF EXAM:	**11/07/2003**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**11/07/2005**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy, MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

APPLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

OSHA, 1910.120 Hazardous Waste Operations and Emergency Response 40 Hour Course

ISSUE DATE: December 13, 1991

EXPIRATION: December 13, 1992

CERTIFICATE: HAZ9112001058

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

P. O. Box 300068
Fern Park, Florida 32730-0068

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Jim Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: **Baseline Examination**

EMPLOYEE:	**Grier, Scott**	**COMPANY:**	**TT/NUS**
SSN:	**209-56-9743**	**POSITION:**	**Earth Scientist**
DATE OF EXAM:	**02/28/2002**	**LOCATION:**	**TT/NUS-King Of Prussia**
EXPIRATION DATE:	**02/28/2004**	**SITE:**	**King Of Prussia**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 03/07/02

Signature: Peter Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

Compliance Solutions

"Today's Training...Tomorrow's Solution"

10515 E 40th Ave, Suite 116, Denver Colorado 80239 800-711-2706

Student Affiliation:
Tetra Tech NUS, Inc.
14818

Certificate of Completion

This is to certify that

Scott Grier

has successfully completed the classroom requirements for

40 Hour HAZWOPER

29 CFR 1910.120(e)

Presented

Friday, March 08, 2002

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: *40409*

Neval Gupta
Vice President

Paul Hewes
Instructor

Compliance Solutions

"Today's Training... Tomorrow's Solution"

10515 E 40th Ave, Suite 116, Denver Colorado 80239 800-711-2706

Student Affiliation:
Tetra Tech NUS, Inc.
14818

Certificate of Completion

This is to certify that

Scott Grier

has successfully completed the classroom requirements for

8 Hour HAZWOPER Refresher

29 CFR 1910.120(e)

Presented

Friday, March 21, 2003

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: *47837*

Neval Gupta
Vice President

Jeffrey Kline
President/CEO

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: _____

To: _____

From: _____

Re: Tim Boehmer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11/22/02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kevin Kruse
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies

that

TIM BOEHMER

Has successfully completed

HAZWOPER

supervisor

&

annual Refresher training

Training

In Accordance with

29 CFR 1910.120

on the

23RD DAY OF DECEMBER 2002

Training Certificate No.

23DEC02 006

Scott Berndt, CHMM — Date: 23Dec02

Occupational Hazard Management
14655 CR. 205
Findlay, Ohio 45840
419-427-0356

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Tim Boehmer

Has Completed
the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Eight (8) Hour Supervisors Course
This 5th Day of April, 1991.

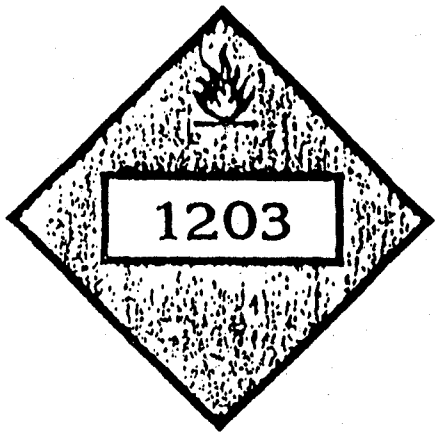
Carl T. Jones

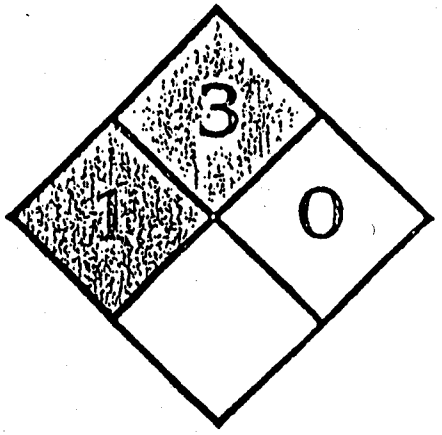
Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

S
M C
INC

Stephen C. Wilson

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246





Certificate of Completion

This Certifies That

TIM BOEHMER

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Boldt
Training Director

Certificate of Completion

This is to certify that

TIM BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000002
Certificate Identification Number

Henry M. Butcher, REM, CEA

The State of Ohio
Ohio Bureau of Workers' Compensation
Division of Safety and Hygiene

TIM BOEHMER

has satisfactorily completed 6 hours

Teaching the Safe Operations of Powered Industrial Trucks

of _____

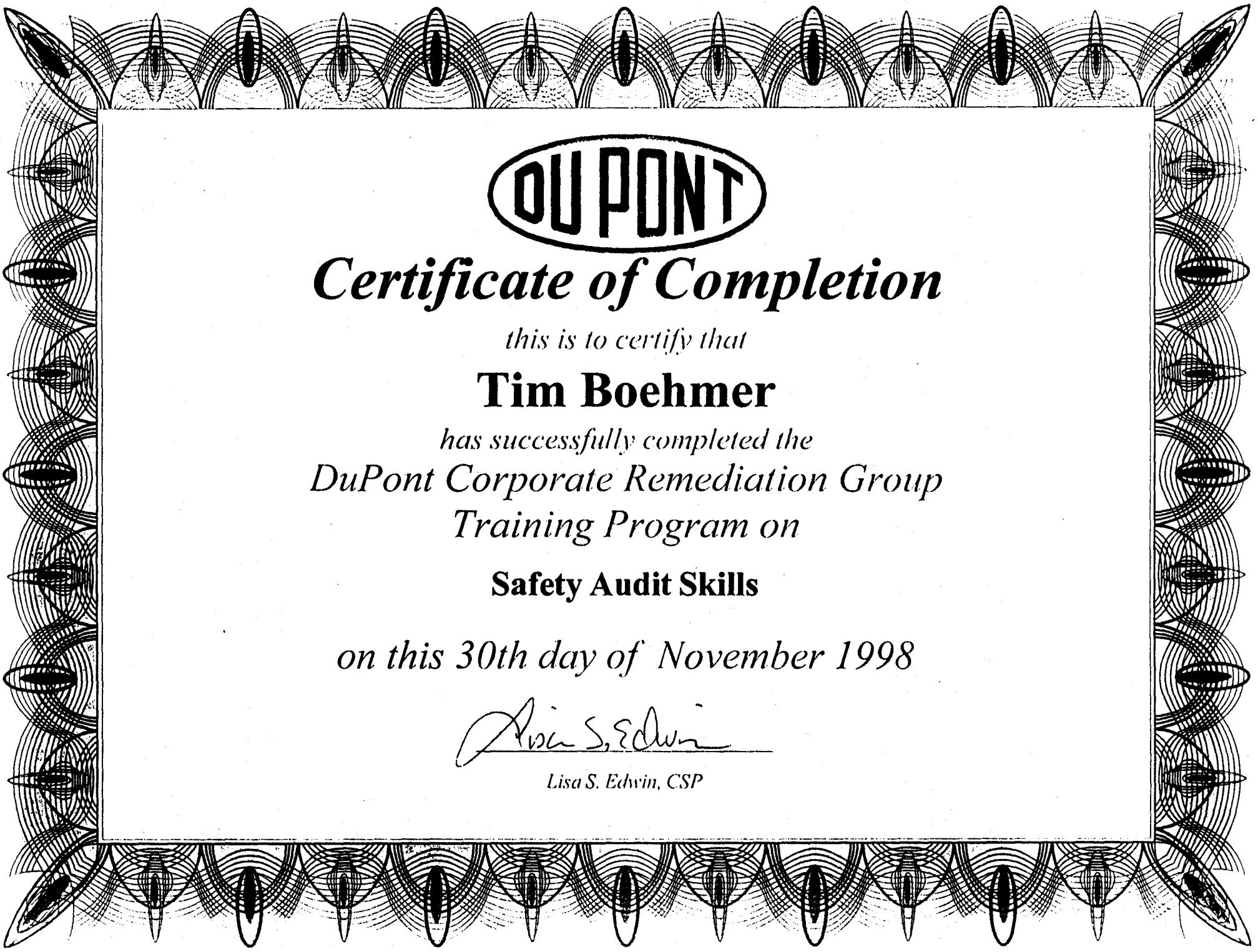
Sponsored By
BWC - Southwest Regional Office

Superintendent

April 11, 1995
Date

Bob Heater & Mona Weiss
Instructor

BWC-1580 (3/90)
CERT-6


DUPONT
Certificate of Completion
this is to certify that
Tim Boehmer
has successfully completed the
DuPont Corporate Remediation Group
Training Program on
Safety Audit Skills
on this 30th day of November 1998
Lisa S. Edwin, CSP

CERTIFICATE OF ACHIEVEMENT

This certificate has been awarded by the Ohio Chamber of Commerce and the Manufacturers' Education Council to

TIM BOEHMER

For a demonstrated commitment to sound safety management practices.

Certified for the successful completion of all requirements in the OSHA Recordkeeping course conducted April 29, 1998 in Columbus, Ohio.

Andrew E. Boehrel

Andrew E. Boehrel, President
Ohio Chamber of Commerce, Columbus

Mark W. Uher

Mark W. Uher, President
Manufacturers' Education Council, Columbus

12/20/2002

LAST NAME GOEHNER
FIRST NAME TIMOTHY

FIT TEST REPORT

Fit test information

ID NUMBER	377-52-1662		
LAST NAME	GOEHNER	CUSTOM1	
FIRST NAME	TIMOTHY	CUSTOM2	
COMPANY	DOWSER NORMER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/20/2002	PORTACOUNT S/N	12643
TEST TIME	08:54	X86 COMPANION	N
DUE DATE	12/20/2003		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SURVIVAIR	PASS LEVEL	1000
MODEL	SIGMA		
MASK STYLE	FULL FACE		
MASK SIZE	MED/LARGE		
APPROVAL			
USE > 90%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	3000	Y
DEEP BREATHING	60	10000	Y
HEAD SIDE TO SIDE	60	2000	Y
HEAD UP AND DOWN	60	10000	Y
TALKING	60	627	N
GRIMACE	15	Excl.	Y
BEND AND TOUCH TOES	60	3510	Y
NORMAL BREATHING	60	1230	Y

OVERALL FF 1770

FIT TEST OPERATOR _____ DATE _____

ERIC HORSTMAN

NAME _____ DATE 12/20/02

TIMOTHY GOEHNER

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10-06-03

To: Bowsee Morner

From: Medwork

Re: Maynard Lahti

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON OCT. 6, 2003. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

ALL WRITTEN OR PRINTED INFORMATION MUST BE LEGIBLE

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(800) 327-6868 • www.jjkeller.com • Printed in the United States

651-FS-L2

MEDICAL EXAMINER'S CERTIFICATE

I certify that I have examined SULO MAYWARD LABTI in accordance with the Federal Motor Carrier Safety Regulations (49 CFR 391.41-391.49) and with knowledge of the driving duties, I find this person is qualified; and, if applicable, only when:

- ☑ wearing corrective lenses
- ☐ wearing hearing aid
- ☐ accompanied by a _____ waiver/exemption
- ☐ driving within an exempt intracity zone (49 CFR 391.62)
- ☐ accompanied by a Skill Performance Evaluation Certificate (SPE
- ☐ qualified by operation of 49 CFR 391.64

The information I have provided regarding this physical examination is true and complete. A complete examination form with any attachment embodies my findings completely and correctly, and is on file in my office.

SIGNATURE OF MEDICAL EXAMINER	TELEPHONE	DATE
		10-6-04

MEDICAL EXAMINER'S NAME (PRINT)	
A ALMAZAN MD	☑ MD ☐ DO ☐ Chiropractor ☐ Physician Assistant ☐ Advanced Practice Nurse

MEDICAL EXAMINER'S LICENSE OR CERTIFICATE NO. / ISSUING STATE	
35076247 A	OH

SIGNATURE OF DRIVER	DRIVER'S LICENSE NO.	STATE
Sulo Maynard Labti	RL367640	OH

ADDRESS OF DRIVER
8936 STAN-HELL RD - KINSMAN, OH. 44428

MEDICAL CERTIFICATE EXPIRATION DATE
10-6-05

DISTRIBUTION: 1 COPY TO THE DRIVER, 1 COPY TO THE MOTOR CARRIER

NOV. 4. 2003 8:59AM BOWSER MORNER NO. 2291 P. 3

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

MAYNARD S. LAHTI

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

16TH DAY OF JANUARY 2003

TRAINING CERTIFICATE NO.

16JAN03 006

Bud Berndt — 16 Jan 03

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14656 CR. 205
FINDLAY, OHIO 45840

HAZMAT TRAINING INFORMATION SERVICES INC.

CERTIFICATE OF COMPLETION

This is to certify that

MAYNARD LAHTI

has successfully completed

THE 40-HOUR HAZARDOUS MATERIALS SITE WORKER COURSE

at

HAZMAT T.I.S.I., COLUMBIA, MARYLAND

Manager, Training Services Department

President

OCTOBER, 1990

Date

12/29/2003

LAST NAME LAHTI
FIRST NAME MAYNARD

FIT TEST REPORT

Fit test information

ID NUMBER 273-52-2403
LAST NAME LAHTI
FIRST NAME MAYNARD
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 09:30
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	1310	Y
DEEP BREATHING	60	843	N
HEAD SIDE TO SIDE	60	1490	Y
HEAD UP AND DOWN	60	1230	Y
TALKING	60	1170	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	2080	Y
NORMAL BREATHING	60	1330	Y
OVERALL FF		1270	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Maynard Lahti DATE 12-29-03
MAYNARD LAHTI

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: Joshua Dean **COMPANY:** Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: (YES) **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C Van Kampen Date: 8/14/03
Nurse Signature

A. ____ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

T.E. Lieser, MD; B.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

NO. 2280 P. 1
SEP. 10. 2003 8:43AM BOWSER MORNER
NOV. 3. 2003 3:30PM BOWSER MORNER
NO. 8693 P. 3/4

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JOSH DEAN

HAS SUCCESSFULLY COMPLETED

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

2ND OF SEPTEMBER 2003

TRAINING CERTIFICATE NO.

02SEP03 001

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
2001 COTTONWOOD STREET
FINDLAY, OHIO 45840

NOV. 3. 2003 3:30PM BOWSER MORNER NO. 2280 P. 8

SEP. 15. 2003 8:43AM BOWSER MORNER NO. 8693 P. 4/4

FINDLAY

THE UNIVERSITY OF FINDLAY

Certificate of Achievement

awarded by

THE NATIONAL CENTER OF EXCELLENCE FOR ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL RESOURCE TRAINING CENTER

to

JOSHUA DEAN

for Successful Completion of

OSHA 40-HOUR SAFETY TRAINING WORKSHOP
(FULFILLS THE REQUIREMENTS OF 29 CFR 1910.120 COVERING HAZARDOUS WASTE OPERATIONS)
4.0 CEU'S
APRIL 27, 2002

EXECUTIVE DIRECTOR

INSTRUCTOR

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: James Walsh **COMPANY:** Bowser-Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: (YES) **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C Van Knighten Date: 2/17/2005
Nurse Signature

A. ____ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

M. G. Russell PAC

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

NOV. 3. 2003 5:37PM BOWSER MUKNER NO. 2280 P. 3

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

JAMES R. WALSH

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

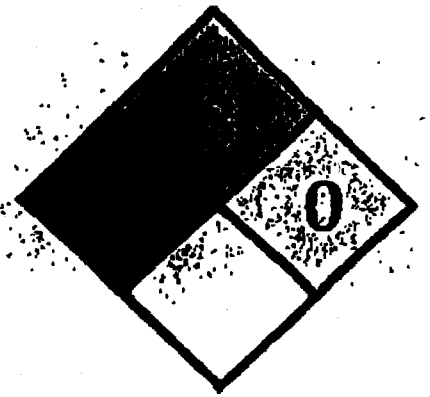
23DEC02 014

Scott Berndt 23Dec02

SCOTT BERNDT, CHMM — DATE

OCCUPATIONAL HAZARD MANAGEMENT
14685 CR. 205
FINDLAY, OHIO 45840
419-427-0356

NOV. 3.2000 9:30PM BOWDEN MUKINEK NO. 2280 P. 4



Certificate of Completion

This Certifies That

James R. Walsh

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

May 8-11, 1987
Date

Training Director

[illegible] LAST NAME WALSH
FIRST NAME JAMES

[illegible] TEST REPORT
[illegible] CERTIFICATION

ID NUMBER 7132
LAST NAME WALSH
FIRST NAME JAMES
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 10/22/2002
TEST TIME 12:07
SUB DATE 10/22/2002

PORTACOUNT S/N 4845
YES COMPARISON N

RESPIRATOR
MANUFACTURER SURVIVAIR
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE MEDIUM
APPROVAL
[illegible]

PROTOCOL OSHA [illegible]
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	[illegible]	[illegible]
NORMAL BREATHING	60	29600	[illegible]
DEEP BREATHING	60	27400	[illegible]
TURN HEAD SIDE TO SIDE	60	3470	[illegible]
NOD HEAD UP AND DOWN	60	29600	[illegible]
TALKING	60	12000	[illegible]
GRIMACE	60	[illegible]	[illegible]
BEND AND TOUCH TOES	60	7100	[illegible]
NORMAL BREATHING	60	29600	[illegible]

OVERALL [illegible] [illegible]

[illegible] TECHNICIAN DATE [illegible]

NAME [illegible] DATE 10-22-02
[illegible] SIGNATURE

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/23/02

To: _____

From: _____

Re: Jon Keifer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON _____. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

Kenneth Krumm
PHYSICIAN SIGNATURE

F:\Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies

that

JON KEIFER

Has successfully completed

HAZWOPER

ANNUAL REFRESHER TRAINING

TRAINING

In Accordance with

29 CFR 1910.120

on the

16TH DAY OF JANUARY 2003

Training Certificate No.

16JAN03 013

Scott Berndt, CHMM — Date: 16 Jan 03

Occupational Hazard Management
14655 CR. 205
Findlay, Ohio 45840

Medchem Safety Corporation, Inc.
of Cincinnati, Ohio

certifies that

Jon Keifer

Has Completed

the OSHA 1910.120 Hazardous Waste Operations and
Emergency Response Forty (40) Hour Course
This 8th Day of June, 1992.

Carl T. Jones, President
Medchem Safety Corporation, Inc.
P.O. Box 46793
Cincinnati, Ohio 45246

S
M C
INC.

Stephen C. Wilson, Vice President
Medchem Safety Corporation, Inc.
5082 Worley Road
Troy, Ohio 45373

© GOES 460-1/2

LITHO IN U.S.A.

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 5/23/05

To: _____

From: _____

Re: DENNIS SINK

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 5/23/05. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies

that

Dennis A. Sink

Has successfully completed

HAZWOPER

supervisor

&

annual Refresher training

Training

In Accordance with

29 CFR 1910.120

on the

23rd day of December 2002

Training Certificate No.

23DEC02 002

Scott Berndt, CHMM — Date: 23 Dec. 02

Occupational Hazard Management
14655 CR. 205
Findlay, Ohio 45840
419-427-0356

Certificate of Completion

This Certifies That

DENNIS SINK

has completed the course

"FORTY HOUR PERSONNEL PROTECTION & SAFETY COURSE"

(In compliance with Federal Regulation 29 CFR 1910.120)

Presented by

SPRINGFIELD SAFETY COUNCIL 50 years

Providing you a . . .

to cost containment

January 29, 1990

Date

J.C. Schaffner

Director Marketing - Training

Certificate of Completion

This is to certify that

DENNIS SINK

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000013
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/23/2002

LAST NAME SINK
FIRST NAME DENNIS

FIT TEST REPORT

Fit test information

ID NUMBER	[illegible]		
LAST NAME	SINK	CUSTOM1	
FIRST NAME	DENNIS	CUSTOM2	
COMPANY	SCHAEFER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/23/2002	PORTACOUNT S/N	4313
TEST TIME	09:15	3M COMPARION	N
DUE DATE	12/23/2003		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SURVIVAIR	PASS LEVEL	100
MODEL	SIGMA		
MASK STYLE	FULL FACE		
MASK SIZE	MED/LARGE		
APPROVAL			
[illegible]	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	[illegible]	Y
DEEP BREATHING	60	[illegible]	Y
HEAD SIDE TO SIDE	60	[illegible]	Y
HEAD UP AND DOWN	60	[illegible]	Y
TALKING	60	[illegible]	Y
GRIMACE	60	[illegible]	Y
BEND AND TOUCH TOES	60	[illegible]	Y
NORMAL BREATHING	60	[illegible]	Y

OVERALL FF [illegible] Y

FIT TEST OPERATOR [signature] DATE 12-23-02

ERIC HORSTMAN

NAME [signature] DATE 12-23-02

DENNIS SINK

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11-6-02

To: _____

From: _____

Re: Todd Wollenhaupt

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 11-6-02. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

_____
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14655 County Road 205
Findlay, Ohio 45840

CERTIFIES
THAT

TODD WOLLENHAUPT

HAS
SUCCESSFULLY
COMPLETED

40 HOUR
SITE WORKER
&
OPERATIONS
TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 27NOV.02 001

ON THE

27TH OF NOVEMBER 2002

Scott Berndt, CHMM — 27Nov.02 Date

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES

THAT

TODD WOLLENHAUPT

HAS SUCCESSFULLY COMPLETED

HAZWOPER

SUPERVISOR

&

ANNUAL REFRESHER TRAINING

TRAINING

IN ACCORDANCE WITH

29 CFR 1910.120

ON THE

23RD DAY OF DECEMBER 2002

TRAINING CERTIFICATE NO.

23DEC02 007

Scott Berndt

SCOTT BERNDT, CHMM

23 Dec. 02

DATE

OCCUPATIONAL HAZARD MANAGEMENT
14655 CR. 205
FINDLAY, OHIO 45840
419-427-0356

OCCUPATIONAL HAZARD MANAGEMENT

14655 CR 205
FINDLAY, OHIO 45840
419-427-0356

Qualitative
Respirator Fit Test Log

Date: 27 Nov. 02
Time: 0900

Personal Information

Name: Todd Wallenhaupt
SS#: 283-64-6069
Company: Bowser-Morner, Inc

Respirator Information

Type: Full Face [X] Half Face [ ] PAPR [ ]

Manufacturer: ~~MSA~~ Sonovision Model: ~~3200B~~ Sec 4000

Fit Test Media: Irritant Smoke: [ ] Banana Oil: [X]

Positive - Negative Self Test:	Pass	BW	Fail	
Looking Forward:	Pass		Fail	
Head Right:	Pass		Fail	
Head Left:	Pass		Fail	
Head Up:	Pass		Fail	
Head Down:	Pass		Fail	
After Jumping Jacks:	Pass		Fail	
After Bending Down:	Pass		Fail	
After Walking:	Pass		Fail	
Rainbow Passage:	Pass	BW	Fail	

Student Signature: Todd Wallenhaupt Date: 11-27-02

Instructor Signature: [signature] Date: 27 Nov. 02

12/23/2002

LAST NAME WOLLENHAUPT
FIRST NAME TODD

FIT TEST REPORT

Fit test information

ID NUMBER [illegible]
LAST NAME WOLLENHAUPT
FIRST NAME TODD
COMPANY BOWSER-MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/23/2002
TEST TIME 14:03
DUE DATE 12/23/2003

PORTACOUNT S/N 42040
ASE COMPARISON N

RESPIRATOR
MANUFACTURER [illegible]
MODEL SIGMA
MASK STYLE FULL FACE
MASK SIZE [illegible]
APPROVAL
[illegible] N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	SPECIFIED DURATION	FIT FACTOR	PASS
NORMAL BREATHING	60	[illegible]	Y
DEEP BREATHING	30	[illegible]	Y
HEAD SIDE TO SIDE	60	[illegible]	Y
HEAD UP AND DOWN	60	[illegible]	Y
TALKING	60	[illegible]	Y
GRIMACE	15	Excl.	N
BEND AND TOUCH TOES	60	[illegible]	Y
NORMAL BREATHING	30	[illegible]	Y

OVERALL FF [illegible]

FIT TEST OPERATOR _____ DATE _____
ERIC HORSTMAN

NAME [illegible] DATE _____
TODD WOLLENHAUPT

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10/10/03

To: _____

From: MEDWORK

Re: NICHOLAS POST

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON OCT. 10, 2003. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

94041540E-01

CERTIFICATE

ENVIROGENICS

HEALTH AND SAFETY TRAINING INSTITUTE
65 South Main Street, Building C, Pennington, NJ 08534

THIS IS TO CERTIFY THAT

NICHOLAS C. POST

HAS SUCCESSFULLY COMPLETED THE TRAINING REQUIREMENTS
FOR

OSHA 1910.120(e)(9) 40-HOUR EQUIVALENT HAZARDOUS WASTE OPERATIONS HEALTH AND SAFETY TRAINING

Jeffrey L. Heath

INSTRUCTOR

April 15, 1994

DATE

© GOES, INC. 1-1/2

LITHO IN U.S.A.

Occupational Hazard Management

Certifies

that

Nick Post

Has successfully completed

HAZWOPER

supervisor

&

annual Refresher training

Training

In Accordance with

29 CFR 1910.120

on the

23rd day of December 2002

Training Certificate No.

23DEC02 025

Bud Berndt 23Dec.02

Scott Berndt, CHMM — Date

Occupational Hazard Management
14655 CR. 205
Findlay, Ohio 45840
419-427-0356

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-10-3-045

October 17, 2003

Project Numbers 9060 and 0845

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0315

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include DPT; drilling; and surface and subsurface soils, sediments, ground water, and surface water sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from October 20 through December 19, 2003. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Mine Fill A, Mine Fill B, Cast High Explosive Fill/Incinerator, Pyrotechnic Test Area, Revision 1, dated October 2003, prepared under CTO 0166; and the Health and Safety Plan for Corrective Measures Study Field Work at Mustard Gas Burial Ground (SWMU 01) dated October 2003 prepared under CTO 0315. These individuals are as follows:

Bob Balkovec
Matt Cochran
Fred Ramser
Terry Rojahn
Frank Wudkwych

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-11-3-029

November 14, 2003

Project Numbers 9060 and 0845

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0315

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to add personnel conducting the field activities at the NSWC Crane site from November 17 through December 19, 2003. Mr. Jim Goerdt and Mr. Scott Grier have been added to the field crew performing this work. All other information in our letter dated October 17, 2003 remains the same.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: B. Gorman (Code ES 34)
D. Wroblewski
M. Perry
K. Henn
R. Basinski
T. Johnston

APPENDIX F.3
SWMU 13
HEALTH AND SAFETY DOCUMENTATION
ROUND 3

Project-Level H&S Recordkeeping

On-site H&S training (topics, participants, dates)...See Section F

Air monitoring instrument calibration...See Section C (C.11.1, C.11.2 & C.11.3)

Monitoring instrument results including background levels, breathing zone readings, personnel exposure records, etc. (air monitoring, noise monitoring, other H&S quantitative measurements)...See Section B (B.1.1, B.1.2 & B.1.3)

H&S training and medical certificates/documents for site personnel... See Section F

Site specific written program documentation (e.g., Hazard communication)...NA

H&S Site clearance letters... See Section F

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at CRANE and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present at the sites
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Initial response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and all of my questions have been answered to my satisfaction. I further state, that the dates of my training (introductory, refresher, and supervisory, as applicable) and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
Josh Dean	7-8-04	8-02	12-'03	NA	8-'03
Jim WAISH	7-8-04	may 87	12-2003	2001	2-1-04
BRUCE KIRKPATRICK	7-8-04	1986	1-2004	NA	11-03
DONALD MULL	7-8-04	1998	12-03	NA	11-03
Charles C. Lowery III	7-8-04	4/30/92	~~7/10~~ 9/5/02	1998	3-04
Jim Goerdt	7-8-04	12/91	10/03	NA	11/03
SJ CONTI	7-8-04	8/83	5/14/04	"84"	12/02
TERRY ROHAN	7-8-04	9/85	1/04	1/04	11/02
Chad Mahaffy	7-23-04	2002	12-2003	12-2003	12/03
JOSH DUTTON	8/9/04	12/01	10/17/03	NA	1/16/04

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
KEN BOEHMER Ken Boehmer	8/26/04	9/97	12-27-03		FEB MARCH 04
JOHN DAVIS John Davis	8/26/04	11/02	12-27-03		12/03
Todd Wollenhaupt	8/26/04	11/02	12-27-03		11/03

Railway Access Plan Pre-Task Briefing
Attestment

By my signature below, I attest that I have participated in a pre-task briefing which included a review of the TtNUS Railway Access Plan for NSWC Crane Hill 600 activities. This briefing addressed supervision and communication of on-track safety methods prior to commencing work in this area, in accordance with Federal Railroad Administration regulation 49 CFR 214.315.

My signature also indicates that I was provided an opportunity to ask questions during this briefing, and that any questions raised were addressed to my satisfaction.

Name (Printed)	Signature	Date	FOL Initials*
JAMES R. WALSH		10-25-04	TR
Stan Conti		10-25-04	TR
TERRY ROJAHN		10-25-04	TR
Todd Walkenhaupt		10-25-04	TR
Josh Dean		10-25-04	TR

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 30, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech NUS.

Employee Name: TERRY ROJAHN

Office Location: PITTSBURGH

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: Anna Jones M.D.

Date: 11/10/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040.

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

WorkCare™

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Terry Rojhan

Office Location: Bluewater

Yes	No	
☒	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☒	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134/

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: [signature] M.D.

Date: 11-5-04

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TETRA TECH NUS, INC.
661 Andersen Drive ▪ Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

March 11, 2003

Mr. Stanley Conti
Tetra Tech NUS, Inc.
Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220

Whom It May Concern:

This letter is to certify that Mr. Stanley Conti successfully completed a course of instruction in Hazardous Materials Handling for Hazardous Waste Site Workers which meets the criteria established in 29 CFR 1910.120(e)(3)(i). This course was prepared and conducted by Tetra Tech NUS (formerly Brown and Root Environmental, a division of HALLIBURTON NUS Corporation) in September 1983. If you have any questions, please feel free to contact me.

Very truly yours,

James K. Lafley
Manager, Training Resources

JKL:lld

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Stan Conti

has successfully completed an 8-hour course of instruction in
OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

May 14, 2004
Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. [illegible]
Manager
Training Services

WORKCARE™
A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Stanley Conti

Office Location: Tetra Tech

Yes	No	
☒	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☒	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134.

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: _____ M.D.

Date: 12/13/02

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

002
FROEHLING & ROBERTSON
10/23/98 FRI 08:22 FAX 757 436 1674

TECHNICAL ENVIRONMENTAL SERVICE TRAINING INSTITUTE

certifies that

CHARLES C. LANEY III

has successfully met the 29 CFR 1910.120 certificate requirements for the course entitled

40 HOUR HEALTH & SAFETY TRAINING - GENERAL SITE WORKER (E-3-1) -

and in evidence thereof is awarded this

CERTIFICATE OF COMPLETION

on the 30 TH day of APRIL , 1992

APRIL 30, 1992
Passed Exam

HSW-00780
Certificate Number

TEST institute

Anthony L. Egitto, Director

1110 Navaho Dr. • Suite 602 • Raleigh, North Carolina 27609 • 919-876-8440

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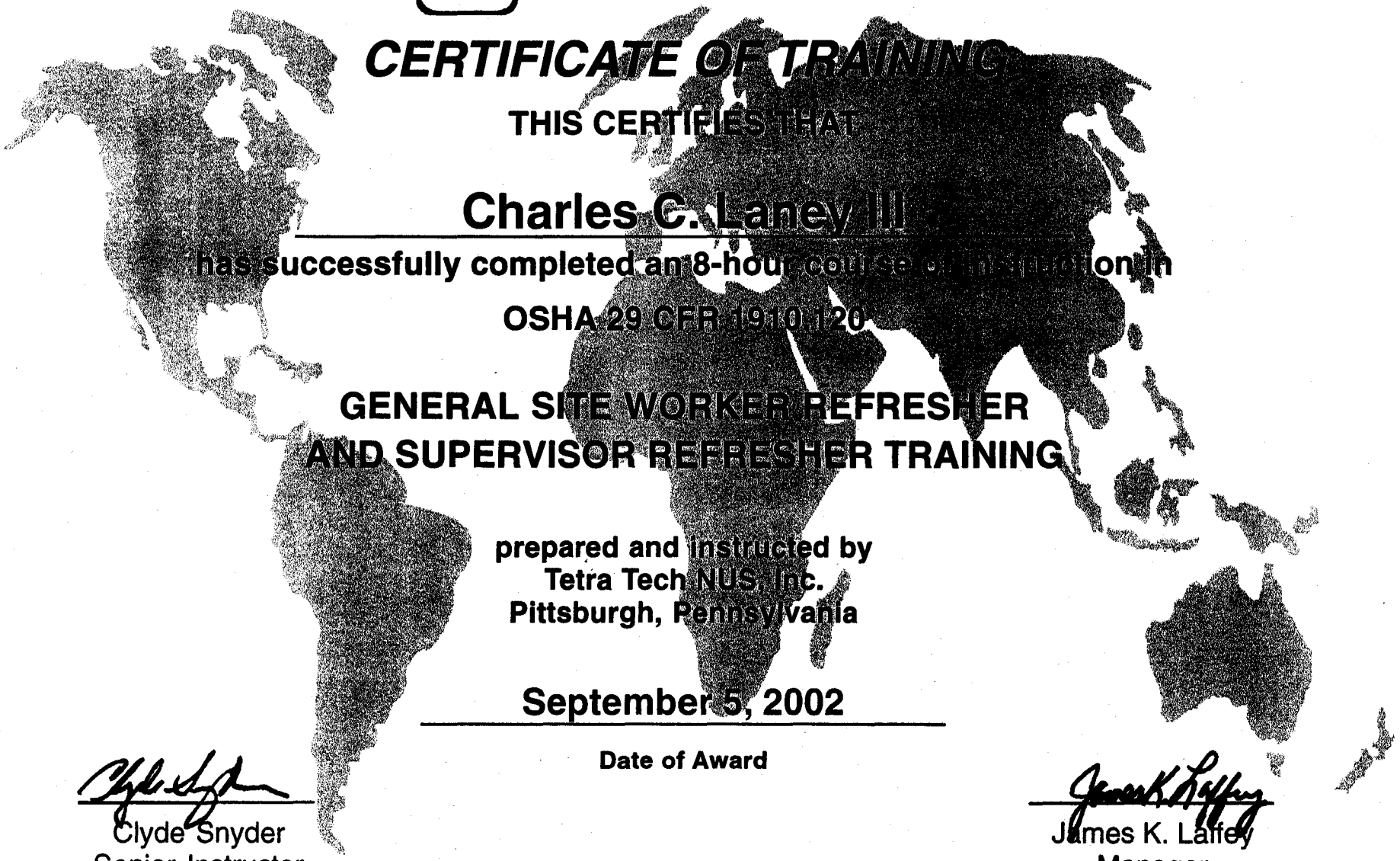
LITHO IN U.S.A.



TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Charles C. Laney III

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

September 5, 2002

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WorkCare™

Release to Duty

NAME OF EXAMINEE: Charles Lowey III

DATE: 7-18-07

CLINIC NAME: SECURE MEDICAL CARE
803 Russell Avenue
Gaithersburg, MD 20879-3584

COMPANY NAME: TTNUS

Based on the limited information WorkCare™ has requested me to review, as stipulated in the WorkCare Clinical Operations Manual, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare, may detect health conditions not apparent to me. It is further agreed that such health conditions may necessitate the need for workplace restrictions.

MARTIN T. LISS, M.D.

Signed: _____ M.D.
Examining Physician

Dated: 7-18-2007

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Mark Peterson

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

January 29, 2004

Date of Award

Matthew M. Soltis, CIH, CSP
Manager
Health and Safety

APPLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

OSHA, 1910.120
Hazardous Waste Operations and Emergency Response 40 Hour Course

ISSUE DATE: **December 13, 1991**

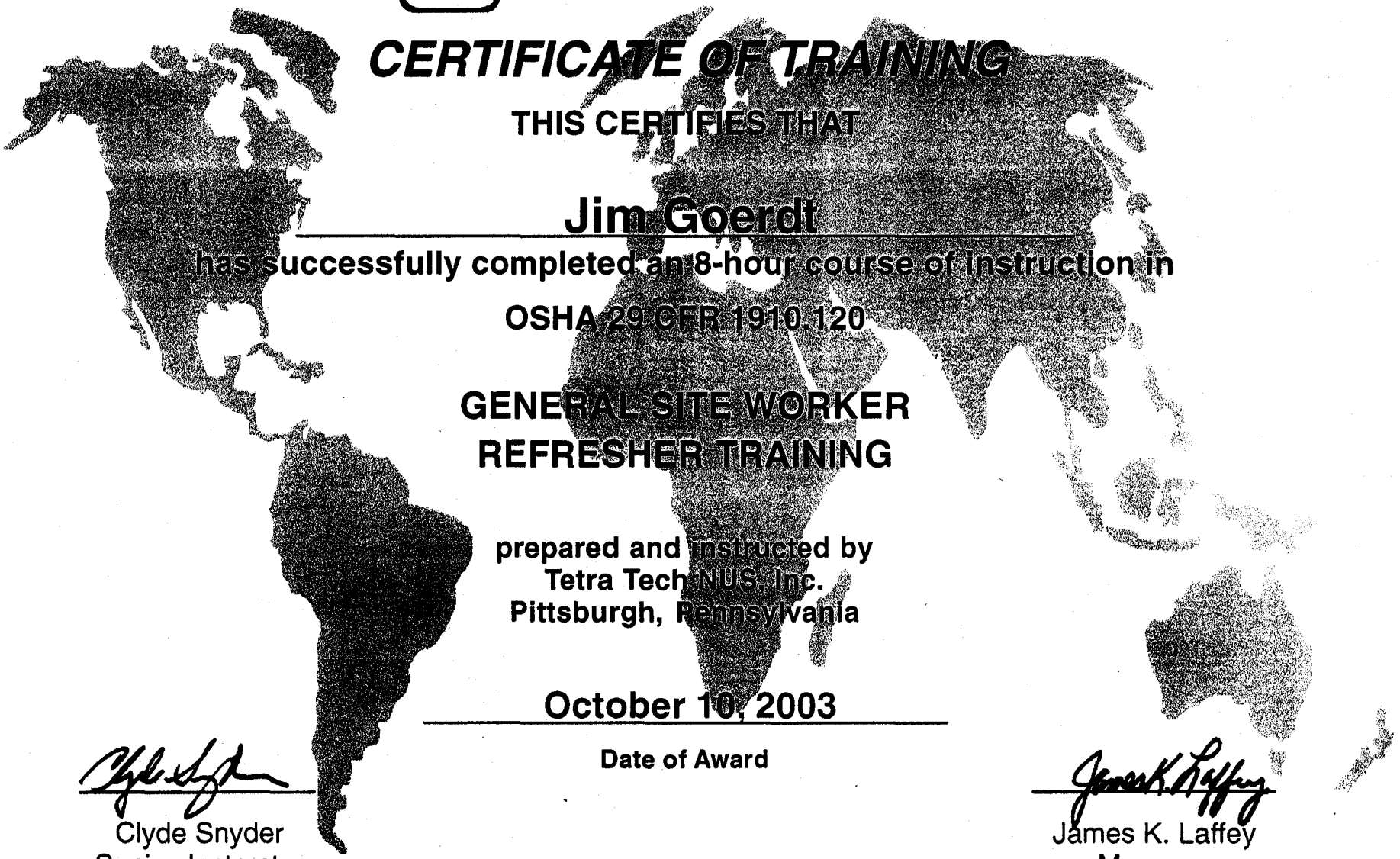
EXPIRATION: **December 13, 1992**

CERTIFICATE: **HAZ9112001058**

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

P. O. Box 300068
Fern Park, Florida 32730-0068



TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Jim Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

October 10, 2003

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**

EMPLOYEE:	**Goerdt, James**	**COMPANY:**	**TT/NUS**
SSN:	**481-86-2691**	**POSITION:**	**Environmental Scientist**
DATE OF EXAM:	**11/07/2003**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**11/07/2005**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

OCCUPATIONAL HEALTH & SAFETY SOLUTIONS

This certificate is confirmation that

Joshua Dutton

has successfully completed the course and examination for

40 HOUR HAZWOPER TRAINING

December, 2001

Indianapolis, Indiana

Certificate No. 010471

Course Director

TRAINING CERTIFICATE

Presented to:

Joshua Dutton

Has successfully completed the:

8-Hour HAZWOPER Refresher Course

Presented By: Scott Defenbaugh

Presented this 17th day of October, 2003

Workplace

Workplace Safety & Health Company, Inc.

Scott W. Defenbaugh – Trainer

MEDICAL APPROVAL FORM

For Employees of Environmental Field Services, Inc.

Participant Name : Joshua Dutton Date & Time of Examination: January 16th @ 8:00a.m.
The above-named individual has:

1. Undergone a physical examination in accordance with OSHA 29 CFR 1910.120, and found to be medically
(✓) qualified to perform work at hazardous work sites.
( ) not qualified to perform work at hazardous work sites.

- and -

2. Undergone a physical examination as per OSHA 29 CFR 1910.134, and found to be medically
(✓) qualified to wear respiratory protection.
( ) not qualified to wear respirator protection.

My evaluation has been based on the following, as provided to me by the employer.

(✓) A Copy of OSHA Standards 29 CFR 1910.120 and appendices.
(✓) A description of the employee's duties as they relate to the employee's exposure.
( ) A list of known/suspected contaminants and their concentrations (if known)
(✓) A description of any personal protective equipment used or to be used.
(✓) Information from previous medical examinations of the employee which is used not readily available to the examining physician.

I, Josh T Perri, have examined Josh Dutton
Physician's Name (Print) Participant's Name (Print)

and have determined the following information:

1 Results of medical examination and test (excluding finding or diagnoses unrelated to occupational exposure):

N/A

2. Any detected medical conditions which place the employee at increase risk of material impairment of the employee's health :

None

3. Recommended limitations upon the employee's assigned work :

N/A

I have informed this participant of the results of this medical examination and any medical conditions which require further examination of treatment.

Based on this information provided to me, and in view of the activities and hazardous potentials involved at hazardous work sites, his participant

(✓) may
( ) may not

perform his/her assigned tasks.

Physician's Signature :
Address: 14828 Craysland Ct 46032
Phone Number: 5829210

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Kenneth A. Boehmer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 348
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Kenneth A Boehmer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Donald B. Kirkpatrick

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 344
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Donald B Kirkpatrick

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

David W. Schrecengost

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1236
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: David W Schrecengost

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Dennis A. Sink

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1270
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Dennis A Sink

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

John E. Filbrun

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 1006
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: John E Filbrun

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Timothy L. Boehmer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 349
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Timothy L Boehmer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Jon T. Keifer

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 2012
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Jon T. Keifer

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

James Nidzgorski

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 350
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: James Nidzgorski

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

Joseph C. McCloud

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 2013
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: Joseph C McCloud

To be placed on the certificate

INDIANA WATER WELL DRILLING LICENSE
Department of Natural Resources
Issued by the Division of Water

James R. Walsh

is entitled to operate water well drilling equipment and engage in the drilling of water wells, pursuant to Indiana Code 25-39.

License Number: 852
Expiration Date: December 31, 2004
DNR Receipt Number: 1010563
Signature: James R Walsh

CHAD R MAHAFFY
001731-224
2/16/1981
295-76-2583
BOWSER MORNER

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 10-10-03

To: _____

From: _____

Re: Chad Mehaffy

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 10-10-03. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X-RAY~~, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

CHAD MAHAFFY

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No:
29DEC03 017

Scott Berndt, CHMM

29 Dec. 03
Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

CHAD MAHAFFY

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 016

Scott Berndt — 29 Dec. 03

Scott Berndt, CHMM — *Date*

Occupational Hazard Management
2004 Cottonwood Road
Findlay, Ohio 45840

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14655 County Road 205
Findlay, Ohio 45840

CERTIFIES
THAT

CHAD R. MAHAFFY

HAS
SUCCESSFULLY
COMPLETED

40 HOUR SITE WORKER & OPERATIONS TRAINING

IN ACCORDANCE WITH
29CFR1910.120
Certificate No: 020CT02 02

ON THE

2ND DAY OF October 2002

Scott Berndt, CHMM — Date

12/29/2003

LAST NAME MAHAFFY
FIRST NAME CHAD

FIT TEST REPORT

Fit test information

ID NUMBER	295-76-2583		
LAST NAME	MAHAFFY	CUSTOM1	
FIRST NAME	CHAD	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	09:47	N95 COMPANION	N
DUE DATE	12/29/2004		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	STANDARD		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	11400	Y
DEEP BREATHING	60	4230	Y
HEAD SIDE TO SIDE	60	46300	Y
HEAD UP AND DOWN	60	78900	Y
TALKING	60	4560	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7380	Y
NORMAL BREATHING	60	26700	Y
OVERALL FF		9330	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Chad Mahaffy DATE 12-29-03
CHAD MAHAFFY

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 2-27-04

To: Bowser Morner

From: Med Work

Re: Kenneth Bohmer

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 2-27-04. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

S Almazan MD

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 007

Scott Berndt, CHMM

29 Dec. 03
Date

Occupational Hazard Management
2004 Cottonwood Street
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 007

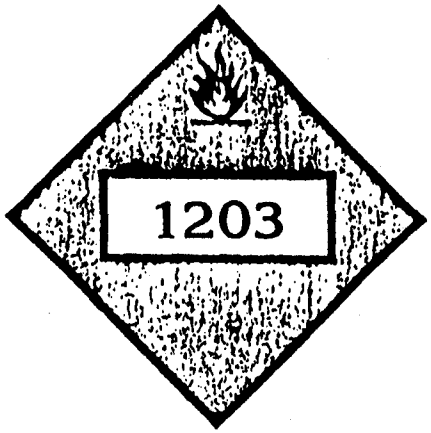
Scott Berndt

Scott Berndt, CHMM

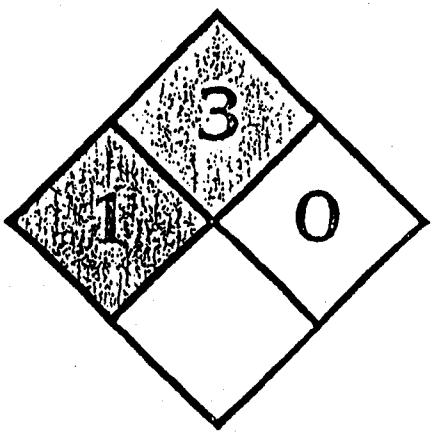
29 Dec. 03

Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840



Certificate of Completion



This Certifies That

KEN BOEHMER

has completed the 40 *hour course:*

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Boldt
Training Director

Certificate of Completion

This is to certify that

KEN BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000001
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME BOEHMER
FIRST NAME KENNETH

FIT TEST REPORT

Fit test information

ID NUMBER	277521850		
LAST NAME	BOEHMER	CUSTOM1	
FIRST NAME	KENNETH	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	08:26	N95 COMPANION	N
DUE DATE	12/29/2004		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	MED/LARGE		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12200	Y
DEEP BREATHING	60	15000	Y
HEAD SIDE TO SIDE	60	30800	Y
HEAD UP AND DOWN	60	34300	Y
TALKING	60	3750	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7340	Y
NORMAL BREATHING	60	8990	Y
OVERALL FF		9670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Kenneth Boehmer DATE 12-29-03
KENNETH BOEHMER

OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: Joshua Dean **COMPANY:** Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: (YES) **NO**

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: C. Van Konynenburg Date: 8/14/03
Nurse Signature

A. ____ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

_____

_____

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

Occupational Hazard Management

Certifies
that

JOSH DEAN

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

18th of December 2003

Training Certificate No.
18Dec03 001

Scott Berndt, CHMM — 18 Dec. 03 — Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

FINDLAY

THE UNIVERSITY OF FINDLAY

Certificate of Achievement

awarded by

THE NATIONAL CENTER OF EXCELLENCE FOR ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL RESOURCE TRAINING CENTER

to

JOSHUA DEAN

for Successful Completion of

OSHA 40-HOUR SAFETY TRAINING WORKSHOP
(FULFILLS THE REQUIREMENTS OF 29 CFR 1910.120 COVERING HAZARDOUS WASTE OPERATIONS)
4.0 CEU'S
APRIL 27, 2002

EXECUTIVE DIRECTOR

INSTRUCTOR

SEP. 10. 2003 8:43AM BOWSER MUKNEY NO. 8093 P. 4/4

12/29/2003

LAST NAME DEAN
FIRST NAME JOSHUA

FIT TEST REPORT

Fit test information

ID NUMBER	270869191		
LAST NAME	DEAN	CUSTOM1	
FIRST NAME	JOSHUA	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	10:24	N95 COMPANION	N
DUE DATE	12/29/2004		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	STANDARD		
APPROVAL			
EFF. < 99%	N		

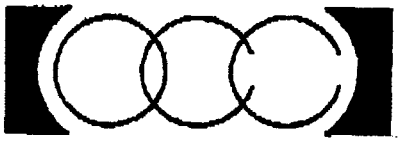
EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	44200	Y
DEEP BREATHING	60	18600	Y
HEAD SIDE TO SIDE	60	22300	Y
HEAD UP AND DOWN	60	18900	Y
TALKING	60	10400	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	11900	Y
NORMAL BREATHING	60	46800	Y
OVERALL FF		18700	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03

ERIC HORSTMAN

NAME Joshua Dean DATE 12-29-03

JOSHUA DEAN



OCCUPATIONAL CARE CONSULTANTS

OCC - East • 3028 Navarre Ave • Oregon, OH 43616
(419) 697-6850 • Fax (419) 697-6861

RESPIRATOR QUESTIONNAIRE

NAME: James R Walsh COMPANY: Bowser Morner

A new questionnaire should be completed annually or sooner if a medical condition intervenes. OCC recommends that a pre-placement medical evaluation be done on all employees using a respirator.

PHYSICAL EXAMINATION REQUIRED: YES (NO)

(If examination is required, it must be completed within 30 days of questionnaire.)

Questionnaire Reviewed by: _____ Date: 3/2/04
Nurse Signature

A. ____ No limitations regarding respirator use.

B. ____ Restrictions are placed on this employee for respirator use related to a medical condition or to the workplace conditions in which the respirator will be used. Restrictions are as follows:

_____

_____

C. ____ Follow-up medical evaluation is recommended as per NIOSH guidelines.
Every 5 years for persons under age 35
Every 2 years for persons aged 35 to 45
Every year for persons over the age of 45

Evaluations for persons performing strenuous work with SCBA:
Every 3 years for those under age 35
Every 18 months for those aged 35 to 45
Annually for those over the age of 45

D. ____ Your employee has been provided a copy of this Licensed Health Care Professional's written recommendation.

_____

T.E. Lieser, MD; P.J. Eby, MD; G. J. Jabaly, MD; B.C. Russell, PA-C, G. Myak, RN, CNP

003/005
BOWSER-MORNER,INC.
9372332016

Occupational Hazard Management

Certifies
that

JAMES WALSH

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

18th of December 2003

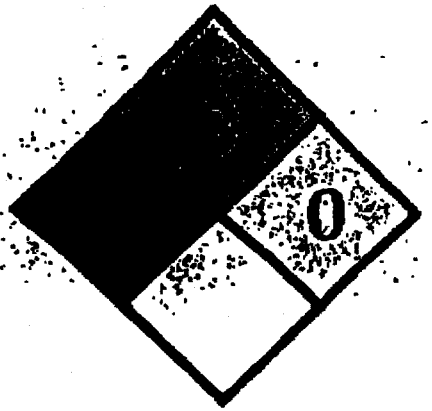
Training Certificate No:
18Dec03 002

Scott Brandt, CHMM

18 Dec. 03
Date

Occupational Hazard Management
2001 Tallmadge Road
Findlay, Ohio 45840

004/005
BOWSER-MORNER, INC.
05/20/2004 16:32 FAX 9372332016



Certificate Of Completion

This Certifies That

James R. Walsh

has completed the 40 hour course:

OSHA 40 Hour Personnel Protection & Safety Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

May 8-11, 1987

Date

Training Director

12/29/2003

LAST NAME WALSH
FIRST NAME JAMES

FIT TEST REPORT

Fit test information

ID NUMBER 9165
LAST NAME WALSH
FIRST NAME JAMES
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 10:35
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	2990	Y
DEEP BREATHING	60	2760	Y
HEAD SIDE TO SIDE	60	3080	Y
HEAD UP AND DOWN	60	31300	Y
TALKING	60	374	N
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	1330	Y
NORMAL BREATHING	60	22900	Y
OVERALL FF		1550	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME James Walsh DATE 12-29-03
JAMES WALSH

FAX TRANSMISSION

BOWSER-MORNER

4518 Taylorsville Road • P.O. Box 51 • Dayton, Ohio 45401-0051
Phone (937) 236-8805 Fax (937) 233-2016

With other offices in:

	Toledo, Ohio	**Lexington, Ky.**
Phone:	(419) 691-4800	(606) 233-0250
Fax:	(419) 691-4805	(606) 253-0183

To: Terry Rajaha

From: Penny L. Keifer, Administrative Manager

Company: Tetra Tech

Phone No:

Date: July 28, 2004

Fax No.: 812-854-3981

No. of Pages (including cover): 5

Re:

Message:

If you have any problems with, or do not receive all the pages in this transmission, please call our office.

BOWSER-MORNER *is an accredited independent testing laboratory and engineering consultant providing services in geotechnical engineering, environmental consulting, construction monitoring and testing, analytical sciences, and subsurface exploration and sampling.*

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MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11-15-03

To: Bowser-Morner

From: MedWork

Re: Todd Wollenhaupt

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Todd Wollenhaupt. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

08/26/2004 10:48 FAX 9372332016 BOWSER-MORNER,INC 003/017

Occupational Hazard Management

Certifies
that

TODD WOLLENHAUPT

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 030

29 Dec 03

Date

Occupational Hazard Management
2001 Cottonwood Road
Fairborn, Ohio 45324

08/26/2004 10:49 FAX 9372332016 BOWSER-MORNER, INC. 004/017

OCCUPATIONAL HAZARD MANAGEMENT

CERTIFIES
THAT

TODD WALLENHAUPT

HAS SUCCESSFULLY COMPLETED

PROCESS SAFETY MANAGEMENT
TRAINING

IN ACCORDANCE WITH
29 CFR 1910.119
ON THE

28TH OF NOVEMBER 2003

TRAINING CERTIFICATE NO.
28NOV03 002

Scott Bernot, CHMM — 28 Nov. 03. Date

OCCUPATIONAL HAZARD MANAGEMENT
5061 COTTONWOOD STREET
FINDLAY, OHIO 45840

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNOT, CHMM
14665 County Road 266
Findlay, Ohio 45840

CERTIFIES
THAT

TODD WOLLENHAUPT

HAS
SUCCESSFULLY
COMPLETED

40 HOUR
SITE WORKER
&
OPERATIONS
TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 27NOV.02 001

ON THE
27TH OF NOVEMBER 2002

Scott Bernot, CHMM — 27 Nov 02
SCOTT BERNOT, CHMM — DATE

12/29/2003

LAST NAME WOLLENHAUPT
FIRST NAME TODD

FIT TEST REPORT

Fit test information

ID NUMBER 283-61-6669
LAST NAME WOLLENHAUPT
FIRST NAME TODD
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 13:42
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	10900	Y
DEEP BREATHING	60	26300	Y
HEAD SIDE TO SIDE	60	83200	Y
HEAD UP AND DOWN	60	26600	Y
TALKING	60	12100	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	10400	Y
NORMAL BREATHING	60	56200	Y
OVERALL FF		18500	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Todd Wollenhaupt DATE 12-29-03
TODD WOLLENHAUPT

Medwork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 12-5-03

To: _____

From: _____

Re: John Davis
1-26-83

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 12.5.03. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF ~~CHEST X-RAY,~~ PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

JOHN DAVIS

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120.
on the

29th of December 2003

Training Certificate No.
29DEC03 009

[illegible] 29 Dec 03

[illegible] Date

Occupational Hazard Management
[illegible]
[illegible], Ohio [illegible]

OCCUPATIONAL HAZARD MANAGEMENT

SCOTT BERNDT, CHMM
14658 COUNTY ROAD 309
FINDLAY, OHIO 45840

CERTIFIES
THAT

JOHN DAVIS

HAS
SUCCESSFULLY
COMPLETED

40 HOUR
SITE WORKER
&
OPERATIONS
TRAINING

IN ACCORDANCE WITH
29CFR1910.120
CERTIFICATE NO: 27NOV.02 003

ON THE

27TH OF NOVEMBER 2002

Scott L. Berndt 27 Nov 02

SCOTT BERNDT, CHMM DATE

08/26/2004 10:51 FAX 9372332016 BOWSER-MORNER, INC. 010/017

Occupational Hazard Management

Certifies
that

JOHN DAVIS

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM-29DEC03-009

Rod Bonnell, CHMM — 29 Dec. 03
Date

Occupational Hazard Management

12/29/2003

LAST NAME DAVIS
FIRST NAME JOHN

FIT TEST REPORT

Fit test information

ID NUMBER 292689571
LAST NAME DAVIS
FIRST NAME JOHN
COMPANY BOWSER MORNER
LOCATION DAYTON
NOTE

CUSTOM1
CUSTOM2
CUSTOM3
CUSTOM4

TEST DATE 12/29/2003
TEST TIME 08:52
DUE DATE 12/29/2004

PORTACOUNT S/N 44721
N95 COMPANION N

RESPIRATOR
MANUFACTURER SUVIVAIR
MODEL 20/20
MASK STYLE FULL FACE
MASK SIZE STANDARD
APPROVAL
EFF. < 99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 1000

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	57300	Y
DEEP BREATHING	60	23100	Y
HEAD SIDE TO SIDE	60	54200	Y
HEAD UP AND DOWN	60	15200	Y
TALKING	60	10600	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	14300	Y
NORMAL BREATHING	60	44200	Y
OVERALL FF		21200	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME John D. Davis DATE 12/29/03
JOHN DAVIS

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 2-27-04

To: Bowser Morner

From: MedWork

Re: Kenneth Barbour

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON 2-27-04. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

D. Ahuja MD
PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

08/26/2004 10:51 FAX 9372332016 BOWSER-MORNER, INC. 013/017

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29D&C03 007

[signature]

29 Dec. 03
Date

Occupational Hazard Management
[illegible]

08/26/2004 10:52 FAX 9372332016 BOWSER-MORNER, INC. 014/017

Occupational Hazard Management

Certifies
that

KEN BOEHMER

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

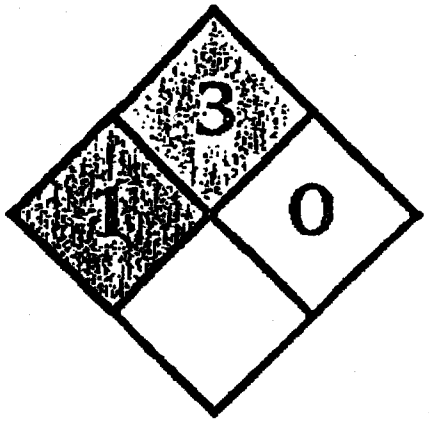
Training Certificate No.
PSM 29DEC03 007

Scott Berndt, CSHM

29 Dec. 03
Date

Occupational Hazard Management
[illegible]
[illegible]

015/017
BOWSER-MORNER, INC.
08/26/2004 10:52 FAX 9372332016



Certificate of Completion

This Certifies That

KEN BOEHMER

has completed the 40 *hour course:*

OSHA 40 Hour Personnel Protection & Safety Course
in accordance with 29CFR1910.120

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

August 31-September 3, 1987
Date

Pete Boldt
Training Director

Certificate of Completion

This is to certify that

KEN BOEHMER

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000001
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME BOEHMER
FIRST NAME KENNETH

FIT TEST REPORT

Fit test information

ID NUMBER	277521850		
LAST NAME	BOEHMER	CUSTOM1	
FIRST NAME	KENNETH	CUSTOM2	
COMPANY	BOWSER MORNER	CUSTOM3	
LOCATION	DAYTON	CUSTOM4	
NOTE			
TEST DATE	12/29/2003	PORTACOUNT S/N	44721
TEST TIME	08:26	N95 COMPANION	N
DUE DATE	12/29/2004		
RESPIRATOR		PROTOCOL	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	PASS LEVEL	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	MED/LARGE		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	12200	Y
DEEP BREATHING	60	15000	Y
HEAD SIDE TO SIDE	60	30800	Y
HEAD UP AND DOWN	60	34300	Y
TALKING	60	3750	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	7340	Y
NORMAL BREATHING	60	8990	Y
OVERALL FF		9670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME [signature] DATE 12-29-03
KENNETH BOEHMER

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/15/2003

To: Bowser Morner

From: Medwork

Re: Donald Kirkpatrick

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Donald Kirkpatrick. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies

that

BRUCE KIRKPATRICK

has successfully completed

HAZWOPER

Annual Refresher training

Training

In Accordance with

29 CFR 1910.120

on the

29TH of January 2004

Training Certificate No.

29JAN04 002

Scott Berndt, CHMM

Occupational Hazard Management

2001 Cottonwood Street

Findlay, Ohio 45840

29 Jan 04

Date

Occupational Hazard Management

Certifies

that

BRUCE KIRKPATRICK

Has successfully completed

PROCESS SAFETY MANAGEMENT TRAINING

In Accordance with

29 CFR 1910.119

on the

29 January 2004

Training Certificate No.

PSM 29JAN04 001

Scott Berndt, CHMM — 21 Jan. 04 Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

Certificate of Completion

This is to certify that

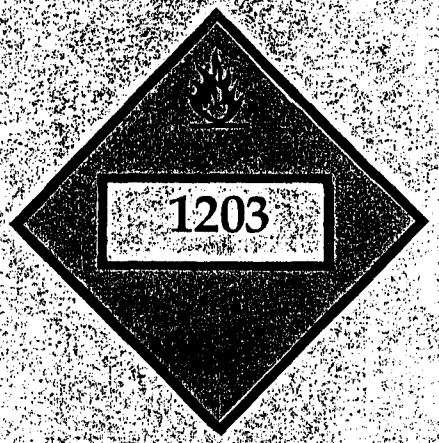
BRUCE KIRKPATRICK

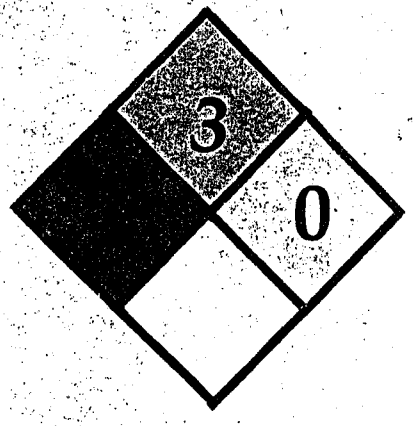
has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

January 18, 2001

118010001
Certificate Identification Number

Henry M. Butcher, REM, CEA





Certificate of Completion

This Certifies That

Bruce Kirkpatrick

has completed the 40 hour course:

OSHA 29CFR1910.120 Personnel Safety & Health Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

March 12-15, 1987

Date

Training Director

Respirator Fit-Test Record

Employee: Bruce Kirk Tetrick **Date:** 2/6/04

Person Fitting Respirator: Scott Pennington

All respirator fit tests will be conducted per the protocol of Appendix A to 1910.134: Fit-testing Procedures. Any deviation from this protocol will be noted in the "Remarks" section below.

Respirator Information

Manufacturer: Scott

Model: 4000

Size: Med

Optional Equipment

Spectacle Kit: N/A

Nose Cup: Yes

Communication: N/A

Testing

Pass: ✓ **Fail:** _____

Remarks

Stanson Chloride — For Smoke

MedWork
Occupational Health Care

725 S. Ludlow Street, Dayton, Ohio 45402

Date: 11/15/03

To: Bowser Morner

From: MEDWORK

Re: Donald Null

THE ABOVE EMPLOYEE HAS BEEN EXAMINED AT MEDWORK, INC. ON Donald Null. I HAVE REVIEWED THEIR MEDICAL HISTORY, THERIF CHEST X-RAY, PULMONARY FUNCTION AND LABORTORY STUDIES (BLOOD AND URINE TESTS) AND FOUND THEM IN GOOD HEALTH, EXCEPT FOR THOSE COMMENTS NOTED ON THE PHYSICAL EXAMINATION. THIS PHYSICAL EXAMINATION MEETS THE MEDICAL SURVEILLANCE REQUIREMENTS FOR THE HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE STANDARDS 1910.120. IT IS MY OPINION THEY ARE ABLE TO WORK IN THIS TYPE OF ENVIRONMENT USING PROPER SAFETY MEASURES AND WEARING A RESPIRATOR.

IF YOU HAVE ANY FURTHER QUESTIONS, PLEASE CONTACT OUR OFFICE.

PHYSICIAN SIGNATURE

F:\2Forms\BOWSERRECERT03-00.doc

Occupational Hazard Management

Certifies
that

DONALD NULL

Has successfully completed

HAZWOPER

Annual Refresher training
Training
In Accordance with
29 CFR 1910.120
on the

29th of December 2003

Training Certificate No.
29DEC03 020

B. L. Bernt — 29 Dec 03

Scott Berndt, CHMM — Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

Occupational Hazard Management

Certifies
that

DONALD NULL

Has successfully completed
PROCESS SAFETY MANAGEMENT
Training
In Accordance with
29 CFR 1910.119
on the

29 December 2003

Training Certificate No.
PSM 29DEC03 019

R L Berndt — 29 Dec 03.

Scott Berndt, CHMM — Date

Occupational Hazard Management
2001 Cottonwood Street
Findlay, Ohio 45840

RESPONSE
UNLIMITED

CERTIFIES THAT

DONALD NULL

HAS ATTENDED THE COURSE AND SUCCESSFULLY COMPLETED STUDIES IN

OSHA 40 HOUR SAFETY TRAINING FOR WASTE SITE WORKERS
(FULFILLS OSHA'S TRAINING REQUIREMENTS OF 29 CFR 1910.120)
(COVERING HAZARDOUS WASTE SITE OPERATIONS)

Brian P. Logue
INSTRUCTOR

April 18, 1999
CERTIFICATE EXPIRATION DATE

April 18, 1998
DATE

Certificate of Completion

This is to certify that

DONALD NULL

has successfully completed the
MSHA 30 CFR Part 46.8
8-Hour Annual Refresher Training
given at
Bowser-Morner, Inc.
4518 Taylorsville Road, Dayton, Ohio

December 28, 2000

1228000010
Certificate Identification Number

Henry M. Butcher, REM, CEA

12/29/2003

LAST NAME NULL
FIRST NAME DONALD

FIT TEST REPORT

Fit test information

ID NUMBER	297-68-4998		
LAST NAME	NULL	**CUSTOM1**	
FIRST NAME	DONALD	**CUSTOM2**	
COMPANY	BOWSER MORNER	**CUSTOM3**	
LOCATION	DAYTON	**CUSTOM4**	
NOTE			
TEST DATE	12/29/2003	**PORTACOUNT S/N**	44721
TEST TIME	09:59	**N95 COMPANION**	N
DUE DATE	12/29/2004		
RESPIRATOR		**PROTOCOL**	OSHA 29CFR1910.134
MANUFACTURER	SUVIVAIR	**PASS LEVEL**	1000
MODEL	20/20		
MASK STYLE	FULL FACE		
MASK SIZE	STANDARD		
APPROVAL			
EFF. < 99%	N		

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	21100	Y
DEEP BREATHING	60	9370	Y
HEAD SIDE TO SIDE	60	25300	Y
HEAD UP AND DOWN	60	29000	Y
TALKING	60	664	N
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	8970	Y
NORMAL BREATHING	60	16000	Y
OVERALL FF		3670	Y

FIT TEST OPERATOR Eric Horstman DATE 12/29/03
ERIC HORSTMAN

NAME Donald Null DATE 12-29-03
DONALD NULL

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-06-4-023

June 8, 2004

Project Number 7448

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number 0343

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include locating and staking locations for proposed groundwater monitoring and soil boring locations in and around the following SWMUs at NSWC Crane site in Indiana:

- SWMU 12, Mine Fill A
- SWMU 13, Mine Fill B
- SWMU 16, Cast High Explosive Fill/ Building 146

This is scheduled to be conducted from June 10 through June 15, 2004. These activities will be performed by Mr. Stan Conti, a Tetra Tech NUS, Inc. employee. After an evaluation of available historical information, it has been determined that Mr. Conti's planned activities will not involve a reasonable potential for any exposures to hazardous waste site safety or health hazards, and as such, the requirements of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations are not considered to be applicable for the purposes of this visit. Nonetheless, Mr. Conti is current in both HAZWOPER training and medical surveillance program requirements.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski
Dr. T. Johnston

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-07-4-017

July 7, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from July 8 through August 6, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) prepared under CTO 0357. These individuals are as follows:

Stan Conti	Chip Laney
Jim Goerdt	Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-07-4-052

July 27, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0343 and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include oversite of field activities being conducted at NSWC Crane site in Indiana. This is scheduled to be conducted from July 28-29, 2004. These activities will be performed by Mr. Mark Peterson, a Tetra Tech NUS, Inc. employee.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-08-4-019

August 6, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number [redacted] 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from August 9 through September 6, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) prepared under CTO 0357. These individuals are as follows:

Stan Conti	Chip Laney
Jim Goerdt	Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-08-4-031

August 13, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to add personnel conducting the field activities at the NSWC Crane site from August 15-18, 2004. Mr. Tom Dickson has been added to the field crew performing this work. All other information in our letter dated August 6, 2004 remains the same.

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld

c: B. Gorman (Code ES 42)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-09-4-006

September 3, 2004

Project Numbers 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 32)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers [redacted] and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; and surface water, seep and sediment sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from September 7 -30, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated June 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) Revision 1, dated August 2004, prepared under CTO 0357. These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
R. Basinski

TETRA TECH NUS, INC.
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Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-10-4-057

October 25, 2004

Project Number 7448 and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Bill Gates (Code ES 324)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0343 and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by a Tetra Tech NUS, Inc. employee under the CLEAN contract, and to attest that the individual identified herein is in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT at the NSWC Crane site in Indiana. This is scheduled to be conducted from October 25 through November 22, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator dated August 2004, prepared under CTO 0343 and the Health and Safety Plan for Mine Fill A (SWMU 12) dated August 2004, prepared under CTO 0357. These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/mlg

c: Mr. B. Gorman (Code ES34)
Mrs. D. Humbert
Mr. M. Perry
Mr. K. Henn
Mr. R. Basinski
File copy CTO 0343 and CTO 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-11-4-003

November 3, 2004

Project Numbers N0039, N0989, and N8925

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Mark Davidson (Code ES33)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Number 0078, 0328, and [redacted]

Subject: Personnel Clearance for Site Visit

Dear Mr. Davidson:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. personnel under the CLEAN contract, and to attest that the personnel identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include collecting groundwater samples at Site 8, Sites 36 and 37, and Site 59; and collecting a soil sample at Site 37 at the NAS Cecil Field site in Jacksonville, Florida. This is scheduled to be conducted November 4 and November 30, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow the Health and Safety Plan for National Attenuation Groundwater Monitoring Sites, Revision 4 dated May 2004, and the Health and Safety Plan for Operable Unit 9, Site 59 - Buildings 324/1845 Area Remedial Investigation dated September 2004. These individuals are as follows:

Scott McGuire	Dave Siefken
Chris Gleaton	Shina Ballard
Gus Nelson	Mervin Dale

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Solis, CIH, CSP
CLEAN Health and Safety Manager

MMS:lld
c: B. Gorman (Code ES34)
D. Humbert
M. Perry
K. Henn
M. Speranza
File

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-12-4-003

December 3, 2004

Project Number N6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0160, 0331, 0343, and 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from December 6, 2004 through December 17, 2004. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for Solid Waste Management Unit 7, dated December 2004, prepared under CTO 0160.
- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.

These individuals are as follows:

Stan Conti
Jim Goerdt
Terry Rojahn
Donald Westerhoff

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/mlg

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0160, 0331, 0343, and 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-12-4-053

December 30, 2004

Project Numbers 3961, 1245, 7448, and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0160, 0331, 0343, and [redacted]

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from January 4-28, 2005. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for Solid Waste Management Unit 7, dated December 2004, prepared under CTO 0160.
- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.

These individuals are as follows:

Stan Conti
Colin Doolan
Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/lld

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0160, 0331, 0343, and 0357

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-2-5-050

February 25, 2005

Project Numbers N1245, N6878, and 00042

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0331, 0357, and 0376

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from February 28 through March 16, 2005. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.
- Health and Safety Plan for Risk Assessment and CMS at Solid Waste Management Unit (SWMU) 9, dated February 2005, prepared under CTO 0376.

These individuals are as follows:

Jim Goerdt
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

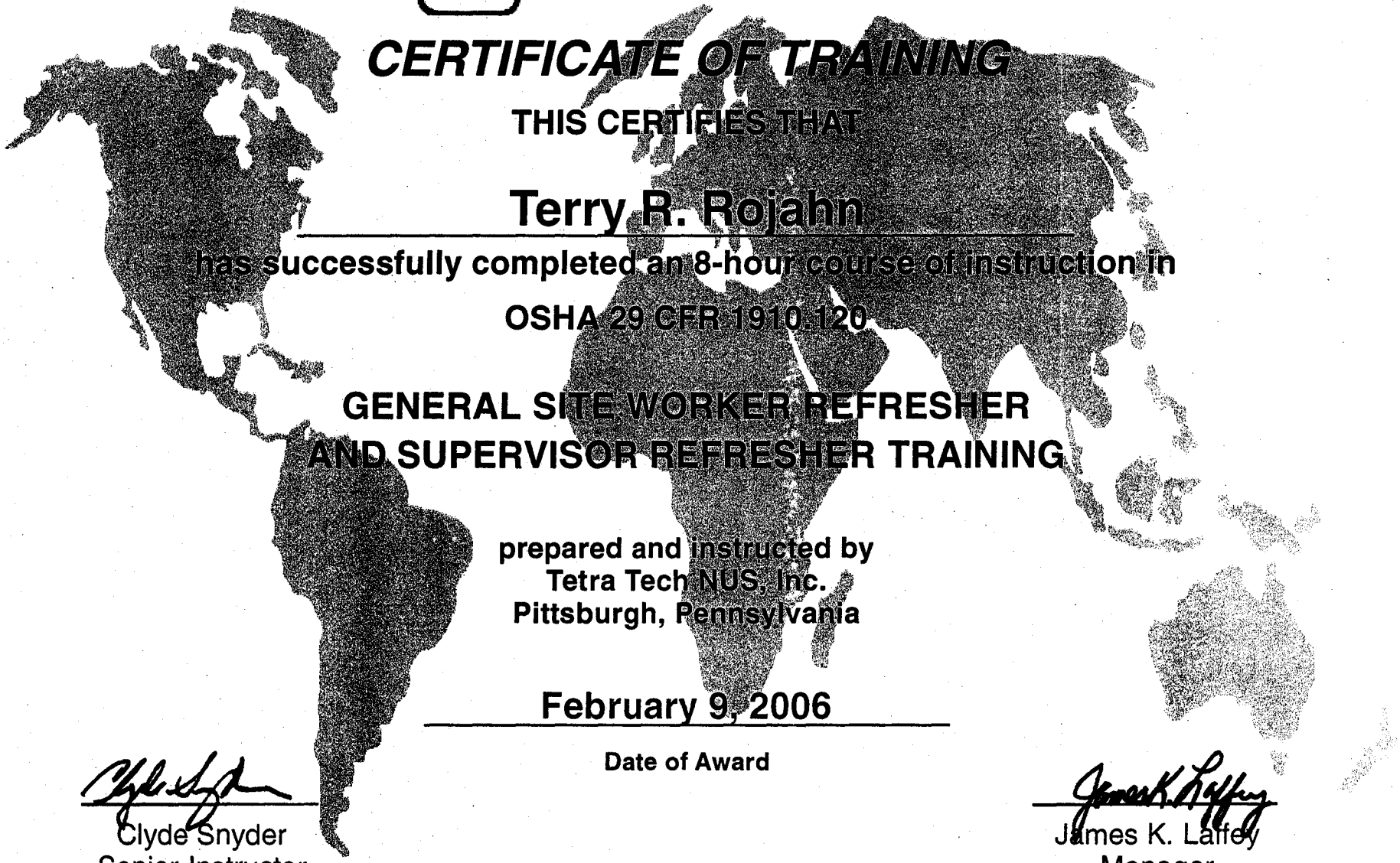
MMS/lld

cc: Mr. B. Gorman (Code ES34)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Roger Clark, Ph.D., TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc.
File copy CTO 0331, 0357, and 0376

APPENDIX F.4
SWMU 13
HEALTH AND SAFETY DOCUMENTATION
EXTERNAL SUMP/DRAINAGE INVESTIGATION
AND
PCB DELINEATION INVESTIGATIONS

TETRA TECH NUS

CERTIFICATE OF TRAINING



THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER
AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

February 9, 2006

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

October 28, 2005

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

James Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

December 29, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

SAFE WORK PERMIT FOR
MULTI MEDIA SAMPLING
NSWC, CRANE INDIANA

Permit No. 1 Date: 2/14/06 Time: From 7:00 to 18:00

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Multi media sampling including soils, surface water, groundwater and sediment sampling. If railway access is required, follow Railway Access Plan (HASP Att. VI)

II. Required Monitoring Instrument(s): FID or a PID with at least a 11.7 eV lamp

III. Field Crew: _____

IV. On-site Inspection conducted ☒ Yes ☐ No Initials of Inspector _____ _____
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required
Full face APR ☐ Escape Pack ☐
Half face APR ☐ None ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves

VI. Chemicals of Concern	Action Level(s)	Response Measures
VOCs/energetics	Any sustained readings(> 1minute >10 ppm above background in the workers breathing zone	Suspend site activities, report to an unaffected area
Metals/PAHs	>2 mg/m3	Employ area wetting dust suppression

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Tyvek coverall if there is a potential for soiling work clothes and PVC or PE coated Tyvek if saturation or work clothes may occur. Hard hat and hearing protection when working near operating equipment or other elevated noise sources. Reflective work vests when working near equipment or traffic or within wooded areas during hunting season.

VIII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation

	Yes	NA
Utility Locating and Excavation Clearance completed	☐	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐
Emergency Equipment Staged	☐	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions Contaminants may be bound to particulates, avoid generation of dusts and situation sampling operations in an upwind/unaffected area. If necessary use area wetting methods. Suspicious materials or items shall be avoided and reported to the site UXO is not anticipated to be a significant hazard at these sites. If suspicious material is located, contact NWSC Crane personnel. Use safe lifting practices when performing sampling activities and when carrying sample coolers. Pack glassware in hard sided containers for transport over uneven ground. Employ the Geoprobe Acetate tube retention kit for cutting acetate liners to avoid cuts and lacerations.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SOIL BORING OPERATIONS
NSWC, CRANE INDIANA

Permit No. 2 Date: 2/14/06 Time: From 7:00 to 18:00

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Soil boring using direct push technology hollow stem auger, or air rotary drilling. If railway access is required, follow Railway Access Plan (HASP Att. VI)

II. Required Monitoring Instrument(s): FID or PID with at least a 11.7 eV lamp

III. Field Crew: _____

IV. On-site Inspection conducted ☒ Yes ☐ No Initials of Inspector _____ _____
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required
Full face APR ☐ Escape Pack ☐
Half face APR ☐ None ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves

VI. Chemicals of Concern	Action Level(s)	Response Measures
VOCs/energetics	Any sustained readings(> 1minute >10 ppm above background in the workers breathing zone	Suspend site activities, report to an unaffected area
Metals/PAHs	>2 mg/m3	Employ area wetting dust suppression

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No		Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No	
Safety Glasses	☒ Yes ☐ No		Safety belt/harness	☐ Yes ☒ No	
Chemical/splash goggles	☐ Yes ☒ No		Radio	☐ Yes ☒ No	
Splash Shield	☐ Yes ☒ No		Barricades	☒ Yes ☐ No	
Splash suits/coveralls	☐ Yes ☐ No		Gloves (Type - Nitrile)	☒ Yes ☐ No	
Steel toe Work shoes or boots	☒ Yes ☐ No		Work/rest regimen	☐ Yes ☒ No	

Modifications/Exceptions: Tyvek coverall if there is a potential for soiling work cloths and PVC or PE coated Tyvek if saturation or work cloths may occur. Hard hats and hearing protection if sampling/working near the DPT/drilling vehicle. Reflective vests for working along in within traffic patterns or in wooded areas during hunting season.

VIII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation

	Yes	NA
Utility Locating and Excavation Clearance completed	☒	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐
Emergency Equipment Staged	☒	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Contaminants may be bound to particulates, avoid generation of dusts. Position sampling operations in an upwind/unaffected area. If necessary use area wetting methods. UXO is not anticipated to be a significant hazard at these sites. Equipment (drill rigs and DPT) shall be inspected using Attachment IV of the HASP. Emergency stop devices must be present and in good working condition. Do not modify site equipment. Stand clear of operating equipment. The drill rig operator will be responsible for visually inspecting the area and verbally alerting personnel prior to starting/engaging the equipment. Employ the Geoprobe Acetate tube retention kit for cutting acetate liners to avoid cuts and lacerations. Never place items to be cut on your knee or within your other hand. Where possible wear cut resistant protection at least on your non-knife hand.

Permit Issued by: _____ Permit Accepted by: _____

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam
Jay McFall	2-14-06	2-19-04	2-3-06		2-6-06
	2-14-06	12/91	12/05		11/05
David Hickey	2-14-06	1/91	1/06	01/01	11/05
TERRY ROLAND	2-14-06	10/85	2/06	03/88	11/04
JOSH DUTTON	2/20/06	12/01	10/05		1/06

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-02-6-020

February 10, 2006

Project No. N6878

Mr. William Gates (Code ES31)
Commander, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29119-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0357

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. (TtNUS) employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include DPT sampling; groundwater, surface water, sump, and sediment sampling at the NSWC Crane site in Indiana. This is scheduled to be conducted from February 13 through March 10, 2006. The individuals that will perform these tasks are employees of TtNUS. They will follow these listed health and safety plans.

- HASP for Mine Fill B (SWMU 13) Cast High Explosives Fill and B-146 Incinerator (SWMU 16) Revision 3, dated January 2006, prepared under CTO 0357.
- HASP for Mine Fill A (SWMU 12), Revision 2, dated January 2006, prepared under CTO 0357.

These individuals will participate in the planned activities described above:

Jim Goerdt
David Hickey
Terry Rojahn

If you have any questions, concerns, or if I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Matthew M. Soltis, CIH, CSP
CLEAN Health and Safety Manager

MMS/lld
c: Mr. B. Gorman (Code ES42)
Ms. Debra Humbert, TtNUS, Inc.
Mr. Mark Perry, TtNUS, Inc.
Mr. Keith Henn, TtNUS, Inc.
Mr. Ralph Basinski, TtNUS, Inc

CERTIFICATE OF COMPLETION

LET IT BE KNOWN THAT

JOSH DUTTON

HAS SATISFACTORILY COMPLETED
ALL REQUIRED COURSEWORK FOR

8 HOUR HAZWOPER REFRESHER

OCTOBER 11, 2005
FOR ENVIRONMENTAL FIELD SERVICES, INC.

FRANCES J. BROWN, M.ED., R.N., COHN-S
OSHA AUTHORIZED INSTRUCTOR
PROJECT T.E.A.C.H., INC.

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**

EMPLOYEE:	**Goerdt, James**	**COMPANY:**	**TT/NUS**
SSN:	**481-86-2691**	**POSITION:**	**Environmental Scientist**
DATE OF EXAM:	**11/07/2003**	**LOCATION:**	**TT/NUS-Pittsburgh**
EXPIRATION DATE:	**11/07/2005**	**SITE:**	**Pittsburgh**

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Rojahn, Terry	**COMPANY:**	TT/NUS
SSN:	XXX-XX-8670	**POSITION:**	Environmental Sampling
DATE OF EXAM:	11/05/2004	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/05/2006	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 11/10/04

Signature: Peter P Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

APPENDIX G

ANALYTICAL DATA

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
Dioxins (ng/kg)								
1,2,3,4,6,7,8,9-OCDD	2240 13SS010002 4430 13SB010204	1910 13SS020002 1900 13SB020204	2810 13SS030002 3030 13SB030204	3310 13SS040002 3580 13SS040002-D 1250 13SB040204	2910 13SS050002 3250 13SB050204	4140 13SS060002 330 13SB060204		
1,2,3,4,6,7,8,9-OCDF	0.2 U 13SS010002 0.2 U 13SB010204	0.2 U 13SS020002 0.2 U 13SB020204	0.5 U 13SS030002 0.3 U 13SB030204	2 U 13SS040002 3.4 J 13SS040002-D 3.4 U 13SB040204	1.6 U 13SS050002 0.6 U 13SB050204	4.6 J 13SS060002 0.7 U 13SB060204		
1,2,3,4,6,7,8-HPCDD	9.8 13SS010002 26.2 13SB010204	7.9 13SS020002 8.5 13SB020204	18 13SS030002 11.8 13SB030204	28.4 13SS040002 37.3 13SS040002-D 7.7 13SB040204	34.3 13SS050002 23.2 13SB050204	45.4 13SS060002 5 13SB060204		
1,2,3,4,6,7,8-HPCDF	0.1 U 13SS010002 0.1 U 13SB010204	0.09 U 13SS020002 0.09 U 13SB020204	0.2 U 13SS030002 0.2 U 13SB030204	0.87 U 13SS040002 1.9 J 13SS040002-D 1.3 U 13SB040204	0.68 U 13SS050002 0.2 U 13SB050204	2.1 J 13SS060002 0.2 U 13SB060204		
1,2,3,4,7,8,9-HPCDF	0.1 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	0.7 U 13SS040002 0.3 U 13SS040002-D 1.5 U 13SB040204	0.7 U 13SS050002 0.2 U 13SB050204	0.7 U 13SS060002 0.3 U 13SB060204		
1,2,3,4,7,8-HXCDD	0.2 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	0.6 U 13SS040002 0.5 J 13SS040002-D 1.5 U 13SB040204	0.7 U 13SS050002 0.2 U 13SB050204	0.6 J 13SS060002 0.2 U 13SB060204		
1,2,3,4,7,8-HXCDF	0.1 U 13SS010002 0.1 U 13SB010204	0.07 U 13SS020002 0.07 U 13SB020204	0.2 U 13SS030002 0.1 U 13SB030204	1 U 13SS040002 1.6 J 13SS040002-D 2.7 J 13SB040204	1.2 U 13SS050002 0.1 U 13SB050204	1.8 J 13SS060002 0.1 U 13SB060204		
1,2,3,6,7,8-HXCDD	0.1 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	0.54 U 13SS040002 0.77 J 13SS040002-D 1.4 U 13SB040204	0.86 U 13SS050002 0.2 U 13SB050204	1 U 13SS060002 0.2 U 13SB060204		
1,2,3,6,7,8-HXCDF	0.09 U 13SS010002 0.1 U 13SB010204	0.07 U 13SS020002 0.07 U 13SB020204	0.2 U 13SS030002 0.1 U 13SB030204	0.3 U 13SS040002 0.51 J 13SS040002-D 0.8 U 13SB040204	0.4 U 13SS050002 0.1 U 13SB050204	0.39 U 13SS060002 0.1 U 13SB060204		
1,2,3,7,8,9-HXCDD	0.2 U 13SS010002 0.67 J 13SB010204	0.1 U 13SS020002 0.69 J 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	0.6 U 13SS040002 1.4 J 13SS040002-D 1.5 U 13SB040204	2 U 13SS050002 1.2 U 13SB050204	1.5 J 13SS060002 0.3 U 13SB060204		
1,2,3,7,8,9-HXCDF	0.1 U 13SS010002 0.1 U 13SB010204	0.09 U 13SS020002 0.08 U 13SB020204	0.2 U 13SS030002 0.2 U 13SB030204	0.4 U 13SS040002 0.2 U 13SS040002-D 0.9 U 13SB040204	0.5 U 13SS050002 0.1 U 13SB050204	0.4 U 13SS060002 0.2 U 13SB060204		
1,2,3,7,8-PECDD	0.2 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.5 U 13SS030002 0.3 U 13SB030204	0.5 U 13SS040002 0.3 U 13SS040002-D 1.1 U 13SB040204	0.8 U 13SS050002 0.2 U 13SB050204	0.6 U 13SS060002 0.2 U 13SB060204		
1,2,3,7,8-PECDF	0.1 U 13SS010002 0.2 U 13SB010204	0.09 U 13SS020002 0.09 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	0.35 U 13SS040002 0.45 J 13SS040002-D 0.7 U 13SB040204	0.4 U 13SS050002 0.2 U 13SB050204	0.3 U 13SS060002 0.1 U 13SB060204		
2,3,4,6,7,8-HXCDF	0.1 U 13SS010002 0.1 U 13SB010204	0.07 U 13SS020002 0.07 U 13SB020204	0.2 U 13SS030002 0.1 U 13SB030204	0.3 U 13SS040002 0.65 J 13SS040002-D 0.8 U 13SB040204	0.4 U 13SS050002 0.1 U 13SB050204	0.7 J 13SS060002 0.1 U 13SB060204		
2,3,4,7,8-PECDF	0.1 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.4 U 13SS030002 0.2 U 13SB030204	5 J 13SS040002 5 13SS040002-D 15.4 13SB040204	3.7 J 13SS050002 0.2 U 13SB050204	8 13SS060002 0.2 U 13SB060204		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
2,3,7,8-TCDD	0.2 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.4 U 13SS030002 0.3 U 13SB030204	0.4 U 13SS040002 0.95 J 13SS040002-D 0.7 U 13SB040204	0.6 U 13SS050002 0.2 U 13SB050204	1.2 U 13SS060002 0.2 U 13SB060204		
2,3,7,8-TCDF	0.64 J 13SS010002 0.2 U 13SB010204	0.46 J 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	2 13SS040002 2.7 13SS040002-D 2.9 13SB040204	5 13SS050002 0.1 U 13SB050204	5.8 13SS060002 0.24 U 13SB060204		
TEQ BIRD HALFND	1.16481 13SS010002 0.97371 13SB010204	0.83736 13SS020002 0.49046 13SB020204	1.180525 13SS030002 0.867815 13SB030204	7.98255 13SS040002 9.71984 13SS040002-D 19.89637 13SB040204	9.99908 13SS050002 0.79623 13SB050204	15.67386 13SS060002 0.511535 13SB060204		
TEQ BIRD	0.8738 13SS010002 0.5362 13SB010204	0.6589 13SS020002 0.2675 13SB020204	0.299 13SS030002 0.3148 13SB030204	7.3594 13SS040002 9.55834 13SS040002-D 18.7027 13SB040204	9.0253 13SS050002 0.3482 13SB050204	14.71086 13SS060002 0.038 13SB060204		
TEQ MAMMAL HALFND	0.65901 13SS010002 1.07851 13SB010204	0.47421 13SS020002 0.50171 13SB020204	1.121025 13SS030002 0.843015 13SB030204	3.9687 13SS040002 5.19734 13SS040002-D 9.73867 13SB040204	4.00398 13SS050002 0.91903 13SB050204	6.92996 13SS060002 0.410035 13SB060204		
TEQ MAMMAL	0.386 13SS010002 0.772 13SB010204	0.316 13SS020002 0.344 13SB020204	0.461 13SS030002 0.421 13SB030204	3.315 13SS040002 5.03584 13SS040002-D 8.462 13SB040204	2.984 13SS050002 0.557 13SB050204	5.92946 13SS060002 0.083 13SB060204		
TOTAL HPCDD	19.8 13SS010002 44.2 13SB010204	16.3 13SS020002 16.4 13SB020204	36.9 13SS030002 25.1 13SB030204	66 13SS040002 95.4 13SS040002-D 17.4 13SB040204	78.5 13SS050002 52.1 13SB050204	112 13SS060002 8.7 13SB060204		
TOTAL HPCDF	0.1 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	1.9 U 13SS040002 4 13SS040002-D 1.4 U 13SB040204	1.7 J 13SS050002 0.2 U 13SB050204	4.8 J 13SS060002 0.2 U 13SB060204		
TOTAL HXCDD	1.3 J 13SS010002 1.1 J 13SB010204	1.2 J 13SS020002 1.5 J 13SB020204	1.1 U 13SS030002 0.2 U 13SB030204	5.2 J 13SS040002 11 J 13SS040002-D 1.4 U 13SB040204	15.7 J 13SS050002 4.2 J 13SB050204	15.1 J 13SS060002 1.1 13SB060204		
TOTAL HXCDF	0.1 U 13SS010002 0.1 U 13SB010204	0.07 U 13SS020002 0.07 U 13SB020204	0.2 U 13SS030002 0.1 U 13SB030204	3.9 J 13SS040002 6.7 13SS040002-D 2.7 13SB040204	2.5 J 13SS050002 0.1 U 13SB050204	9.8 J 13SS060002 0.1 U 13SB060204		
TOTAL PECDD	0.2 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.5 U 13SS030002 1.4 U 13SB030204	0.5 U 13SS040002 0.3 U 13SS040002-D 1.1 U 13SB040204	0.8 U 13SS050002 0.2 U 13SB050204	2.8 U 13SS060002 0.2 U 13SB060204		
TOTAL PECDF	0.1 U 13SS010002 0.2 U 13SB010204	0.94 J 13SS020002 0.1 U 13SB020204	0.3 U 13SS030002 0.2 U 13SB030204	48 J 13SS040002 46.3 J 13SS040002-D 71.8 J 13SB040204	23.1 J 13SS050002 0.2 U 13SB050204	79 J 13SS060002 0.49 U 13SB060204		
TOTAL TCDD	0.2 U 13SS010002 0.2 U 13SB010204	0.1 U 13SS020002 0.1 U 13SB020204	0.4 U 13SS030002 0.3 U 13SB030204	1.8 U 13SS040002 2.9 13SS040002-D 5.2 U 13SB040204	0.6 U 13SS050002 0.2 U 13SB050204	2.1 J 13SS060002 0.2 U 13SB060204		
TOTAL TCDF	7 J 13SS010002 0.2 U 13SB010204	15.7 J 13SS020002 0.1 U 13SB020204	1.8 13SS030002 0.94 U 13SB030204	238 J 13SS040002 216 J 13SS040002-D 292 J 13SB040204	177 J 13SS050002 1.7 13SB050204	328 J 13SS060002 1.3 U 13SB060204		
Volatile Organics (ug/kg)								
1,1,1,2-TETRACHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,1,1-TRICHLOROETHANE						1.2 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
						1 U 13SB060204		
1,1,2,2-TETRACHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,1,2-TRICHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,1-DICHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,1-DICHLOROETHENE						1.2 U 13SS060002 1 U 13SB060204		
1,2,3-TRICHLOROPROPANE						1.2 U 13SS060002 1 U 13SB060204		
1,2-DIBROMO-3-CHLOROPROPANE						1.2 U 13SS060002 1 U 13SB060204		
1,2-DIBROMOETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,2-DICHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
1,2-DICHLOROPROPANE						1.2 U 13SS060002 1 U 13SB060204		
1,4-DIOXANE						100 U 13SS060002 120 U 13SB060204		
2-BUTANONE						1.2 U 13SS060002 1 U 13SB060204		
2-HEXANONE						1.2 U 13SS060002 1 U 13SB060204		
3-CHLOROPROPENE						1.2 U 13SS060002 1 U 13SB060204		
4-METHYL-2-PENTANONE						1.2 U 13SS060002 1 U 13SB060204		
ACETONE						1.2 UJ 13SS060002 1 UJ 13SB060204		
ACETONITRILE						42 U 13SS060002 48 U 13SB060204		
ACROLEIN						1.2 UR 13SS060002 1 UR 13SB060204		
ACRYLONITRILE						1.2 U 13SS060002 1 U 13SB060204		
BENZENE						1.2 U 13SS060002 1 U 13SB060204		
BROMODICHLOROMETHANE						1.2 U 13SS060002 1 U 13SB060204		
BROMOFORM						1.2 U 13SS060002 1 U 13SB060204		
BROMOMETHANE						1.2 UJ 13SS060002 1 UJ 13SB060204		
CARBON DISULFIDE						1.2 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
						1 UJ 13SB060204		
CARBON TETRACHLORIDE						1.2 U 13SS060002 1 U 13SB060204		
CHLOROBENZENE						1.2 U 13SS060002 1 U 13SB060204		
CHLORODIBROMOMETHANE						1.2 U 13SS060002 1 U 13SB060204		
CHLOROETHANE						1.2 U 13SS060002 1 U 13SB060204		
CHLOROFORM						1.2 U 13SS060002 1 U 13SB060204		
CHLOROMETHANE						1.2 U 13SS060002 1 U 13SB060204		
CHLOROPRENE						1.2 U 13SS060002 1 U 13SB060204		
CIS-1,2-DICHLOROETHENE						1.2 U 13SS060002 1 U 13SB060204		
CIS-1,3-DICHLOROPROPENE						1.2 U 13SS060002 1 U 13SB060204		
DIBROMOMETHANE						1.2 U 13SS060002 1 U 13SB060204		
DICHLORODIFLUOROMETHANE						1.2 U 13SS060002 1 U 13SB060204		
ETHYL METHACRYLATE						1.2 U 13SS060002 1 U 13SB060204		
ETHYLBENZENE						1.2 U 13SS060002 1 U 13SB060204		
ISOBUTANOL						42 U 13SS060002 48 U 13SB060204		
METHACRYLONITRILE						1.2 U 13SS060002 1 U 13SB060204		
METHYL IODIDE						1.2 UJ 13SS060002 1 UJ 13SB060204		
METHYL METHACRYLATE						1.2 U 13SS060002 1 U 13SB060204		
METHYLENE CHLORIDE						1.2 UJ 13SS060002 3 BU 13SB060204		
PROPIONITRILE						42 U 13SS060002 48 U 13SB060204		
STYRENE						1.2 U 13SS060002 1 U 13SB060204		
TETRACHLOROETHENE						1.2 U 13SS060002 1 U 13SB060204		
TOLUENE						1.2 U 13SS060002 1 U 13SB060204		
TOTAL XYLENES						1.2 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
						1 U 13SB060204		
TRANS-1,2-DICHLOROETHENE						2 J 13SS060002 1 U 13SB060204		
TRANS-1,3-DICHLOROPROPENE						1.2 U 13SS060002 1 U 13SB060204		
TRANS-1,4-DICHLORO-2-BUTENE						1.2 U 13SS060002 1 U 13SB060204		
TRICHLOROETHENE						1.2 U 13SS060002 1 U 13SB060204		
TRICHLOROFLUOROMETHANE						2 J 13SS060002 2 J 13SB060204		
VINYL ACETATE						1.2 U 13SS060002 1 U 13SB060204		
VINYL CHLORIDE						1.2 U 13SS060002 1 U 13SB060204		
Semivolatile Organics (ug/kg)								
1,2,4,5-TETRACHLOROBENZENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,2,4-TRICHLOROBENZENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,2-DICHLOROBENZENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,3-DICHLOROBENZENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,4-DICHLOROBENZENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,4-NAPHTHOQUINONE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
1,4-PHENYLENEDIAMINE	80 UJ 13SS010002 81 UJ 13SB010204	80 UJ 13SS020002 78 UJ 13SB020204	78 UJ 13SS030002 79 UJ 13SB030204	84 UJ 13SS040002 87 UJ 13SS040002-D 81 UJ 13SB040204	99 UJ 13SS050002 80 UJ 13SB050204	87 UJ 13SS060002 87 UJ 13SB060204		
1-NAPHTHYLAMINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
2,2'-OXYBIS(1-CHLOROPROPANE)	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
2,3,4,6-TETRACHLOROPHENOL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	
LOCATION	13SB01	13SB02	13SB03	13SB04	13SB05	13SB06	13SB07	
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3
2,4,5-TRICHLOROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2,4,6-TRICHLOROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2,4-DICHLOROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2,4-DIMETHYLPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2,4-DINITROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2,6-DICHLOROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-ACETYLAMINOFLUORENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-CHLORONAPHTHALENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-CHLOROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-METHYLNAPHTHALENE	3.9 U 13SS010002	4 U 13SS020002	3.8 U 13SS030002	4.2 U 13SS040002	4.9 U 13SS050002	4.3 U 13SS060002		
				4.3 U 13SS040002-D				
	4 U 13SB010204	3.8 U 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
2-METHYLPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-NAPHTHYLAMINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-NITROANILINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-NITROPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
2-PICOLINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
3&4-METHYLPHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	87 U 13SS040002-D 81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
3,3'-DICHLOROBENZIDINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 UR 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
3,3'-DIMETHYLBENZIDINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
3-METHYLCHOLANTHRENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
3-NITROANILINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 UJ 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4,6-DINITRO-2-METHYLPHENOL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-AMINOBIPHENYL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-BROMOPHENYL PHENYL ETHER	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-CHLORO-3-METHYLPHENOL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-CHLOROANILINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 UJ 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-CHLOROPHENYL PHENYL ETHER	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-NITROANILINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-NITROPHENOL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
4-NITROQUINOLINE-1-OXIDE	80 UR 13SS010002 81 UR 13SB010204	80 UR 13SS020002 78 UR 13SB020204	78 UR 13SS030002 79 UR 13SB030204	84 UR 13SS040002 87 UR 13SS040002-D 81 UR 13SB040204	99 UR 13SS050002 80 UR 13SB050204	87 UR 13SS060002 87 UR 13SB060204		
5-NITRO-O-TOLUIDINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
7,12-DIMETHYLBENZ(A)ANTHRACENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
A,A-DIMETHYLPHENETHYLAMINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
ACENAPHTHENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	4.2 U 13SS040002 4.3 U 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	4.3 U 13SS060002 4.3 U 13SB060204		
ACENAPHTHYLENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	4.2 U 13SS040002 4.3 U 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	4.3 U 13SS060002 4.3 U 13SB060204		
ACETOPHENONE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
ANILINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
ANTHRACENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	4.2 U 13SS040002 4.3 U 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	5 J 13SS060002 4.3 U 13SB060204		
ARAMITE	80 UR 13SS010002 81 UR 13SB010204	80 UR 13SS020002 78 UR 13SB020204	78 UR 13SS030002 79 UR 13SB030204	84 UR 13SS040002 87 UR 13SS040002-D 81 UR 13SB040204	99 UR 13SS050002 80 UR 13SB050204	87 UR 13SS060002 87 UR 13SB060204		
BENZO(A)ANTHRACENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	20 13SS040002 22 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	32 13SS060002 4.3 U 13SB060204		
BENZO(A)PYRENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	27 13SS040002 34 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	42 13SS060002 4.3 U 13SB060204		
BENZO(B)FLUORANTHENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	37 13SS040002 40 13SS040002-D 4 U 13SB040204	7 J 13SS050002 3.9 U 13SB050204	58 13SS060002 4.3 U 13SB060204		
BENZO(G,H,I)PERYLENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	18 13SS040002 32 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	29 13SS060002 4.3 U 13SB060204		
BENZO(K)FLUORANTHENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	18 13SS040002 25 13SS040002-D 4 U 13SB040204	5 J 13SS050002 3.9 U 13SB050204	26 13SS060002 4.3 U 13SB060204		
BENZYL ALCOHOL	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
BIS(2-CHLOROETHOXY)METHANE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
BIS(2-CHLOROETHYL)ETHER	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	
LOCATION	13SB01	13SB02	13SB03	13SB04	13SB05	13SB06	13SB07	
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3
BIS(2-ETHYLHEXYL)PHTHALATE	130 J 13SS010002	91 J 13SS020002	78 U 13SS030002	120 J 13SS040002	99 U 13SS050002	140 J 13SS060002		
				130 J 13SS040002-D				
	110 J 13SB010204	110 J 13SB020204	79 U 13SB030204	120 J 13SB040204	130 J 13SB050204	90 J 13SB060204		
BUTYL BENZYL PHTHALATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
CHLOROBENZILATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
CHRYSENE	3.9 U 13SS010002	4 U 13SS020002	3.8 U 13SS030002	28 13SS040002	7 J 13SS050002	50 13SS060002		
				35 13SS040002-D				
	4 U 13SB010204	4 J 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
DIALLATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DIBENZO(A,H)ANTHRACENE	3.9 U 13SS010002	4 U 13SS020002	3.8 U 13SS030002	4.2 U 13SS040002	4.9 U 13SS050002	4.3 U 13SS060002		
				4.3 U 13SS040002-D				
	4 U 13SB010204	3.8 U 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
DIBENZOFURAN	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DIETHYL PHTHALATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DIMETHYL PHTHALATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DI-N-BUTYL PHTHALATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DI-N-OCTYL PHTHALATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
DIPHENYLAMINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
ETHYL METHANE SULFONATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		
				87 U 13SS040002-D				
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
FLUORANTHENE	6 J 13SS010002	4 U 13SS020002	3.8 U 13SS030002	34 13SS040002	10 13SS050002	75 13SS060002		
				35 13SS040002-D				
	4 U 13SB010204	7 J 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
FLUORENE	3.9 U 13SS010002	4 U 13SS020002	3.8 U 13SS030002	4.2 U 13SS040002	4.9 U 13SS050002	4.3 U 13SS060002		
				4.3 U 13SS040002-D				
	4 U 13SB010204	3.8 U 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
HEXACHLOROBENZENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002	99 U 13SS050002	87 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	87 U 13SS040002-D 81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
HEXACHLOROBUTADIENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
HEXACHLOROCYCLOPENTADIENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 UJ 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
HEXACHLOROETHANE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
HEXACHLOROPROPENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
INDENO(1,2,3-CD)PYRENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	16 13SS040002 23 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	26 13SS060002 4.3 U 13SB060204		
ISODRIN	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
ISOPHORONE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
ISOSAFROLE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
KEPONE	80 UJ 13SS010002 81 UJ 13SB010204	80 UJ 13SS020002 78 UJ 13SB020204	78 UJ 13SS030002 79 UJ 13SB030204	84 UJ 13SS040002 87 UJ 13SS040002-D 81 UJ 13SB040204	99 UJ 13SS050002 80 UJ 13SB050204	87 UJ 13SS060002 87 UJ 13SB060204		
METHAPYRILENE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
METHYL METHANE SULFONATE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
NAPHTHALENE	3.9 U 13SS010002 4 U 13SB010204	4 U 13SS020002 3.8 U 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	4.2 U 13SS040002 4.3 U 13SS040002-D 4 U 13SB040204	4.9 U 13SS050002 3.9 U 13SB050204	4.3 U 13SS060002 4.3 U 13SB060204		
N-NITROSODIETHYLAMINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
N-NITROSODIMETHYLAMINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
N-NITROSO-DI-N-BUTYLAMINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	
LOCATION	13SB01	13SB02	13SB03	13SB04	13SB05	13SB06	13SB07	
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
N-NITROSO-DI-N-PROPYLAMINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
N-NITROSOMETHYLETHYLAMINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
N-NITROSOMORPHOLINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
N-NITROSOPIPERIDINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
N-NITROSOPYRROLIDINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
O,O,O-TRIETHYL PHOSPHOROTHIOATE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
O-TOLUIDINE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
P-(DIMETHYLAMINO)AZOBENZENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PENTACHLOROBENZENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PENTACHLOROETHANE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PENTACHLORONITROBENZENE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PHENACETIN	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PHENANTHRENE	4 J 13SS010002	4 U 13SS020002	3.8 U 13SS030002	15 13SS040002 19 13SS040002-D	5 J 13SS050002	23 13SS060002		
	4 U 13SB010204	6 J 13SB020204	3.9 U 13SB030204	4 U 13SB040204	3.9 U 13SB050204	4.3 U 13SB060204		
PHENOL	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		
PRONAMIDE	80 U 13SS010002	80 U 13SS020002	78 U 13SS030002	84 U 13SS040002 87 U 13SS040002-D	99 U 13SS050002	87 U 13SS060002		
	81 U 13SB010204	78 U 13SB020204	79 U 13SB030204	81 U 13SB040204	80 U 13SB050204	87 U 13SB060204		

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB01 3/25/2003	01 13SB02 3/25/2003	01 13SB03 3/25/2003	01 13SB04 3/25/2003	01 13SB05 3/25/2003	01 13SB06 3/25/2003	01 13SB07 3/26/2003	3
PYRENE	7 J 13SS010002 4 U 13SB010204	4 U 13SS020002 13 13SB020204	3.8 U 13SS030002 3.9 U 13SB030204	45 13SS040002 65 13SS040002-D 4 U 13SB040204	10 13SS050002 3.9 U 13SB050204	65 13SS060002 4.3 U 13SB060204		
PYRIDINE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
SAFROLE	80 U 13SS010002 81 U 13SB010204	80 U 13SS020002 78 U 13SB020204	78 U 13SS030002 79 U 13SB030204	84 U 13SS040002 87 U 13SS040002-D 81 U 13SB040204	99 U 13SS050002 80 U 13SB050204	87 U 13SS060002 87 U 13SB060204		
Pesticides PCBs (ug/kg)								
AROCLOR-1016	20 U 13SS010002 20 U 13SB010204	20 U 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	21 UJ 13SS040002 22 UJ 13SS040002-D 20 U 13SB040204	25 U 13SS050002 20 U 13SB050204	22 U 13SS060002 22 U 13SB060204		
AROCLOR-1221	41 U 13SS010002 41 U 13SB010204	41 U 13SS020002 39 U 13SB020204	39 U 13SS030002 40 U 13SB030204	43 UJ 13SS040002 44 UJ 13SS040002-D 41 U 13SB040204	50 U 13SS050002 41 U 13SB050204	44 U 13SS060002 44 U 13SB060204		
AROCLOR-1232	20 U 13SS010002 20 U 13SB010204	20 U 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	21 UJ 13SS040002 22 UJ 13SS040002-D 20 U 13SB040204	25 U 13SS050002 20 U 13SB050204	22 U 13SS060002 22 U 13SB060204		
AROCLOR-1242	20 U 13SS010002 20 U 13SB010204	20 U 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	21 UJ 13SS040002 22 UJ 13SS040002-D 20 U 13SB040204	25 U 13SS050002 20 U 13SB050204	22 U 13SS060002 22 U 13SB060204		
AROCLOR-1248	220 13SS010002 20 U 13SB010204	210 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	46000 J 13SS040002 140000 J 13SS040002-D 35000 J 13SB040204	5100 13SS050002 20 U 13SB050204	1300 13SS060002 370 J 13SB060204		
AROCLOR-1254	20 U 13SS010002 20 U 13SB010204	20 U 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	21 UJ 13SS040002 22 UJ 13SS040002-D 20 U 13SB040204	25 U 13SS050002 20 U 13SB050204	22 U 13SS060002 22 U 13SB060204		
AROCLOR-1260	20 U 13SS010002 20 U 13SB010204	20 U 13SS020002 20 U 13SB020204	20 U 13SS030002 20 U 13SB030204	21 UJ 13SS040002 22 UJ 13SS040002-D 20 U 13SB040204	25 U 13SS050002 20 U 13SB050204	22 U 13SS060002 22 U 13SB060204		
Herbicides (ug/kg)								
HEXACHLOROPHENE	1 U 13SS010002 1 U 13SB010204	1 U 13SS020002 0.98 U 13SB020204	0.99 U 13SS030002 1 U 13SB030204	1.1 U 13SS040002 1.1 U 13SS040002-D 1 U 13SB040204	1.3 U 13SS050002 1 U 13SB050204	1.1 U 13SS060002 1.1 U 13SB060204		
PENTACHLOROPHENOL	1.6 R 13SS010002 0.85 J 13SB010204	1.6 R 13SS020002 0.52 U 13SB020204	0.52 U 13SS030002 0.53 U 13SB030204	0.57 U 13SS040002 1.1 J 13SS040002-D 0.54 U 13SB040204	0.66 U 13SS050002 0.54 U 13SB050204	0.58 U 13SS060002 0.58 U 13SB060204		
Miscellaneous Parameter								
CATION EXCHANGE CAPACITY (MEQ/1)							14 13SS070002 14 13SB070810	15 18 13
PH (S.U.)							7.4 13SS070002 5.3 13SB070810	5.1 5.2 5.8
TOTAL ORGANIC CARBON (mg/kg)							1000 U 13SS070002	1000 U

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	01	01	01	01	01	01	01	
LOCATION	13SB01	13SB02	13SB03	13SB04	13SB05	13SB06	13SB07	
SAMPLE DATE	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/25/2003	3/26/2003	3
								1300
							1100 J 13SB070810	1000 U

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
Dioxins (ng/kg)							
1,2,3,4,6,7,8,9-OCDD		1570 J 13SS090002 2070 J 13SS090002-D 923 J 13SB090204	2270 J 13SS100002 1410 J 13SB100204	828 J 13SS110002 3460 J 13SB110204	813 J 13SS120002 2720 J 13SB120204	2390 J 13SS130002 3210 J 13SB130204	2340 13SS140001 REF
1,2,3,4,6,7,8,9-OCDF		1.7 J 13SS090002 1.8 J 13SS090002-D 0.4 UJ 13SB090204	1.3 U 13SS100002 2.9 J 13SB100204	0.55 J 13SS110002 0.1 UJ 13SB110204	0.2 UJ 13SS120002 0.2 UJ 13SB120204	0.3 UJ 13SS130002 0.3 UJ 13SB130204	9.5 J 13SS140001 REF
1,2,3,4,6,7,8-HPCDD		13.6 13SS090002 18.4 13SS090002-D 8.1 13SB090204	18.8 13SS100002 10.6 13SB100204	6.2 13SS110002 25 13SB110204	8.1 13SS120002 15.3 13SB120204	19.1 13SS130002 17 13SB130204	22.7 13SS140001 REF
1,2,3,4,6,7,8-HPCDF		2.3 J 13SS090002 2.4 J 13SS090002-D 0.69 13SB090204	3.1 J 13SS100002 1.1 J 13SB100204	0.18 U 13SS110002 0.08 U 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.57 J 13SS130002 0.2 U 13SB130204	4 U 13SS140001 REF
1,2,3,4,7,8,9-HPCDF		0.3 U 13SS090002 0.2 U 13SS090002-D 0.2 U 13SB090204	0.3 U 13SS100002 0.3 U 13SB100204	0.1 U 13SS110002 0.1 U 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.2 U 13SS130002 0.2 U 13SB130204	1.3 J 13SS140001 REF
1,2,3,4,7,8-HXCDD		0.2 U 13SS090002 0.2 U 13SS090002-D 0.2 U 13SB090204	0.2 U 13SS100002 0.2 U 13SB100204	0.1 U 13SS110002 0.09 U 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.63 J 13SS130002 0.44 J 13SB130204	0.42 J 13SS140001 REF
1,2,3,4,7,8-HXCDF		0.46 U 13SS090002 0.5 U 13SS090002-D 0.73 13SB090204	0.41 U 13SS100002 1.7 J 13SB100204	0.33 U 13SS110002 0.2 U 13SB110204	0.08 U 13SS120002 0.13 U 13SB120204	0.51 U 13SS130002 0.1 U 13SB130204	6.4 13SS140001 REF
1,2,3,6,7,8-HXCDD		0.2 U 13SS090002 0.41 J 13SS090002-D 0.17 U 13SB090204	0.2 U 13SS100002 0.2 U 13SB100204	0.1 U 13SS110002 0.3 U 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.69 J 13SS130002 0.33 U 13SB130204	0.84 J 13SS140001 REF
1,2,3,6,7,8-HXCDF		0.3 U 13SS090002 0.1 U 13SS090002-D 0.1 U 13SB090204	0.1 U 13SS100002 0.45 U 13SB100204	0.07 U 13SS110002 0.14 U 13SB110204	0.08 U 13SS120002 0.07 U 13SB120204	0.41 U 13SS130002 0.1 U 13SB130204	1.6 J 13SS140001 REF
1,2,3,7,8,9-HXCDD		0.72 J 13SS090002 0.69 J 13SS090002-D 0.5 U 13SB090204	0.79 J 13SS100002 0.53 J 13SB100204	0.1 U 13SS110002 1.1 J 13SB110204	0.49 U 13SS120002 0.1 U 13SB120204	1.6 J 13SS130002 0.96 13SB130204	1.5 J 13SS140001 REF
1,2,3,7,8,9-HXCDF		0.2 U 13SS090002 0.2 U 13SS090002-D 0.2 U 13SB090204	0.2 U 13SS100002 0.2 U 13SB100204	0.09 U 13SS110002 0.07 U 13SB110204	0.1 U 13SS120002 0.09 U 13SB120204	0.31 J 13SS130002 0.1 U 13SB130204	0.33 J 13SS140001 REF
1,2,3,7,8-PECDD		0.34 U 13SS090002 0.2 U 13SS090002-D 0.2 U 13SB090204	0.3 U 13SS100002 0.3 U 13SB100204	0.2 U 13SS110002 0.1 U 13SB110204	0.2 U 13SS120002 0.21 J 13SB120204	0.71 J 13SS130002 0.1 U 13SB130204	0.2 U 13SS140001 REF
1,2,3,7,8-PECDF		0.2 U 13SS090002 0.1 U 13SS090002-D 0.31 13SB090204	0.2 U 13SS100002 0.66 U 13SB100204	0.09 U 13SS110002 0.08 U 13SB110204	0.1 U 13SS120002 0.3 J 13SB120204	0.36 J 13SS130002 0.08 U 13SB130204	2.5 J 13SS140001 REF
2,3,4,6,7,8-HXCDF		0.21 U 13SS090002 0.1 U 13SS090002-D 0.2 U 13SB090204	0.21 J 13SS100002 0.59 J 13SB100204	0.07 U 13SS110002 0.09 J 13SB110204	0.07 U 13SS120002 0.07 U 13SB120204	0.42 J 13SS130002 0.1 U 13SB130204	1.8 J 13SS140001 REF
2,3,4,7,8-PECDF		0.53 U 13SS090002 1.1 J 13SS090002-D 0.66 U 13SB090204	1.2 J 13SS100002 6.8 13SB100204	1 J 13SS110002 0.31 J 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.47 J 13SS130002 0.1 U 13SB130204	21.8 13SS140001 REF

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
2,3,7,8-TCDD		0.52 J 13SS090002 0.49 U 13SS090002-D 0.1 U 13SB090204	0.4 U 13SS100002 0.2 U 13SB100204	0.1 U 13SS110002 0.1 U 13SB110204	0.2 U 13SS120002 0.1 U 13SB120204	0.2 U 13SS130002 0.1 U 13SB130204	0.1 U 13SS140001 REF
2,3,7,8-TCDF		0.35 J 13SS090002 1.1 13SS090002-D 0.5 U 13SB090204	0.56 J 13SS100002 5.2 13SB100204	1.2 13SS110002 0.2 U 13SB110204	0.1 U 13SS120002 0.09 U 13SB120204	0.53 J 13SS130002 0.1 U 13SB130204	21 13SS140001 REF
TEQ BIRD HALFND		1.64677 13SS090002 2.92368 13SS090002-D 0.99819 13SB090204	2.539865 13SS100002 12.76789 13SB100204	2.480955 13SS110002 1.02916 13SB110204	0.43942 13SS120002 0.69932 13SB120204	2.42823 13SS130002 0.68368 13SB130204	44.68305 13SS140001 REF
TEQ BIRD		1.13577 13SS090002 2.52268 13SS090002-D 0.21134 13SB090204	2.1368 13SS100002 12.44489 13SB100204	2.289055 13SS110002 0.80001 13SB110204	0.08942 13SS120002 0.52732 13SB120204	2.28123 13SS130002 0.45603 13SB130204	44.51305 13SS140001 REF
TEQ MAMMAL HALFND		1.33067 13SS090002 1.58868 13SS090002-D 0.67824 13SB090204	1.614065 13SS100002 4.78079 13SB100204	0.961505 13SS110002 1.02291 13SB110204	0.44682 13SS120002 0.76352 13SB120204	1.96373 13SS130002 0.80153 13SB130204	15.05895 13SS140001 REF
TEQ MAMMAL		0.94317 13SS090002 1.18518 13SS090002-D 0.26874 13SB090204	1.202 13SS100002 4.46029 13SB100204	0.764855 13SS110002 0.87001 13SB110204	0.16232 13SS120002 0.65002 13SB120204	1.81673 13SS130002 0.63103 13SB130204	14.88895 13SS140001 REF
TOTAL HPCDD		28 13SS090002 38.4 13SS090002-D 17 13SB090204	36.2 13SS100002 21.4 13SB100204	11.8 13SS110002 47.3 13SB110204	14.5 13SS120002 26.4 13SB120204	36.5 13SS130002 44.1 13SB130204	56 13SS140001 REF
TOTAL HPCDF		3.7 13SS090002 4.6 J 13SS090002-D 1.5 J 13SB090204	5.3 13SS100002 2 J 13SB100204	0.38 J 13SS110002 0.1 U 13SB110204	0.1 U 13SS120002 0.1 U 13SB120204	0.57 13SS130002 0.2 U 13SB130204	10.1 J 13SS140001 REF
TOTAL HXCDD		3.1 13SS090002 4.2 J 13SS090002-D 2.5 J 13SB090204	3.8 13SS100002 1.5 J 13SB100204	0.77 J 13SS110002 4 J 13SB110204	1.1 J 13SS120002 0.65 J 13SB120204	5 13SS130002 3.4 J 13SB130204	8.4 J 13SS140001 REF
TOTAL HXCDF		3.1 J 13SS090002 3.4 J 13SS090002-D 2.4 J 13SB090204	4.1 J 13SS100002 5.4 J 13SB100204	0.33 13SS110002 0.43 13SB110204	0.08 U 13SS120002 0.13 U 13SB120204	1.6 13SS130002 0.1 U 13SB130204	19.4 J 13SS140001 REF
TOTAL PECDD		0.34 U 13SS090002 0.2 U 13SS090002-D 0.2 U 13SB090204	0.3 U 13SS100002 0.3 U 13SB100204	0.2 U 13SS110002 0.1 U 13SB110204	0.2 U 13SS120002 0.21 13SB120204	0.71 13SS130002 0.1 U 13SB130204	2.1 U 13SS140001 REF
TOTAL PECDF		7.6 J 13SS090002 15.3 J 13SS090002-D 6.1 J 13SB090204	11.8 J 13SS100002 40.1 J 13SB100204	4.6 J 13SS110002 1.8 13SB110204	0.1 U 13SS120002 0.3 13SB120204	0.83 13SS130002 0.09 U 13SB130204	135 J 13SS140001 REF
TOTAL TCDD		0.52 13SS090002 1.1 U 13SS090002-D 0.1 U 13SB090204	0.71 U 13SS100002 3 J 13SB100204	0.33 U 13SS110002 0.15 13SB110204	0.2 U 13SS120002 0.1 U 13SB120204	0.2 U 13SS130002 0.1 U 13SB130204	2.2 U 13SS140001 REF
TOTAL TCDF		39.9 J 13SS090002 55.4 J 13SS090002-D 24.6 J 13SB090204	59.4 J 13SS100002 211 J 13SB100204	36.1 J 13SS110002 12.8 J 13SB110204	0.1 U 13SS120002 0.09 U 13SB120204	7.8 J 13SS130002 0.1 U 13SB130204	540 J 13SS140001 REF
Volatile Organics (ug/kg)							
1,1,1,2-TETRACHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,1,1-TRICHLOROETHANE		1.4 U 13SS150002					

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		1.2 U 13SB150204					
1,1,2,2-TETRACHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,1,2-TRICHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,1-DICHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,1-DICHLOROETHENE		1.4 U 13SS150002 1.2 U 13SB150204					
1,2,3-TRICHLOROPROPANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,2-DIBROMO-3-CHLOROPROPANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,2-DIBROMOETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,2-DICHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,2-DICHLOROPROPANE		1.4 U 13SS150002 1.2 U 13SB150204					
1,4-DIOXANE		140 U 13SS150002 120 U 13SB150204					
2-BUTANONE		1.4 U 13SS150002 18 13SB150204					
2-HEXANONE		1.4 U 13SS150002 1.2 U 13SB150204					
3-CHLOROPROPENE		1.4 U 13SS150002 1.2 U 13SB150204					
4-METHYL-2-PENTANONE		1.4 U 13SS150002 3 J 13SB150204					
ACETONE		1.4 UJ 13SS150002 89 BJ 13SB150204					
ACETONITRILE		56 U 13SS150002 46 U 13SB150204					
ACROLEIN		1.4 UR 13SS150002 1.2 UR 13SB150204					
ACRYLONITRILE		1.4 U 13SS150002 1.2 U 13SB150204					
BENZENE		1.4 U 13SS150002 1.2 U 13SB150204					
BROMODICHLOROMETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
BROMOFORM		1.4 U 13SS150002 1.2 U 13SB150204					
BROMOMETHANE		1.4 UJ 13SS150002 1.2 UJ 13SB150204					
CARBON DISULFIDE		1.4 UJ 13SS150002					

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		1.2 UJ 13SB150204					
CARBON TETRACHLORIDE		1.4 U 13SS150002 1.2 U 13SB150204					
CHLOROBENZENE		1.4 U 13SS150002 1.2 U 13SB150204					
CHLORODIBROMOMETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
CHLOROETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
CHLOROFORM		1.4 U 13SS150002 1.2 U 13SB150204					
CHLOROMETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
CHLOROPRENE		1.4 U 13SS150002 1.2 U 13SB150204					
CIS-1,2-DICHLOROETHENE		1.4 U 13SS150002 1.2 U 13SB150204					
CIS-1,3-DICHLOROPROPENE		1.4 U 13SS150002 1.2 U 13SB150204					
DIBROMOMETHANE		1.4 U 13SS150002 1.2 U 13SB150204					
DICHLORODIFLUOROMETHANE		1.4 UJ 13SS150002 7 J 13SB150204					
ETHYL METHACRYLATE		1.4 U 13SS150002 1.2 U 13SB150204					
ETHYLBENZENE		1.4 U 13SS150002 1.2 U 13SB150204					
ISOBUTANOL		56 U 13SS150002 46 U 13SB150204					
METHACRYLONITRILE		1.4 U 13SS150002 1.2 U 13SB150204					
METHYL IODIDE		1.4 U 13SS150002 1.2 U 13SB150204					
METHYL METHACRYLATE		1.4 U 13SS150002 1.2 U 13SB150204					
METHYLENE CHLORIDE		1.4 UJ 13SS150002 1.2 UJ 13SB150204					
PROPIONITRILE		56 U 13SS150002 46 U 13SB150204					
STYRENE		1.4 U 13SS150002 1.2 U 13SB150204					
TETRACHLOROETHENE		1.4 U 13SS150002 1.2 U 13SB150204					
TOLUENE		1.4 U 13SS150002 1.2 U 13SB150204					
TOTAL XYLENES		1.4 U 13SS150002					

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		1.2 U 13SB150204					
TRANS-1,2-DICHLOROETHENE		1.4 U 13SS150002 1.2 U 13SB150204					
TRANS-1,3-DICHLOROPROPENE		1.4 U 13SS150002 1.2 U 13SB150204					
TRANS-1,4-DICHLORO-2-BUTENE		1.4 U 13SS150002 1.2 U 13SB150204					
TRICHLOROETHENE		1.4 U 13SS150002 1.2 U 13SB150204					
TRICHLOROFLUOROMETHANE		3 J 13SS150002 3 J 13SB150204					
VINYL ACETATE		1.4 U 13SS150002 1.2 U 13SB150204					
VINYL CHLORIDE		1.4 U 13SS150002 1.2 U 13SB150204					
Semivolatile Organics (ug/kg)							
1,2,4,5-TETRACHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,2,4-TRICHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,2-DICHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,3-DICHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,4-DICHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,4-NAPHTHOQUINONE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
1,4-PHENYLENEDIAMINE		90 UJ 13SS090002 89 UJ 13SS090002-D 76 UJ 13SB090204	82 UJ 13SS100002 77 UJ 13SB100204	80 UJ 13SS110002 78 UJ 13SB110204	82 UJ 13SS120002 76 UJ 13SB120204	81 UJ 13SS130002 83 UJ 13SB130204	85 UJ 13SS140001 REF
1-NAPHTHYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,2'-OXYBIS(1-CHLOROPROPANE)		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,3,4,6-TETRACHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
2,4,5-TRICHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,4,6-TRICHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,4-DICHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,4-DIMETHYLPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,4-DINITROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2,6-DICHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-ACETYLAMINOFLUORENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-CHLORONAPHTHALENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-CHLOROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-METHYLNAPHTHALENE		4.4 U 13SS090002 4.4 U 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
2-METHYLPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-NAPHTHYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-NITROANILINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-NITROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
2-PICOLINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
3&4-METHYLPHENOL		90 U 13SS090002	82 U 13SS100002	80 U 13SS110002	82 U 13SS120002	81 U 13SS130002	85 U 13SS140001

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		89 U 13SS090002-D 560 13SB090204	77 U 13SB100204	78 U 13SB110204	76 U 13SB120204	83 U 13SB130204	REF
3,3'-DICHLOROBENZIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
3,3'-DIMETHYLBENZIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
3-METHYLCHOLANTHRENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
3-NITROANILINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4,6-DINITRO-2-METHYLPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-AMINOBIPHENYL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001
4-BROMOPHENYL PHENYL ETHER		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-CHLORO-3-METHYLPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-CHLOROANILINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-CHLOROPHENYL PHENYL ETHER		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-NITROANILINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-NITROPHENOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
4-NITROQUINOLINE-1-OXIDE		90 UR 13SS090002 89 UR 13SS090002-D 76 UR 13SB090204	82 UR 13SS100002 77 UR 13SB100204	80 UR 13SS110002 78 UR 13SB110204	82 UR 13SS120002 76 UR 13SB120204	81 UR 13SS130002 83 UR 13SB130204	85 UR 13SS140001 REF
5-NITRO-O-TOLUIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
7,12-DIMETHYLBENZ(A)ANTHRACENE		90 U 13SS090002 89 U 13SS090002-D	82 U 13SS100002	80 U 13SS110002	82 U 13SS120002	81 U 13SS130002	85 U 13SS140001

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		76 U 13SB090204	77 U 13SB100204	78 U 13SB110204	76 U 13SB120204	83 U 13SB130204	REF
A,A-DIMETHYLPHENETHYLAMINE		90 UJ 13SS090002 89 UJ 13SS090002-D 76 UJ 13SB090204	82 UJ 13SS100002 77 UJ 13SB100204	80 UJ 13SS110002 78 UJ 13SB110204	82 UJ 13SS120002 76 UJ 13SB120204	81 UJ 13SS130002 83 UJ 13SB130204	85 UJ 13SS140001 REF
ACENAPHTHENE		52 J 13SS090002 4.4 UJ 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
ACENAPHTHYLENE		4.4 U 13SS090002 4.4 U 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
ACETOPHENONE		90 U 13SS090002 150 J 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
ANILINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
ANTHRACENE		210 J 13SS090002 4.4 UJ 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
ARAMITE		90 UR 13SS090002 89 UR 13SS090002-D 76 UR 13SB090204	82 UR 13SS100002 77 UR 13SB100204	80 UR 13SS110002 78 UR 13SB110204	82 UR 13SS120002 76 UR 13SB120204	81 UR 13SS130002 83 UR 13SB130204	85 UR 13SS140001 REF
BENZO(A)ANTHRACENE		1100 J 13SS090002 44 J 13SS090002-D 3.7 U 13SB090204	7 J 13SS100002 3.8 U 13SB100204	5 J 13SS110002 3.9 U 13SB110204	4 J 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	8 J 13SS140001 REF
BENZO(A)PYRENE		1000 J 13SS090002 71 J 13SS090002-D 3.7 U 13SB090204	7 J 13SS100002 3.8 U 13SB100204	6 J 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	10 13SS140001 REF
BENZO(B)FLUORANTHENE		1100 J 13SS090002 93 J 13SS090002-D 3.7 U 13SB090204	14 13SS100002 3.8 U 13SB100204	9 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	14 J 13SS140001 REF
BENZO(G,H,I)PERYLENE		750 J 13SS090002 57 J 13SS090002-D 3.7 U 13SB090204	8 J 13SS100002 3.8 U 13SB100204	6 J 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	9 13SS140001 REF
BENZO(K)FLUORANTHENE		640 J 13SS090002 74 J 13SS090002-D 3.7 U 13SB090204	8 J 13SS100002 3.8 U 13SB100204	5 J 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	10 13SS140001 REF
BENZYL ALCOHOL		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
BIS(2-CHLOROETHOXY)METHANE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
BIS(2-CHLOROETHYL)ETHER		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
BIS(2-ETHYLHEXYL)PHTHALATE		140 J 13SS090002 100 J 13SS090002-D 76 U 13SB090204	110 J 13SS100002 110 J 13SB100204	80 U 13SS110002 78 U 13SB110204	130 J 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	190 BU 13SS140001 REF
BUTYL BENZYL PHTHALATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
CHLOROBENZILATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
CHRYSENE		1100 J 13SS090002 77 J 13SS090002-D 3.7 U 13SB090204	13 13SS100002 3.8 U 13SB100204	10 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	11 13SS140001 REF
DIALLATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DIBENZO(A,H)ANTHRACENE		200 J 13SS090002 16 J 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
DIBENZOFURAN		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DIETHYL PHTHALATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DIMETHYL PHTHALATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DI-N-BUTYL PHTHALATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DI-N-OCTYL PHTHALATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
DIPHENYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
ETHYL METHANE SULFONATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
FLUORANTHENE		1800 J 13SS090002 23 J 13SS090002-D 3.7 U 13SB090204	10 13SS100002 3.8 U 13SB100204	6 J 13SS110002 3.9 U 13SB110204	7 J 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	9 13SS140001 REF
FLUORENE		50 J 13SS090002 4.4 UJ 13SS090002-D 3.7 U 13SB090204	4.1 U 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
HEXACHLOROBENZENE		90 U 13SS090002	82 U 13SS100002	80 U 13SS110002	82 U 13SS120002	81 U 13SS130002	85 U 13SS140001

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		89 U 13SS090002-D 76 U 13SB090204	77 U 13SB100204	78 U 13SB110204	76 U 13SB120204	83 U 13SB130204	REF
HEXACHLOROBUTADIENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
HEXACHLOROCYCLOPENTADIENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
HEXACHLOROETHANE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
HEXACHLOROPROPENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
INDENO(1,2,3-CD)PYRENE		650 J 13SS090002 51 J 13SS090002-D 3.7 U 13SB090204	7 J 13SS100002 3.8 U 13SB100204	4 J 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	7 J 13SS140001 REF
ISODRIN		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
ISOPHORONE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
ISOSAFROLE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
KEPONE		90 UJ 13SS090002 89 UJ 13SS090002-D 76 UJ 13SB090204	82 UJ 13SS100002 77 UJ 13SB100204	80 UJ 13SS110002 78 UJ 13SB110204	82 UJ 13SS120002 76 UJ 13SB120204	81 UJ 13SS130002 83 UJ 13SB130204	85 UR 13SS140001 REF
METHAPYRILENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
METHYL METHANE SULFONATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
NAPHTHALENE		4.4 U 13SS090002 4.4 U 13SS090002-D 3.7 U 13SB090204	5 J 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	4 U 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
N-NITROSODIETHYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSODIMETHYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSO-DI-N-BUTYLAMINE		90 U 13SS090002 89 U 13SS090002-D	82 U 13SS100002	80 U 13SS110002	82 U 13SS120002	81 U 13SS130002	85 U 13SS140001

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
		76 U 13SB090204	77 U 13SB100204	78 U 13SB110204	76 U 13SB120204	83 U 13SB130204	REF
N-NITROSO-DI-N-PROPYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSOMETHYLETHYLAMINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSOMORPHOLINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSOPIPERIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
N-NITROSOPYRROLIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
O,O,O-TRIETHYL PHOSPHOROTHIOATE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
O-TOLUIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
P-(DIMETHYLAMINO)AZOBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PENTACHLOROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PENTACHLOROETHANE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PENTACHLORONITROBENZENE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PHENACETIN		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PHENANTHRENE		1000 J 13SS090002 8 J 13SS090002-D 3.7 U 13SB090204	5 J 13SS100002 3.8 U 13SB100204	3.9 U 13SS110002 3.9 U 13SB110204	6 J 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	4.2 U 13SS140001 REF
PHENOL		90 U 13SS090002 89 U 13SS090002-D 110 J 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
PRONAMIDE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 /30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
PYRENE		2400 J 13SS090002 26 J 13SS090002-D 3.7 U 13SB090204	10 13SS100002 3.8 U 13SB100204	6 J 13SS110002 3.9 U 13SB110204	7 J 13SS120002 3.8 U 13SB120204	4 U 13SS130002 4.1 U 13SB130204	12 13SS140001 REF
PYRIDINE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
SAFROLE		90 U 13SS090002 89 U 13SS090002-D 76 U 13SB090204	82 U 13SS100002 77 U 13SB100204	80 U 13SS110002 78 U 13SB110204	82 U 13SS120002 76 U 13SB120204	81 U 13SS130002 83 U 13SB130204	85 U 13SS140001 REF
Pesticides PCBs (ug/kg)							
AROCLOR-1016		23 U 13SS090002 23 U 13SS090002-D 19 U 13SB090204	21 U 13SS100002 20 U 13SB100204	20 U 13SS110002 20 U 13SB110204	21 U 13SS120002 19 U 13SB120204	21 U 13SS130002 21 U 13SB130204	22 U 13SS140001 REF
AROCLOR-1221		46 U 13SS090002 45 U 13SS090002-D 39 U 13SB090204	42 U 13SS100002 39 U 13SB100204	40 U 13SS110002 40 U 13SB110204	42 U 13SS120002 39 U 13SB120204	41 U 13SS130002 42 U 13SB130204	43 U 13SS140001 REF
AROCLOR-1232		23 U 13SS090002 23 U 13SS090002-D 19 U 13SB090204	21 U 13SS100002 20 U 13SB100204	20 U 13SS110002 20 U 13SB110204	21 U 13SS120002 19 U 13SB120204	21 U 13SS130002 21 U 13SB130204	22 U 13SS140001 REF
AROCLOR-1242		23 U 13SS090002 23 U 13SS090002-D 19 U 13SB090204	21 U 13SS100002 20 U 13SB100204	20 U 13SS110002 20 U 13SB110204	21 U 13SS120002 19 U 13SB120204	21 U 13SS130002 21 U 13SB130204	22 U 13SS140001 REF
AROCLOR-1248		5400 J 13SS090002 6700 J 13SS090002-D 190 J 13SB090204	160000 13SS100002 210000 13SB100204	67000 J 13SS110002 59 J 13SB110204	330 J 13SS120002 590 J 13SB120204	39000 J 13SS130002 220 J 13SB130204	150000 13SS140001 REF
AROCLOR-1254		23 U 13SS090002 23 U 13SS090002-D 19 U 13SB090204	21 U 13SS100002 20 U 13SB100204	20 U 13SS110002 20 U 13SB110204	21 U 13SS120002 19 U 13SB120204	21 U 13SS130002 21 U 13SB130204	22 U 13SS140001 REF
AROCLOR-1260		23 U 13SS090002 23 U 13SS090002-D 19 U 13SB090204	21 U 13SS100002 20 U 13SB100204	20 U 13SS110002 20 U 13SB110204	21 U 13SS120002 19 U 13SB120204	21 U 13SS130002 21 U 13SB130204	22 U 13SS140001 REF
Herbicides (ug/kg)							
HEXACHLOROPHENE		1.1 U 13SS090002 1.1 U 13SS090002-D 0.96 U 13SB090204	1 U 13SS100002 0.98 U 13SB100204	1 U 13SS110002 0.99 U 13SB110204	1 U 13SS120002 0.97 U 13SB120204	1 U 13SS130002 1 U 13SB130204	1.1 U 13SS140001 REF
PENTACHLOROPHENOL		0.6 U 13SS090002 0.6 U 13SS090002-D 0.51 U 13SB090204	0.55 U 13SS100002 0.52 U 13SB100204	0.54 U 13SS110002 0.53 U 13SB110204	0.55 U 13SS120002 0.67 J 13SB120204	0.54 U 13SS130002 0.55 U 13SB130204	0.57 U 13SS140001 REF
Miscellaneous Parameter							
CATION EXCHANGE CAPACITY (MEQ/1)	13SS080002 13SS080002-D 13SB080608						
PH (S.U.)	13SS080002 13SS080002-D 13SB080608						
TOTAL ORGANIC CARBON (mg/kg)	13SS080002						

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	01 13SB08 3/30/2003	01 13SB09/15 3/26/2003	01 13SB10 3/26/2003	01 13SB11 3/26/2003	01 13SB12 3/26/2003	01 13SB13 3/26/2003	01 13SB14 3/26/2003
	1300 13SS080002-D 1000 U 13SB080608						

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	02	02	02	02	02	02	02
LOCATION	13SB16	13SB17	13SB18	13SB19	13SB20	13SB21	13SB22	13SB23	13SB24
SAMPLE DATE	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003	12/8/2003
Pesticides PCBs (ug/kg)									
AROCLOR-1016	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203
AROCLOR-1221	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203
AROCLOR-1232	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203
AROCLOR-1242	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203
AROCLOR-1248	50 J 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	6400 J 13SS190002 28000 J 13SB190203	36000 J 13SS200002 REF	8800 J 13SS210002 100 J 13SB210204 35 J 13SB210204-D	2600 13SS220002 130 J 13SB220204	630 13SS230002 21 J 13SB230204	160 J 13SS240002 24 J 13SB240203
AROCLOR-1254	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203
AROCLOR-1260	17 U 13SS160002 17 U 13SB160204	17 U 13SS170002 17 U 13SB170204	17 U 13SS180002 17 U 13SB180204 17 U 13SB180204-D	21 U 13SS190002 17 U 13SB190203	17 UJ 13SS200002 REF	17 U 13SS210002 17 U 13SB210204 17 U 13SB210204-D	17 U 13SS220002 17 U 13SB220204	17 U 13SS230002 20 U 13SB230204	20 U 13SS240002 19 U 13SB240203

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02
LOCATION	13SB25
SAMPLE DATE	12/8/2003
Pesticides PCBs (ug/kg)	
AROCLOR-1016	17 U 13SS250002 17 U 13SB250204
AROCLOR-1221	17 U 13SS250002 17 U 13SB250204
AROCLOR-1232	17 U 13SS250002 17 U 13SB250204
AROCLOR-1242	17 U 13SS250002 17 U 13SB250204
AROCLOR-1248	17 U 13SS250002 17 U 13SB250204
AROCLOR-1254	17 U 13SS250002 17 U 13SB250204
AROCLOR-1260	17 U 13SS250002 17 U 13SB250204

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	03 13SB26 8/10/2004	03 13SB27 8/10/2004	03 13SB28 8/10/2004	03 13SB29 8/10/2004	03 13SB30 8/11/2004	03 13SB31 8/10/2004	03 13SB32 8/10/2004	03 13SB33 8/10/2004	03 13SB34 8/10/2004	03 13SB35 8/10/2004
Pesticides PCBs (ug/kg)										
AROCLOR-1016	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204
AROCLOR-1221	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204
AROCLOR-1232	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204
AROCLOR-1242	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204
AROCLOR-1248	42 13SS260002 9.9 U 13SB260204	2800 13SS270002 840 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	5800 13SS290002 280 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 13 J 13SB310608	140 13SS320002 220 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	110 13SS350002 26 13SB350204
AROCLOR-1254	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204
AROCLOR-1260	9.4 U 13SS260002 9.9 U 13SB260204	11 U 13SS270002 11 U 13SB270204	9.4 U 13SB280204 9.5 U 13SB280406	10 U 13SS290002 10 U 13SB290204	9.2 U 13SS300002 9 U 13SB300204 9.1 U 13SB300204-D	9.2 U 13SB310406 9.2 U 13SB310406-D 9.2 U 13SB310608	10 U 13SS320002 10 U 13SB320204	9.2 U 13SS330002 9.2 U 13SB330204	8.8 U 13SS340002 9.8 U 13SB340204	9.4 U 13SS350002 9.3 U 13SB350204

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	03 13SB36 8/10/2004	03 13SB37 8/10/2004	03 13SB38 8/10/2004	03 13SB39 8/10/2004	03 13SB40 8/10/2004	03 13SB41 8/10/2004	03 13SB42 8/10/2004	03 13SB43 8/10/2004	03 13SB44 8/10/2004	03 13SB45 8/10/2004
Pesticides PCBs (ug/kg										
AROCLOR-1016	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406
AROCLOR-1221	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406
AROCLOR-1232	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406
AROCLOR-1242	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406
AROCLOR-1248	10 U 13SS360002 9.4 U 13SB360204	51000 13SS370002 300 13SB370204	520 13SS380002 9.8 U 13SB380204	1500 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	60 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	300 13SB450406
AROCLOR-1254	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406
AROCLOR-1260	10 U 13SS360002 9.4 U 13SB360204	10 U 13SS370002 9.5 U 13SB370204	9.3 U 13SS380002 9.8 U 13SB380204	9.9 U 13SS390002 9.3 U 13SB390204	9.9 U 13SS400002 9.2 U 13SB400204	9.5 U 13SB410406 9.4 U 13SB410608	9.7 U 13SB420406 9.4 U 13SB420608	9.4 U 13SB430406	9.2 U 13SB440406	9.9 U 13SB450406

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND LOCATION SAMPLE DATE	03 13SB46 8/10/2004	03 13SB47 8/11/2004
Pesticides PCBs (ug/kg		
AROCLOR-1016	9.9 U 13SB460406	10 U 13SB470406
AROCLOR-1221	9.9 U 13SB460406	10 U 13SB470406
AROCLOR-1232	9.9 U 13SB460406	10 U 13SB470406
AROCLOR-1242	9.9 U 13SB460406	10 U 13SB470406
AROCLOR-1248	9.9 U 13SB460406	49 13SB470406
AROCLOR-1254	9.9 U 13SB460406	10 U 13SB470406
AROCLOR-1260	9.9 U 13SB460406	10 U 13SB470406

REF - Sampling was not conducted due to refusal.

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB48		13SB49		13SB50		13SB51		13SB52		13SB53		13SB54		13SB55		13SB56	
SAMPLE DATE	2/14/2006		2/14/2006		2/14/2006		2/14/2006		2/15/2006		2/15/2006		38763		2/15/2006		2/15/2006	
Explosives (mg/kg)																		
1,3,5-Trinitrobenzene	0.25 U	13SB480204	3.7	13SB490204							0.25 U	13SB530204						
1,3,5-Trinitrobenzene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
1,3,5-Trinitrobenzene													0.25 U	13SB540305-D				
1,3,5-Trinitrobenzene							0.25 J	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
1,3,5-Trinitrobenzene													0.25 U	13SB540507				
1,3,5-Trinitrobenzene			0.25 U	13SB490608			0.46 J	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
1,3,5-Trinitrobenzene					0.25 U	13SB500709												
1,3,5-Trinitrobenzene																		
1,3,5-Trinitrobenzene																		
1,3,5-Trinitrobenzene																		
1,3,5-Trinitrobenzene																		
1,3,5-Trinitrobenzene																		
1,3-Dinitrobenzene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
1,3-Dinitrobenzene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
1,3-Dinitrobenzene													0.25 U	13SB540305-D				
1,3-Dinitrobenzene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
1,3-Dinitrobenzene													0.25 U	13SB540507				
1,3-Dinitrobenzene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
1,3-Dinitrobenzene					0.25 U	13SB500709												
1,3-Dinitrobenzene																		
1,3-Dinitrobenzene																		
1,3-Dinitrobenzene																		
1,3-Dinitrobenzene																		
1,3-Dinitrobenzene																		
2,4,6-Trinitrotoluene	0.25 U	13SB480204	14	13SB490204							0.25 U	13SB530204						
2,4,6-Trinitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
2,4,6-Trinitrotoluene													0.25 U	13SB540305-D				
2,4,6-Trinitrotoluene							3.5	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
2,4,6-Trinitrotoluene													0.25 U	13SB540507				
2,4,6-Trinitrotoluene			1.2	13SB490608			9.3	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2,4,6-Trinitrotoluene					0.25 U	13SB500709												
2,4,6-Trinitrotoluene																		
2,4,6-Trinitrotoluene																		
2,4,6-Trinitrotoluene																		
2,4,6-Trinitrotoluene																		
2,4,6-Trinitrotoluene																		
2,4-Di-amino-6-nitrotoluene	0.25 U	13SB480204									0.25 U	13SB530204						
2,4-Di-amino-6-nitrotoluene																	0.25 U	13SB560305
2,4-Di-amino-6-nitrotoluene													0.25 U	13SB540507				
2,4-Di-amino-6-nitrotoluene			0.36 J	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2,4-Di-amino-6-nitrotoluene					0.25 U	13SB500709												
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene																		
2,4-Dinitrotoluene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
2,4-Dinitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
2,4-Dinitrotoluene													0.25 U	13SB540305-D				
2,4-Dinitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
2,4-Dinitrotoluene													0.25 U	13SB540507				
2,4-Dinitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2,4-Dinitrotoluene					0.25 U	13SB500709												
2,4-Dinitrotoluene																		
2,4-Dinitrotoluene																		
2,4-Dinitrotoluene																		
2,4-Dinitrotoluene																		

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB48		13SB49		13SB50		13SB51		13SB52		13SB53		13SB54		13SB55		13SB56	
SAMPLE DATE	2/14/2006		2/14/2006		2/14/2006		2/14/2006		2/15/2006		2/15/2006		38763		2/15/2006		2/15/2006	
2,6-Di-amino-4-nitrotoluene	0.39 J	13SB480204									0.25 U	13SB530204						
2,6-Di-amino-4-nitrotoluene																	0.25 U	13SB560305
2,6-Di-amino-4-nitrotoluene													0.25 U	13SB540507				
2,6-Di-amino-4-nitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2,6-Di-amino-4-nitrotoluene					0.25 U	13SB500709												
2,6-Di-amino-4-nitrotoluene																		
2,6-Di-amino-4-nitrotoluene																		
2,6-Di-amino-4-nitrotoluene																		
2,6-Dinitrotoluene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
2,6-Dinitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
2,6-Dinitrotoluene													0.25 U	13SB540305-D				
2,6-Dinitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
2,6-Dinitrotoluene													0.25 U	13SB540507				
2,6-Dinitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2,6-Dinitrotoluene					0.25 U	13SB500709												
2,6-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Amino-4,6-dinitrotoluene	2.2 J	13SB480204	1.3 J	13SB490204							0.25 U	13SB530204						
2-Amino-4,6-dinitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
2-Amino-4,6-dinitrotoluene													0.25 U	13SB540305-D				
2-Amino-4,6-dinitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
2-Amino-4,6-dinitrotoluene													0.25 U	13SB540507				
2-Amino-4,6-dinitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2-Amino-4,6-dinitrotoluene					0.25 U	13SB500709												
2-Amino-4,6-dinitrotoluene																		
2-Amino-4,6-dinitrotoluene																		
2-Amino-4,6-dinitrotoluene																		
2-Amino-4,6-dinitrotoluene																		
2-Amino-4,6-dinitrotoluene																		
2-Nitrotoluene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
2-Nitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
2-Nitrotoluene													0.25 U	13SB540305-D				
2-Nitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
2-Nitrotoluene													0.25 U	13SB540507				
2-Nitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
2-Nitrotoluene					0.25 U	13SB500709												
2-Nitrotoluene																		
2-Nitrotoluene																		
2-Nitrotoluene																		
2-Nitrotoluene																		
3,5-Dinitroaniline	0.25 U	13SB480204									0.25 U	13SB530204						
3,5-Dinitroaniline																	0.25 U	13SB560305
3,5-Dinitroaniline													0.25 U	13SB540507				
3,5-Dinitroaniline			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
3,5-Dinitroaniline					0.25 U	13SB500709												
3,5-Dinitroaniline																		
3,5-Dinitroaniline																		
3,5-Dinitroaniline																		

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB48		13SB49		13SB50		13SB51		13SB52		13SB53		13SB54		13SB55		13SB56	
SAMPLE DATE	2/14/2006		2/14/2006		2/14/2006		2/14/2006		2/15/2006		2/15/2006		38763		2/15/2006		2/15/2006	
3-Nitrotoluene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
3-Nitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
3-Nitrotoluene													0.25 U	13SB540305-D				
3-Nitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
3-Nitrotoluene													0.25 U	13SB540507				
3-Nitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
3-Nitrotoluene					0.25 U	13SB500709												
3-Nitrotoluene																		
3-Nitrotoluene																		
3-Nitrotoluene																		
3-Nitrotoluene																		
4,4'-TN-Azoxy	0.5 U	13SB480204									0.5 U	13SB530204						
4,4'-TN-Azoxy																	0.5 U	13SB560305
4,4'-TN-Azoxy													0.5 U	13SB540507				
4,4'-TN-Azoxy			0.5 U	13SB490608			0.5 U	13SB510607	0.5 U	13SB520608					0.5 U	13SB550608		
4,4'-TN-Azoxy					0.5 U	13SB500709												
4,4'-TN-Azoxy																		
4,4'-TN-Azoxy																		
4,4'-TN-Azoxy																		
4-Amino-2,6-dinitrotoluene	5.2	13SB480204	1 J	13SB490204							0.25 U	13SB530204						
4-Amino-2,6-dinitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
4-Amino-2,6-dinitrotoluene													0.25 U	13SB540305-D				
4-Amino-2,6-dinitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
4-Amino-2,6-dinitrotoluene													0.25 U	13SB540507				
4-Amino-2,6-dinitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
4-Amino-2,6-dinitrotoluene					0.25 U	13SB500709												
4-Amino-2,6-dinitrotoluene																		
4-Amino-2,6-dinitrotoluene																		
4-Amino-2,6-dinitrotoluene																		
4-Amino-2,6-dinitrotoluene																		
4-Nitrotoluene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
4-Nitrotoluene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
4-Nitrotoluene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
4-Nitrotoluene													0.25 U	13SB540507				
4-Nitrotoluene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
4-Nitrotoluene					0.25 U	13SB500709												
4-Nitrotoluene																		
4-Nitrotoluene																		
4-Nitrotoluene																		
4-Nitrotoluene																		
4-Nitrotoluene																		
DNX	0.25 U	13SB480204									0.25 U	13SB530204						
DNX																	0.25 U	13SB560305
DNX													0.25 U	13SB540507				
DNX			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
DNX					0.25 U	13SB500709												
DNX																		
DNX																		
DNX																		
HMX	2.1	13SB480204	2.1	13SB490204							0.25 U	13SB530204						
HMX					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
HMX													0.25 U	13SB540305-D				
HMX							1.2	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
HMX													0.25 U	13SB540507				
HMX			0.78	13SB490608			2.1	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
HMX					0.25 U	13SB500709												
HMX																		
HMX																		
HMX																		
HMX																		
HMX																		

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB48		13SB49		13SB50		13SB51		13SB52		13SB53		13SB54		13SB55		13SB56	
SAMPLE DATE	2/14/2006		2/14/2006		2/14/2006		2/14/2006		2/15/2006		2/15/2006		38763		2/15/2006		2/15/2006	
MNX	0.25 U	13SB480204									0.25 U	13SB530204						
MNX																	0.25 U	13SB560305
MNX													0.25 U	13SB540507				
MNX			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
MNX					0.25 U	13SB500709												
MNX																		
MNX																		
MNX																		
Nitrobenzene	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
Nitrobenzene					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
Nitrobenzene													0.25 U	13SB540305-D				
Nitrobenzene							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
Nitrobenzene													0.25 U	13SB540507				
Nitrobenzene			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
Nitrobenzene					0.25 U	13SB500709												
Nitrobenzene																		
Nitrobenzene																		
Nitrobenzene																		
Nitrobenzene																		
Nitrobenzene																		
RDX	0.33 J	13SB480204	4	13SB490204							0.25 U	13SB530204						
RDX					0.68	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
RDX													0.25 U	13SB540305-D				
RDX							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
RDX													0.25 U	13SB540507				
RDX			1.1	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
RDX					0.33 J	13SB500709												
RDX																		
RDX																		
RDX																		
RDX																		
RDX																		
Tetryl	0.25 U	13SB480204	0.25 U	13SB490204							0.25 U	13SB530204						
Tetryl					0.25 U	13SB500305							0.25 U	13SB540305			0.25 U	13SB560305
Tetryl													0.25 U	13SB540305-D				
Tetryl							0.25 U	13SB510406	0.25 U	13SB520406					0.25 U	13SB550406		
Tetryl													0.25 U	13SB540507				
Tetryl			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
Tetryl					0.25 U	13SB500709												
Tetryl																		
Tetryl																		
Tetryl																		
Tetryl																		
TNX	0.25 U	13SB480204									0.25 U	13SB530204						
TNX																	0.25 U	13SB560305
TNX													0.25 U	13SB540507				
TNX			0.25 U	13SB490608			0.25 U	13SB510607	0.25 U	13SB520608					0.25 U	13SB550608		
TNX					0.25 U	13SB500709												
TNX																		
TNX																		
TNX																		

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB57		13SB58		13SB59		13SB60		13SB61		13SB62		13SB63		13SB64		13SB65	
SAMPLE DATE	2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/14/2006		2/14/2006		2/15/2006		38763	
Explosives (mg/kg)																		
1,3,5-Trinitrobenzene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
1,3,5-Trinitrobenzene											0.25 U	13SB620305					0.25 U	13SB650305
1,3,5-Trinitrobenzene																		
1,3,5-Trinitrobenzene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
1,3,5-Trinitrobenzene											0.25 U	13SB620506	0.25 U	13SB630507				
1,3,5-Trinitrobenzene															0.25 U	13SB640608		
1,3,5-Trinitrobenzene													0.25 U	13SB630709			0.25 U	13SB650709
1,3,5-Trinitrobenzene																	0.25 U	13SB650709-D
1,3,5-Trinitrobenzene							0.25 U	13SB600810										
1,3,5-Trinitrobenzene	0.25 U	13SB570911																
1,3,5-Trinitrobenzene							0.25 U	13SB601012										
1,3,5-Trinitrobenzene	0.25 U	13SB571112																
1,3-Dinitrobenzene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
1,3-Dinitrobenzene											0.25 U	13SB620305					0.25 U	13SB650305
1,3-Dinitrobenzene																		
1,3-Dinitrobenzene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
1,3-Dinitrobenzene											0.25 U	13SB620506	0.25 U	13SB630507				
1,3-Dinitrobenzene															0.25 U	13SB640608		
1,3-Dinitrobenzene													0.25 U	13SB630709			0.25 U	13SB650709
1,3-Dinitrobenzene																	0.25 U	13SB650709-D
1,3-Dinitrobenzene							0.25 U	13SB600810										
1,3-Dinitrobenzene	0.25 U	13SB570911																
1,3-Dinitrobenzene							0.25 U	13SB601012										
1,3-Dinitrobenzene	0.25 U	13SB571112																
2,4,6-Trinitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
2,4,6-Trinitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
2,4,6-Trinitrotoluene																		
2,4,6-Trinitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
2,4,6-Trinitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
2,4,6-Trinitrotoluene															0.25 U	13SB640608		
2,4,6-Trinitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2,4,6-Trinitrotoluene																	0.25 U	13SB650709-D
2,4,6-Trinitrotoluene							0.25 U	13SB600810										
2,4,6-Trinitrotoluene	0.25 U	13SB570911																
2,4,6-Trinitrotoluene							0.25 U	13SB601012										
2,4,6-Trinitrotoluene	0.25 U	13SB571112																
2,4-Di-amino-6-nitrotoluene			0.25 U	13SB580203	0.29 J	13SB590204			0.25 U	13SB610204								
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene											0.25 U	13SB620506						
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene																		
2,4-Di-amino-6-nitrotoluene							0.25 U	13SB601012										
2,4-Di-amino-6-nitrotoluene	0.25 U	13SB571112																
2,4-Dinitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
2,4-Dinitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
2,4-Dinitrotoluene																		
2,4-Dinitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
2,4-Dinitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
2,4-Dinitrotoluene															0.25 U	13SB640608		
2,4-Dinitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2,4-Dinitrotoluene																	0.25 U	13SB650709-D
2,4-Dinitrotoluene							0.25 U	13SB600810										
2,4-Dinitrotoluene	0.25 U	13SB570911																
2,4-Dinitrotoluene							0.25 U	13SB601012										
2,4-Dinitrotoluene	0.25 U	13SB571112																

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB57		13SB58		13SB59		13SB60		13SB61		13SB62		13SB63		13SB64		13SB65	
SAMPLE DATE	2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/14/2006		2/14/2006		2/15/2006		38763	
2,6-Di-amino-4-nitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
2,6-Di-amino-4-nitrotoluene																		
2,6-Di-amino-4-nitrotoluene											0.25 U	13SB620506						
2,6-Di-amino-4-nitrotoluene															0.25 U	13SB640608		
2,6-Di-amino-4-nitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2,6-Di-amino-4-nitrotoluene																	0.25 U	13SB650709-D
2,6-Di-amino-4-nitrotoluene							0.25 U	13SB601012										
2,6-Di-amino-4-nitrotoluene	0.25 U	13SB571112																
2,6-Dinitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
2,6-Dinitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
2,6-Dinitrotoluene																		
2,6-Dinitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
2,6-Dinitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
2,6-Dinitrotoluene															0.25 U	13SB640608		
2,6-Dinitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2,6-Dinitrotoluene																	0.25 U	13SB650709-D
2,6-Dinitrotoluene							0.25 U	13SB600810										
2,6-Dinitrotoluene	0.25 U	13SB570911																
2,6-Dinitrotoluene							0.25 U	13SB601012										
2,6-Dinitrotoluene	0.25 U	13SB571112																
2-Amino-4,6-dinitrotoluene			0.25 U	13SB580203	1.9 J	13SB590204			0.25 U	13SB610204								
2-Amino-4,6-dinitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
2-Amino-4,6-dinitrotoluene																		
2-Amino-4,6-dinitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
2-Amino-4,6-dinitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
2-Amino-4,6-dinitrotoluene															0.25 U	13SB640608		
2-Amino-4,6-dinitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2-Amino-4,6-dinitrotoluene																	0.25 U	13SB650709-D
2-Amino-4,6-dinitrotoluene							0.25 U	13SB600810										
2-Amino-4,6-dinitrotoluene	0.25 U	13SB570911																
2-Amino-4,6-dinitrotoluene							0.25 U	13SB601012										
2-Amino-4,6-dinitrotoluene	0.25 U	13SB571112																
2-Nitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
2-Nitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
2-Nitrotoluene																		
2-Nitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
2-Nitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
2-Nitrotoluene															0.25 U	13SB640608		
2-Nitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
2-Nitrotoluene																	0.25 U	13SB650709-D
2-Nitrotoluene							0.25 U	13SB600810										
2-Nitrotoluene	0.25 U	13SB570911																
2-Nitrotoluene							0.25 U	13SB601012										
2-Nitrotoluene	0.25 U	13SB571112																
3,5-Dinitroaniline			0.25 U	13SB580203	0.27 J	13SB590204			0.25 U	13SB610204								
3,5-Dinitroaniline																		
3,5-Dinitroaniline											0.25 U	13SB620506						
3,5-Dinitroaniline															0.25 U	13SB640608		
3,5-Dinitroaniline													0.25 U	13SB630709			0.25 U	13SB650709
3,5-Dinitroaniline																	0.25 U	13SB650709-D
3,5-Dinitroaniline							0.25 U	13SB601012										
3,5-Dinitroaniline	0.25 U	13SB571112																

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB57		13SB58		13SB59		13SB60		13SB61		13SB62		13SB63		13SB64		13SB65	
SAMPLE DATE	2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/14/2006		2/14/2006		2/15/2006		38763	
3-Nitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
3-Nitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
3-Nitrotoluene																		
3-Nitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
3-Nitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
3-Nitrotoluene															0.25 U	13SB640608		
3-Nitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
3-Nitrotoluene																	0.25 U	13SB650709-D
3-Nitrotoluene							0.25 U	13SB600810										
3-Nitrotoluene	0.25 U	13SB570911																
3-Nitrotoluene							0.25 U	13SB601012										
3-Nitrotoluene	0.25 U	13SB571112																
4,4'-TN-Azoxy			0.5 U	13SB580203	0.5 U	13SB590204			0.5 U	13SB610204								
4,4'-TN-Azoxy																		
4,4'-TN-Azoxy											0.5 U	13SB620506						
4,4'-TN-Azoxy															0.5 U	13SB640608		
4,4'-TN-Azoxy													0.5 U	13SB630709			0.5 U	13SB650709
4,4'-TN-Azoxy																	0.5 U	13SB650709-D
4,4'-TN-Azoxy							0.5 U	13SB601012										
4,4'-TN-Azoxy	0.5 U	13SB571112																
4-Amino-2,6-dinitrotoluene			0.25 U	13SB580203	1.5	13SB590204			0.25 U	13SB610204								
4-Amino-2,6-dinitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
4-Amino-2,6-dinitrotoluene																		
4-Amino-2,6-dinitrotoluene	0.28 J	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
4-Amino-2,6-dinitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
4-Amino-2,6-dinitrotoluene															0.25 U	13SB640608		
4-Amino-2,6-dinitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
4-Amino-2,6-dinitrotoluene																	0.25 U	13SB650709-D
4-Amino-2,6-dinitrotoluene							0.25 U	13SB600810										
4-Amino-2,6-dinitrotoluene	0.25 U	13SB570911																
4-Amino-2,6-dinitrotoluene							0.25 U	13SB601012										
4-Amino-2,6-dinitrotoluene	0.25 U	13SB571112																
4-Nitrotoluene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
4-Nitrotoluene											0.25 U	13SB620305					0.25 U	13SB650305
4-Nitrotoluene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
4-Nitrotoluene											0.25 U	13SB620506	0.25 U	13SB630507				
4-Nitrotoluene															0.25 U	13SB640608		
4-Nitrotoluene													0.25 U	13SB630709			0.25 U	13SB650709
4-Nitrotoluene																	0.25 U	13SB650709-D
4-Nitrotoluene							0.25 U	13SB600810										
4-Nitrotoluene	0.25 U	13SB570911																
4-Nitrotoluene							0.25 U	13SB601012										
4-Nitrotoluene	0.25 U	13SB571112																
DNX			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
DNX																		
DNX											0.25 U	13SB620506						
DNX															0.25 U	13SB640608		
DNX													0.25 U	13SB630709			0.25 U	13SB650709
DNX																	0.25 U	13SB650709-D
DNX							0.25 U	13SB601012										
DNX	0.25 U	13SB571112																
HMX			0.25 U	13SB580203	0.81	13SB590204			0.25 U	13SB610204								
HMX											0.25 U	13SB620305					0.25 U	13SB650305
HMX																		
HMX	0.7	13SB570406					0.42 J	13SB600406							0.25 U	13SB640406		
HMX											0.25 U	13SB620506	0.25 U	13SB630507				
HMX															0.25 U	13SB640608		
HMX													0.25 U	13SB630709			0.25 U	13SB650709
HMX																	0.25 U	13SB650709-D
HMX							0.26 J	13SB600810										
HMX	0.25 U	13SB570911																
HMX							0.25 U	13SB601012										
HMX	0.25 U	13SB571112																

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB57		13SB58		13SB59		13SB60		13SB61		13SB62		13SB63		13SB64		13SB65	
SAMPLE DATE	2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/15/2006		2/14/2006		2/14/2006		2/15/2006		38763	
MNX			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
MNX																		
MNX											0.25 U	13SB620506						
MNX															0.25 U	13SB640608		
MNX													0.25 U	13SB630709			0.25 U	13SB650709
MNX																	0.25 U	13SB650709-D
MNX							0.25 U	13SB601012										
MNX	0.25 U	13SB571112																
Nitrobenzene			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
Nitrobenzene											0.25 U	13SB620305					0.25 U	13SB650305
Nitrobenzene																		
Nitrobenzene	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
Nitrobenzene											0.25 U	13SB620506	0.25 U	13SB630507				
Nitrobenzene															0.25 U	13SB640608		
Nitrobenzene													0.25 U	13SB630709			0.25 U	13SB650709
Nitrobenzene																	0.25 U	13SB650709-D
Nitrobenzene							0.25 U	13SB600810										
Nitrobenzene	0.25 U	13SB570911																
Nitrobenzene							0.25 U	13SB601012										
Nitrobenzene	0.25 U	13SB571112																
RDX			0.8	13SB580203	1.2	13SB590204			0.25 U	13SB610204								
RDX											0.35 J	13SB620305					0.25 U	13SB650305
RDX																		
RDX	0.25 U	13SB570406					1.1	13SB600406							0.25 U	13SB640406		
RDX											0.25 U	13SB620506	0.42 J	13SB630507				
RDX															0.25 U	13SB640608		
RDX													0.26 J	13SB630709			0.25 U	13SB650709
RDX																	0.25 U	13SB650709-D
RDX							1.1	13SB600810										
RDX	0.25 U	13SB570911																
RDX							1.5	13SB601012										
RDX	0.25 U	13SB571112																
Tetryl			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
Tetryl											0.25 U	13SB620305					0.25 U	13SB650305
Tetryl																		
Tetryl	0.25 U	13SB570406					0.25 U	13SB600406							0.25 U	13SB640406		
Tetryl											0.25 U	13SB620506	0.25 U	13SB630507				
Tetryl															0.25 U	13SB640608		
Tetryl													0.25 U	13SB630709			0.25 U	13SB650709
Tetryl																	0.25 U	13SB650709-D
Tetryl							0.25 U	13SB600810										
Tetryl	0.25 U	13SB570911																
Tetryl							0.25 U	13SB601012										
Tetryl	0.25 U	13SB571112																
TNX			0.25 U	13SB580203	0.25 U	13SB590204			0.25 U	13SB610204								
TNX																		
TNX											0.25 U	13SB620506						
TNX															0.25 U	13SB640608		
TNX													0.25 U	13SB630709			0.25 U	13SB650709
TNX																	0.25 U	13SB650709-D
TNX							0.25 U	13SB601012										
TNX	0.25 U	13SB571112																

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB66		13SB67		13SB68		13SB69		13SB70		13SB71		13SB72	
SAMPLE DATE	2/15/2006		2/15/2006		2/21/2006		2/14/2006		2/14/2006		2/14/2006		2/21/2006	
Explosives (mg/kg)														
1,3,5-Trinitrobenzene					0.25 U	13SB680204	0.25 U	13SB690204						
1,3,5-Trinitrobenzene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
1,3,5-Trinitrobenzene														
1,3,5-Trinitrobenzene	0.25 U	13SB660406												
1,3,5-Trinitrobenzene											0.25 U	13SB710507		
1,3,5-Trinitrobenzene	0.25 U	13SB660608												
1,3,5-Trinitrobenzene			0.25 U	13SB670709										
1,3,5-Trinitrobenzene														
1,3,5-Trinitrobenzene														
1,3,5-Trinitrobenzene														
1,3,5-Trinitrobenzene														
1,3,5-Trinitrobenzene														
1,3-Dinitrobenzene					0.25 U	13SB680204	0.25 U	13SB690204						
1,3-Dinitrobenzene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
1,3-Dinitrobenzene														
1,3-Dinitrobenzene	0.25 U	13SB660406												
1,3-Dinitrobenzene											0.25 U	13SB710507		
1,3-Dinitrobenzene	0.25 U	13SB660608												
1,3-Dinitrobenzene			0.25 U	13SB670709										
1,3-Dinitrobenzene														
1,3-Dinitrobenzene														
1,3-Dinitrobenzene														
1,3-Dinitrobenzene														
1,3-Dinitrobenzene														
2,4,6-Trinitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2,4,6-Trinitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	22 J	13SB720305
2,4,6-Trinitrotoluene														
2,4,6-Trinitrotoluene	0.25 U	13SB660406												
2,4,6-Trinitrotoluene											0.25 U	13SB710507		
2,4,6-Trinitrotoluene	0.25 U	13SB660608												
2,4,6-Trinitrotoluene			0.25 U	13SB670709										
2,4,6-Trinitrotoluene														
2,4,6-Trinitrotoluene														
2,4,6-Trinitrotoluene														
2,4,6-Trinitrotoluene														
2,4,6-Trinitrotoluene														
2,4-Di-amino-6-nitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2,4-Di-amino-6-nitrotoluene									0.25 U	13SB700305			0.25 U	13SB720305
2,4-Di-amino-6-nitrotoluene											0.25 U	13SB710507		
2,4-Di-amino-6-nitrotoluene	0.25 U	13SB660608												
2,4-Di-amino-6-nitrotoluene			0.25 U	13SB670709										
2,4-Di-amino-6-nitrotoluene														
2,4-Di-amino-6-nitrotoluene														
2,4-Dinitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2,4-Dinitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
2,4-Dinitrotoluene														
2,4-Dinitrotoluene	0.25 U	13SB660406												
2,4-Dinitrotoluene											0.25 U	13SB710507		
2,4-Dinitrotoluene	0.25 U	13SB660608												
2,4-Dinitrotoluene			0.25 U	13SB670709										
2,4-Dinitrotoluene														
2,4-Dinitrotoluene														
2,4-Dinitrotoluene														
2,4-Dinitrotoluene														
2,4-Dinitrotoluene														

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB66		13SB67		13SB68		13SB69		13SB70		13SB71		13SB72	
SAMPLE DATE	2/15/2006		2/15/2006		2/21/2006		2/14/2006		2/14/2006		2/14/2006		2/21/2006	
2,6-Di-amino-4-nitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2,6-Di-amino-4-nitrotoluene									0.25 U	13SB700305			0.25 U	13SB720305
2,6-Di-amino-4-nitrotoluene											0.25 U	13SB710507		
2,6-Di-amino-4-nitrotoluene	0.25 U	13SB660608												
2,6-Di-amino-4-nitrotoluene			0.25 U	13SB670709										
2,6-Di-amino-4-nitrotoluene														
2,6-Di-amino-4-nitrotoluene														
2,6-Di-amino-4-nitrotoluene														
2,6-Dinitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2,6-Dinitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
2,6-Dinitrotoluene														
2,6-Dinitrotoluene	0.25 U	13SB660406												
2,6-Dinitrotoluene											0.25 U	13SB710507		
2,6-Dinitrotoluene	0.25 U	13SB660608												
2,6-Dinitrotoluene			0.25 U	13SB670709										
2,6-Dinitrotoluene														
2,6-Dinitrotoluene														
2,6-Dinitrotoluene														
2,6-Dinitrotoluene														
2-Amino-4,6-dinitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2-Amino-4,6-dinitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
2-Amino-4,6-dinitrotoluene														
2-Amino-4,6-dinitrotoluene	0.25 U	13SB660406												
2-Amino-4,6-dinitrotoluene											0.25 U	13SB710507		
2-Amino-4,6-dinitrotoluene	0.25 U	13SB660608												
2-Amino-4,6-dinitrotoluene			0.25 U	13SB670709										
2-Amino-4,6-dinitrotoluene														
2-Amino-4,6-dinitrotoluene														
2-Amino-4,6-dinitrotoluene														
2-Amino-4,6-dinitrotoluene														
2-Nitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
2-Nitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
2-Nitrotoluene														
2-Nitrotoluene	0.25 U	13SB660406												
2-Nitrotoluene											0.25 U	13SB710507		
2-Nitrotoluene	0.25 U	13SB660608												
2-Nitrotoluene			0.25 U	13SB670709										
2-Nitrotoluene														
2-Nitrotoluene														
2-Nitrotoluene														
2-Nitrotoluene														
2-Nitrotoluene														
3,5-Dinitroaniline					0.25 U	13SB680204	0.25 U	13SB690204						
3,5-Dinitroaniline									0.25 U	13SB700305			0.25 U	13SB720305
3,5-Dinitroaniline											0.25 U	13SB710507		
3,5-Dinitroaniline	0.25 U	13SB660608												
3,5-Dinitroaniline			0.25 U	13SB670709										
3,5-Dinitroaniline														
3,5-Dinitroaniline														
3,5-Dinitroaniline														

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB66		13SB67		13SB68		13SB69		13SB70		13SB71		13SB72	
SAMPLE DATE	2/15/2006		2/15/2006		2/21/2006		2/14/2006		2/14/2006		2/14/2006		2/21/2006	
3-Nitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
3-Nitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
3-Nitrotoluene														
3-Nitrotoluene	0.25 U	13SB660406												
3-Nitrotoluene											0.25 U	13SB710507		
3-Nitrotoluene	0.25 U	13SB660608												
3-Nitrotoluene			0.25 U	13SB670709										
3-Nitrotoluene														
3-Nitrotoluene														
3-Nitrotoluene														
3-Nitrotoluene														
3-Nitrotoluene														
4,4'-TN-Azoxy					0.5 U	13SB680204	0.5 U	13SB690204						
4,4'-TN-Azoxy									0.5 U	13SB700305			0.5 U	13SB720305
4,4'-TN-Azoxy											0.5 U	13SB710507		
4,4'-TN-Azoxy	0.5 U	13SB660608												
4,4'-TN-Azoxy			0.5 U	13SB670709										
4,4'-TN-Azoxy														
4,4'-TN-Azoxy														
4,4'-TN-Azoxy														
4-Amino-2,6-dinitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
4-Amino-2,6-dinitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
4-Amino-2,6-dinitrotoluene														
4-Amino-2,6-dinitrotoluene	0.25 U	13SB660406												
4-Amino-2,6-dinitrotoluene											0.25 U	13SB710507		
4-Amino-2,6-dinitrotoluene	0.25 U	13SB660608												
4-Amino-2,6-dinitrotoluene			0.25 U	13SB670709										
4-Amino-2,6-dinitrotoluene														
4-Amino-2,6-dinitrotoluene														
4-Amino-2,6-dinitrotoluene														
4-Amino-2,6-dinitrotoluene														
4-Amino-2,6-dinitrotoluene														
4-Nitrotoluene					0.25 U	13SB680204	0.25 U	13SB690204						
4-Nitrotoluene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
4-Nitrotoluene	0.25 U	13SB660406												
4-Nitrotoluene											0.25 U	13SB710507		
4-Nitrotoluene	0.25 U	13SB660608												
4-Nitrotoluene			0.25 U	13SB670709										
4-Nitrotoluene														
4-Nitrotoluene														
4-Nitrotoluene														
4-Nitrotoluene														
4-Nitrotoluene														
DNX					0.25 U	13SB680204	0.25 U	13SB690204						
DNX									0.25 U	13SB700305			0.25 U	13SB720305
DNX											0.25 U	13SB710507		
DNX	0.25 U	13SB660608												
DNX			0.25 U	13SB670709										
DNX														
DNX														
DNX														
HMX					0.25 U	13SB680204	0.25 U	13SB690204						
HMX			0.25 U	13SB670305					0.25 U	13SB700305	0.28 R	13SB710305	0.25 U	13SB720305
HMX														
HMX	0.25 U	13SB660406												
HMX											0.25 U	13SB710507		
HMX	0.25 U	13SB660608												
HMX			0.25 U	13SB670709										
HMX														
HMX														
HMX														
HMX														
HMX														

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI		ES/DI	
SAMPLE LOCATION	13SB66		13SB67		13SB68		13SB69		13SB70		13SB71		13SB72	
SAMPLE DATE	2/15/2006		2/15/2006		2/21/2006		2/14/2006		2/14/2006		2/14/2006		2/21/2006	
MNX					0.25 U	13SB680204	0.25 U	13SB690204						
MNX									0.25 U	13SB700305			0.25 U	13SB720305
MNX											0.25 U	13SB710507		
MNX	0.25 U	13SB660608												
MNX			0.25 U	13SB670709										
MNX														
MNX														
MNX														
Nitrobenzene					0.25 U	13SB680204	0.25 U	13SB690204						
Nitrobenzene			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
Nitrobenzene														
Nitrobenzene	0.25 U	13SB660406												
Nitrobenzene											0.25 U	13SB710507		
Nitrobenzene	0.25 U	13SB660608												
Nitrobenzene			0.25 U	13SB670709										
Nitrobenzene														
Nitrobenzene														
Nitrobenzene														
Nitrobenzene														
Nitrobenzene														
RDX					0.25 U	13SB680204	0.25 U	13SB690204						
RDX			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
RDX														
RDX	0.25 U	13SB660406												
RDX											0.25 U	13SB710507		
RDX	0.25 U	13SB660608												
RDX			0.25 U	13SB670709										
RDX														
RDX														
RDX														
RDX														
Tetryl					0.25 U	13SB680204	0.25 U	13SB690204						
Tetryl			0.25 U	13SB670305					0.25 U	13SB700305	0.25 U	13SB710305	0.25 U	13SB720305
Tetryl														
Tetryl	0.25 U	13SB660406												
Tetryl											0.25 U	13SB710507		
Tetryl	0.25 U	13SB660608												
Tetryl			0.25 U	13SB670709										
Tetryl														
Tetryl														
Tetryl														
Tetryl														
Tetryl														
TNX					0.25 U	13SB680204	0.25 U	13SB690204						
TNX									0.25 U	13SB700305			0.25 U	13SB720305
TNX											0.25 U	13SB710507		
TNX	0.25 U	13SB660608												
TNX			0.25 U	13SB670709										
TNX														
TNX														
TNX														

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB073		13SB074		13SB075		13SB076		13SB077	
SAMPLE DATE	6/6/2006		6/6/2006		6/6/2006		6/5/2006		6/6/2006	
PCBs (ug/kg)										
AROCLOR-1016	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1016	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1016									241 U	13SB770204
AROCLOR-1221	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1221	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1221									241 U	13SB770204
AROCLOR-1232	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1232	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1232									241 U	13SB770204
AROCLOR-1242	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1242	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1242									241 U	13SB770204
AROCLOR-1248	2000 J	13SA730002	870	13SA740002	25000	13SA750001	20000 J	13SA760001	940	13SA770002
AROCLOR-1248	10.5 U	13SB730204							1300	13SA770002-D
AROCLOR-1248									2700	13SB770204
AROCLOR-1254	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1254	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1254									241 U	13SB770204
AROCLOR-1260	218 U	13SA730002	110 U	13SA740002	10.9 U	13SA750001	10.7 U	13SA760001	113 U	13SA770002
AROCLOR-1260	10.5 U	13SB730204							116 U	13SA770002-D
AROCLOR-1260									241 U	13SB770204
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1254										
TOTAL PCBS AS AROCLOR-1254										
TOTAL PCBS AS AROCLOR-1254										

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB078		13SB079		13SB080		13SB081		13SB082	
SAMPLE DATE	6/6/2006		6/6/2006		6/6/2006		6/6/2006		6/6/2006	
PCBs (ug/kg)										
AROCLOR-1016	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1016	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1016										
AROCLOR-1221	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1221	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1221										
AROCLOR-1232	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1232	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1232										
AROCLOR-1242	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1242	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1242										
AROCLOR-1248	2500	13SA780002	1200 J	13SA790002	10.6 U	13SA800002	41 J	13SA810002	10.4 U	13SA820002
AROCLOR-1248	110	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1248										
AROCLOR-1254	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1254	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1254										
AROCLOR-1260	270 U	13SA780002	208 U	13SA790002	10.6 U	13SA800002	11 U	13SA810002	10.4 U	13SA820002
AROCLOR-1260	11.4 U	13SB780204	10.9 U	13SB790204	10.4 U	13SB800204	10.5 U	13SB810204		
AROCLOR-1260										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1254										
TOTAL PCBS AS AROCLOR-1254										
TOTAL PCBS AS AROCLOR-1254										

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB083		13SB084		13SB085		13SB086		13SB087	
SAMPLE DATE	6/6/2006		6/6/2006		8/25/2006		8/25/2006		8/25/2006	
PCBs (ug/kg)										
AROCLOR-1016	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1016	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1016										
AROCLOR-1221	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1221	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1221										
AROCLOR-1232	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1232	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1232										
AROCLOR-1242	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1242	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1242										
AROCLOR-1248	31	13SA830002	280	13SA840002						
AROCLOR-1248	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1248										
AROCLOR-1254	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1254	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1254										
AROCLOR-1260	11 U	13SA830002	109 U	13SA840002						
AROCLOR-1260	11.1 U	13SB830204	10.9 U	13SB840204						
AROCLOR-1260										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1254					0.5 U	13SB850406	0.5 U	13SB860406	0.5 U	13SA870002
TOTAL PCBS AS AROCLOR-1254					0.5 U	13SB850608	0.5 U	13SB860608	0.5 U	13SB870204
TOTAL PCBS AS AROCLOR-1254									0.5 U	13SB870506

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB088		13SB089		13SB090		13SB091		13SB093	
SAMPLE DATE	8/24/2006		8/24/2006		8/24/2006		8/24/2006		8/24/2006	
PCBs (ug/kg)										
AROCLOR-1016					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1016										
AROCLOR-1016										
AROCLOR-1221					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1221										
AROCLOR-1221										
AROCLOR-1232					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1232										
AROCLOR-1232										
AROCLOR-1242					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1242										
AROCLOR-1242										
AROCLOR-1248					24	13SA900002	900 J	13SA910001		
AROCLOR-1248										
AROCLOR-1248										
AROCLOR-1254					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1254										
AROCLOR-1254										
AROCLOR-1260					20 U	13SA900002	190 U	13SA910001		
AROCLOR-1260										
AROCLOR-1260										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1	0.5 U	13SA880001	0.08 J	13SA890001	0.5 U	13SA900002	0.35 J	13SA910001	0.11 J	13SA930002
TOTAL PCBS AS AROCLOR-1254					0.03 J	13SB900203				
TOTAL PCBS AS AROCLOR-1254										

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB094		13SB095		13SB096		13SB097		13SB098	
SAMPLE DATE	8/24/2006		8/24/2006		8/23/2006		8/23/2006		8/23/2006	
PCBs (ug/kg)										
AROCLOR-1016			2000 U	13SA950001						
AROCLOR-1016			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1016			210000 U	13SA950102-D						
AROCLOR-1221			2000 U	13SA950001						
AROCLOR-1221			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1221			210000 U	13SA950102-D						
AROCLOR-1232			2000 U	13SA950001						
AROCLOR-1232			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1232			210000 U	13SA950102-D						
AROCLOR-1242			2000 U	13SA950001						
AROCLOR-1242			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1242			210000 U	13SA950102-D						
AROCLOR-1248			14000 J	13SA950001						
AROCLOR-1248			64000 J	13SA950102	370 J	13SB960204				
AROCLOR-1248			400000 J	13SA950102-D						
AROCLOR-1254			2000 U	13SA950001						
AROCLOR-1254			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1254			210000 U	13SA950102-D						
AROCLOR-1260			2000 U	13SA950001						
AROCLOR-1260			17000 U	13SA950102	200 U	13SB960204				
AROCLOR-1260			210000 U	13SA950102-D						
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1	0.08 J	13SA940002	4.81	13SA950001	13.85 J	13SA960002	0.03 J	13SA970002	0.05 J	13SA980002
TOTAL PCBS AS AROCLOR-1254			10.4 J	13SA950102	0.1 J	13SB960204	0.09 J	13SB970203	0.5 U	13SB980204
TOTAL PCBS AS AROCLOR-1254										

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB		PCB	
LOCATION	13SB099		13SB100		13SB101		13SB102		13SB103	
SAMPLE DATE	8/23/2006		8/23/2006		8/23/2006		8/25/2006		8/25/2006	
PCBs (ug/kg)										
AROCLOR-1016							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1016										
AROCLOR-1016										
AROCLOR-1221							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1221										
AROCLOR-1221										
AROCLOR-1232							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1232										
AROCLOR-1232										
AROCLOR-1242							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1242										
AROCLOR-1242										
AROCLOR-1248							1600 J	13SA1020002	280 J	13SA1030002
AROCLOR-1248										
AROCLOR-1248										
AROCLOR-1254							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1254										
AROCLOR-1254										
AROCLOR-1260							810 U	13SA1020002	20 U	13SA1030002
AROCLOR-1260										
AROCLOR-1260										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1	0.5 U	13SA990002	0.5 U	13SA1000002	0.5 U	13SA1010002	0.13 J	13SA1020002	0.2 J	13SA1030002
TOTAL PCBS AS AROCLOR-1	0.5 U	13SB990204	0.5 U	13SB1000204	0.5 U	13SB1010204				
TOTAL PCBS AS AROCLOR-1254										

TABLE G-1

SUMMARY OF ANALYTIC RESULTS
SOIL SAMPLES PCB DELINEATION INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	PCB		PCB		PCB		PCB	
LOCATION	13SB104		13SB105		13SB106		13SB107	
SAMPLE DATE	8/26/2006		8/26/2006		8/27/2006		8/27/2006	
PCBs (ug/kg)								
AROCLOR-1016			4000 U	13SA1050002				
AROCLOR-1016								
AROCLOR-1016								
AROCLOR-1221			4000 U	13SA1050002				
AROCLOR-1221								
AROCLOR-1221								
AROCLOR-1232			4000 U	13SA1050002				
AROCLOR-1232								
AROCLOR-1232								
AROCLOR-1242			4000 U	13SA1050002				
AROCLOR-1242								
AROCLOR-1242								
AROCLOR-1248			12000 J	13SA1050002				
AROCLOR-1248								
AROCLOR-1248								
AROCLOR-1254			4000 U	13SA1050002				
AROCLOR-1254								
AROCLOR-1254								
AROCLOR-1260			4000 U	13SA1050002				
AROCLOR-1260								
AROCLOR-1260								
Field PCB Results (mg/kg)								
TOTAL PCBS AS AROCLOR-1	0.5 U	13SA1040002	2.24	13SA1050002	0.01 J	13SA1060002	0.1 J	13SA1070002
TOTAL PCBS AS AROCLOR-1	0.5 U	13SB1040204	0.5 U	13SB1050204				
TOTAL PCBS AS AROCLOR-1	0.5 U	13SB1040406	0.5 U	13SB1050406				

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE									1 U		1 U
1,2,4-TRICHLOROBENZENE									1 U		1 U
1,2-DICHLOROBENZENE									1 U		1 U
1,3-DICHLOROBENZENE									1 U		1 U
1,4-DICHLOROBENZENE									1 U		1 U
1,4-NAPHTHOQUINONE									1 U		1 U
1,4-PHENYLENEDIAMINE									1 UJ		1 UJ
1-NAPHTHYLAMINE									1 U		1 U
2,2'-OXYBIS(1-CHLOROPROPANE)									1 U		1 U
2,3,4,6-TETRACHLOROPHENOL									1 U		1 U
2,4,5-TRICHLOROPHENOL									1 U		1 U
2,4,6-TRICHLOROPHENOL									1 U		1 U
2,4-DICHLOROPHENOL									1 U		1 U
2,4-DIMETHYLPHENOL									1 U		1 U
2,4-DINITROPHENOL									1 U		1 U
2,6-DICHLOROPHENOL									1 U		1 U
2-ACETYLAMINOFLUORENE									1 U		1 U
2-CHLORONAPHTHALENE									1 UJ		1 UJ
2-CHLOROPHENOL									1 U		1 U
2-METHYLNAPHTHALENE									0.05 U		0.05 U
2-METHYLPHENOL									1 U		1 U
2-NAPHTHYLAMINE									1 U		1 U
2-NITROANILINE									1 U		1 U
2-NITROPHENOL									1 U		1 U
2-PICOLINE									1 U		1 U
3&4-METHYLPHENOL									1 U		1 U
3,3'-DICHLOROBENZIDINE									1 U		1 U
3,3'-DIMETHYLBENZIDINE									1 U		1 U
3-METHYLCHOLANTHRENE									1 U		1 U
3-NITROANILINE									1 U		1 U
4,6-DINITRO-2-METHYLPHENOL									1 U		1 U
4-AMINOBIPHENYL									1 U		1 U
4-BROMOPHENYL PHENYL ETHER									1 U		1 U
4-CHLORO-3-METHYLPHENOL									1 U		1 U
4-CHLOROANILINE									1 U		1 U
4-CHLOROPHENYL PHENYL ETHER									1 U		1 U
4-NITROANILINE									1 U		1 U
4-NITROPHENOL									1 U		1 U
4-NITROQUINOLINE-1-OXIDE									1 UR		1 UR
5-NITRO-O-TOLUIDINE									1 U		1 U
7,12-DIMETHYLBENZ(A)ANTHRACENE									1 U		1 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
A,A-DIMETHYLPHENETHYLAMINE									1 UJ		1 UJ
ACENAPHTHENE									0.05 U		0.05 U
ACENAPHTHYLENE									0.05 U		0.05 U
ACETOPHENONE									1 U		1 U
ANILINE									1 U		1 U
ANTHRACENE									0.05 U		0.05 U
ARAMITE									1 UR		1 UR
BENZO(A)ANTHRACENE									0.05 U		0.05 U
BENZO(A)PYRENE									0.05 U		0.05 U
BENZO(B)FLUORANTHENE									0.05 U		0.05 U
BENZO(G,H,I)PERYLENE									0.05 U		0.05 U
BENZO(K)FLUORANTHENE									0.05 U		0.05 U
BENZYL ALCOHOL									1 U		1 U
BIS(2-CHLOROETHOXY)METHANE									1 U		1 U
BIS(2-CHLOROETHYL)ETHER									1 U		1 U
BIS(2-ETHYLHEXYL)PHTHALATE									2 BU		14 BU
BUTYL BENZYL PHTHALATE									1 U		1 U
CHLOROBENZILATE									1 U		1 U
CHRYSENE									0.05 U		0.05 U
DI-N-BUTYL PHTHALATE									1 U		1 U
DI-N-OCTYL PHTHALATE									1 U		1 U
DIALLATE									1 U		1 U
DIBENZO(A,H)ANTHRACENE									0.05 U		0.05 U
DIBENZOFURAN									1 U		1 U
DIETHYL PHTHALATE									1 U		1 U
DIMETHYL PHTHALATE									1 U		1 U
DIPHENYLAMINE									1 U		1 U
ETHYL METHANE SULFONATE									1 U		1 U
FLUORANTHENE									0.05 U		0.05 U
FLUORENE									0.05 U		0.05 U
HEXACHLOROBENZENE									1 U		1 U
HEXACHLOROBUTADIENE									1 U		1 U
HEXACHLOROCYCLOPENTADIENE									1 UR		1 UR
HEXACHLOROETHANE									1 U		1 U
HEXACHLOROPROPENE									1 U		1 U
INDENO(1,2,3-CD)PYRENE									0.05 U		0.05 U
ISODRIN									1 U		1 U
ISOPHORONE									1 U		1 U
ISOSAFROLE									1 U		1 U
KEPONE									1 UJ		1 UJ
METHAPYRILENE									1 UJ		1 UJ
METHYL METHANE SULFONATE									1 U		1 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
N-NITROSO-DI-N-BUTYLAMINE									1 U		1 U
N-NITROSO-DI-N-PROPYLAMINE									1 U		1 U
N-NITROSODIETHYLAMINE									1 U		1 U
N-NITROSODIMETHYLAMINE									1 U		1 U
N-NITROSOMETHYLETHYLAMINE									1 U		1 U
N-NITROSOMORPHOLINE									1 U		1 U
N-NITROSOPIPERIDINE									1 U		1 U
N-NITROSOPYRROLIDINE									1 U		1 U
NAPHTHALENE									0.05 U		0.05 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE									1 U		1 U
O-TOLUIDINE									1 U		1 U
P-(DIMETHYLAMINO)AZOBENZENE									1 U		1 U
PENTACHLOROBENZENE									1 U		1 U
PENTACHLOROETHANE									1 U		1 U
PENTACHLORONITROBENZENE									1 U		1 U
PHENACETIN									1 U		1 U
PHENANTHRENE									0.05 U		0.05 U
PHENOL									1 U		1 U
PRONAMIDE									1 U		1 U
PYRENE									0.05 U		0.05 U
PYRIDINE									1 U		1 U
SAFROLE									1 U		1 U
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
1,3-DINITROBENZENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE											
2,4,6-TRINITROTOLUENE	2.3				0.53 J		0.265 U		0.5 U		0.475 U
2,4-DIAMINO-6-NITROTOLUENE											
2,4-DINITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
2,6-DIAMINO-4-NITROTOLUENE											
2,6-DINITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
2-AMINO-4,6-DINITROTOLUENE	0.53 J				0.435 U		0.265 U		0.5 U		0.475 U
2-NITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
3,5-DINITROANILINE											
3-NITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE	1.4				0.52 J		0.265 U		0.5 U		0.475 U
4-NITROTOLUENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
DNX											
HMX	0.5 U				2.2		0.265 U		0.5 U		3.5
MNX											
NITROBENZENE	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
RDX	1.5				14		0.25 U		0.47 U		5.3
TETRYL	0.5 U				0.435 U		0.265 U		0.5 U		0.475 U
TNX											
Herbicides (ug/L)											
HEXACHLOROPHENE									0.025 U		0.025 U
PENTACHLOROPHENOL									0.091		0.013 U
Total Metals (ug/L)											
ALUMINUM	575 J		3080 J		4280 J		904 J		10600 J		3460 J
ANTIMONY	0.73 U		1.4 U		0.62 U		0.13 U		0.2 U		0.12 U
ARSENIC	0.51 U		1.6 J		1.5 J		0.67 U		3.4 J		1.3 J
BARIUM	112 J		184 J		71.8 J		57 J		94.5 J		56.3 J
BERYLLIUM	0.13 U		0.15 U		0.35 U		0.03 U		0.4 U		0.11 U
CADMIUM	0.3 U		1.3 J		0.32 U		0.08 U		0.37 U		0.11 U
CALCIUM	47200 J		56800 J		39000 J		32800 J		30100 J		28900 J
CHROMIUM	1.2 J		16.8 J		4.6 J		1 U		15.6 J		3.5 J
COBALT	0.16 U		2.1		1.6 J		0.69 U		3.2 J		2.6 J
COPPER	5.2 J		22.8		6.1 J		3.3 J		12.2 J		3.4 J
IRON	467 J		3690		3180 J		700 J		8940 J		3060 J
LEAD	3.5 J		137 J		3.6 J		0.94 U		7.4 J		1.5 J
LITHIUM	1.3 U				4.4 J		2.2 U		9.1 J		5.9 J
MAGNESIUM	6820 J		7430 J		7180 J		7210 J		6190 J		7500 J
MANGANESE	8.2 J		63		104 J		71.7 J		66.8 J		114 J
MERCURY	0.02 U		0.04 U		0.02 U		0.02 U		0.02 U		0.02 U
NICKEL	0.89 J		5.7		3.6 J		3.9 J		7.6 J		5.4 J
POTASSIUM	855 J		3580 J		1630 J		2670 J		3760 J		1220 J
SELENIUM	0.21 U		0.36 U		0.29 U		0.15 U		0.28 U		0.24 U
SILVER	1 U		0.03 U		0.46 U		0.09 U		0.25 U		0.08 U
SODIUM	2960 J		3860 J		18400 J		66800 J		16500 J		5420 J
STRONTIUM	105 J				103 J		83.7 J		74.2 J		94.7 J
THALLIUM	0.15 U		0.05 U		0.35 U		0.09 U		0.16 U		0.06 U
TIN	0.26 U		0.77 U		0.36 U		0.03 U		0.25 U		0.55 U
TITANIUM	11.1 J				67.5 J		18.4 J		122 J		63.2 J
VANADIUM	1.3 J		6.3		7.5 J		1.8 J		18.8 J		6.6 J
ZINC	21.9 J		269 J		30.5 J		12.7 J		43.7 J		14.1 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		52.7 J		194 J		119		82.6		138	
ANTIMONY, FILTERED		0.82 U		1.3 U		0.65 U		0.21 U		0.25 U	
ARSENIC, FILTERED		0.35 U		0.33 U		0.36 U		0.45 U		0.47 U	
BARIUM, FILTERED		107 J		142 J		47.9 J		50.8 J		40.9 J	
BERYLLIUM, FILTERED		0.12 U		0.02 U		0.09 U		0.03 U		0.03 U	
CADMIUM, FILTERED		0.23 U		0.08 U		0.07 U		0.05 U		0.05 U	
CALCIUM, FILTERED		46000 J		54200 J		38500 J		33100 J		28100 J	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	03	03	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD02	13SW/SD03	13SW/SD03	13SW/SD04	13SW/SD04	13SW/SD05
SAMPLE NUMBER	13SW0101	13SW0101-F	13SW0102	13SW0102-F	13SW0201	13SW0201-F	13SW0301	13SW0301-F	13SW0401	13SW0401-F	13SW0501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/7/2004	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
CHROMIUM, FILTERED		0.4 U		0.67 U		0.57 U		0.4 U		0.48 U	
COBALT, FILTERED		0.26 U		0.088 U		0.59 U		0.55 U		0.61 U	
COPPER, FILTERED		3.2 J		2.2		2 J		2.5 J		3.8 J	
IRON, FILTERED		35.7 J		6.15 U		119 J		97 J		176 J	
LEAD, FILTERED		0.38 U		1.1 J		0.21 U		0.12 U		0.16 U	
LITHIUM, FILTERED		0.77 U				0.88 U		1.3 U		1.3 U	
MAGNESIUM, FILTERED		6590 J		6850		6690 J		7210 J		4970 J	
MANGANESE, FILTERED		2.9 J		3.8 J		14.4 J		28 J		5.3 J	
MERCURY, FILTERED		0.02 U		0.039 U		0.02 U		0.02 U		0.02 U	
NICKEL, FILTERED		0.59 U		0.58 J		0.85 U		3.3 J		1.9 J	
POTASSIUM, FILTERED		769 J		2760 J		1100 J		2560 J		1460 J	
SELENIUM, FILTERED		0.28 U		0.26 U		0.32 U		0.15 U		0.15 U	
SILVER, FILTERED		0.28 U		0.028 U		0.2 U		0.04 U		0.19 U	
SODIUM, FILTERED		2950 J		4370 J		18000 J		70600 J		16300 J	
STRONTIUM, FILTERED		103 J				101 J		83.5 J		64.3 J	
THALLIUM, FILTERED		0.13 U		0.043 U		0.15 U		0.04 U		0.04 U	
TIN, FILTERED		0.15 U		0.048 U		0.15 U		0.03 U		0.03 U	
TITANIUM, FILTERED		1.6 J				3.5 J		3.5 J		5.1 J	
VANADIUM, FILTERED		0.3 U		1.14 U		0.47 U		0.37 U		0.42 U	
ZINC, FILTERED		12.2 J		21.2 J		9.2 J		8.6 J		5.7 U	
Field Parameters (mg/L)											
DISSOLVED OXYGEN			2.83								
DISSOLVED OXYGEN - METER	11.7				9.28		9.12		10.41		10.8
OXIDATION REDUCTION POTENTIAL (MV)	95		271.200000		113		131		174		109
PH (S.U.)	7.49		6.97		7.24		7.39		7.75		7.58
SPECIFIC CONDUCTANCE (MS/CM)	0.262		829		0.28		0.496		0.181		0.203
TEMPERATURE (C)	9.29		16.27		9.29		11		10.65		10.49
TURBIDITY (NTU)	11		9.4		59		16		298		36
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U				0.01 U		0.04 J		0.02 J		0.02 J
NITRITE/NITRATE-N	0.15 J				0.33 J		0.02 U		0.02 U		0.02 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE		1 U									
1,2,4-TRICHLOROBENZENE		1 U									
1,2-DICHLOROBENZENE		1 U									
1,3-DICHLOROBENZENE		1 U									
1,4-DICHLOROBENZENE		1 U									
1,4-NAPHTHOQUINONE		1 U									
1,4-PHENYLENEDIAMINE		1 UJ									
1-NAPHTHYLAMINE		1 U									
2,2'-OXYBIS(1-CHLOROPROPANE)		1 U									
2,3,4,6-TETRACHLOROPHENOL		1 U									
2,4,5-TRICHLOROPHENOL		1 U									
2,4,6-TRICHLOROPHENOL		1 U									
2,4-DICHLOROPHENOL		1 U									
2,4-DIMETHYLPHENOL		1 U									
2,4-DINITROPHENOL		1 U									
2,6-DICHLOROPHENOL		1 U									
2-ACETYLAMINOFLUORENE		1 U									
2-CHLORONAPHTHALENE		1 UJ									
2-CHLOROPHENOL		1 U									
2-METHYLNAPHTHALENE		0.05 U									
2-METHYLPHENOL		1 U									
2-NAPHTHYLAMINE		1 U									
2-NITROANILINE		1 U									
2-NITROPHENOL		1 U									
2-PICOLINE		1 U									
3&4-METHYLPHENOL		1 U									
3,3'-DICHLOROBENZIDINE		1 U									
3,3'-DIMETHYLBENZIDINE		1 U									
3-METHYLCHOLANTHRENE		1 U									
3-NITROANILINE		1 U									
4,6-DINITRO-2-METHYLPHENOL		1 U									
4-AMINOBIPHENYL		1 U									
4-BROMOPHENYL PHENYL ETHER		1 U									
4-CHLORO-3-METHYLPHENOL		1 U									
4-CHLOROANILINE		1 U									
4-CHLOROPHENYL PHENYL ETHER		1 U									
4-NITROANILINE		1 U									
4-NITROPHENOL		1 U									
4-NITROQUINOLINE-1-OXIDE		1 UR									
5-NITRO-O-TOLUIDINE		1 U									
7,12-DIMETHYLBENZ(A)ANTHRACENE		1 U									

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
A,A-DIMETHYLPHENETHYLAMINE		1 UJ									
ACENAPHTHENE		0.05 U									
ACENAPHTHYLENE		0.05 U									
ACETOPHENONE		1 U									
ANILINE		1 U									
ANTHRACENE		0.05 U									
ARAMITE		1 UR									
BENZO(A)ANTHRACENE		0.22									
BENZO(A)PYRENE		0.26									
BENZO(B)FLUORANTHENE		0.38									
BENZO(G,H,I)PERYLENE		0.23									
BENZO(K)FLUORANTHENE		0.2									
BENZYL ALCOHOL		1 U									
BIS(2-CHLOROETHOXY)METHANE		1 U									
BIS(2-CHLOROETHYL)ETHER		1 U									
BIS(2-ETHYLHEXYL)PHTHALATE		1 U									
BUTYL BENZYL PHTHALATE		1 U									
CHLOROBENZILATE		1 U									
CHRYSENE		0.35									
DI-N-BUTYL PHTHALATE		1 U									
DI-N-OCTYL PHTHALATE		1 U									
DIALLATE		1 U									
DIBENZO(A,H)ANTHRACENE		0.05 U									
DIBENZOFURAN		1 U									
DIETHYL PHTHALATE		1 U									
DIMETHYL PHTHALATE		1 U									
DIPHENYLAMINE		1 U									
ETHYL METHANE SULFONATE		1 U									
FLUORANTHENE		0.96									
FLUORENE		0.05 U									
HEXACHLOROBENZENE		1 U									
HEXACHLOROBUTADIENE		1 U									
HEXACHLOROCYCLOPENTADIENE		1 UR									
HEXACHLOROETHANE		1 U									
HEXACHLOROPROPENE		1 U									
INDENO(1,2,3-CD)PYRENE		0.2									
ISODRIN		1 U									
ISOPHORONE		1 U									
ISOSAFROLE		1 U									
KEPONE		1 UJ									
METHAPYRILENE		1 UJ									
METHYL METHANE SULFONATE		1 U									

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
N-NITROSO-DI-N-BUTYLAMINE		1 U									
N-NITROSO-DI-N-PROPYLAMINE		1 U									
N-NITROSODIETHYLAMINE		1 U									
N-NITROSODIMETHYLAMINE		1 U									
N-NITROSOMETHYLETHYLAMINE		1 U									
N-NITROSOMORPHOLINE		1 U									
N-NITROSOPIPERIDINE		1 U									
N-NITROSOPYRROLIDINE		1 U									
NAPHTHALENE		0.05 U									
O,O,O-TRIETHYL PHOSPHOROTHIOATE		1 U									
O-TOLUIDINE		1 U									
P-(DIMETHYLAMINO)AZOBENZENE		1 U									
PENTACHLOROBENZENE		1 U									
PENTACHLOROETHANE		1 U									
PENTACHLORONITROBENZENE		1 U									
PHENACETIN		1 U									
PHENANTHRENE		0.51									
PHENOL		1 U									
PRONAMIDE		1 U									
PYRENE		0.65									
PYRIDINE		1 U									
SAFROLE		1 U									
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
1,3-DINITROBENZENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE						0.47 U				0.49 U	
2,4,6-TRINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2,4-DIAMINO-6-NITROTOLUENE						0.24 U				0.25 U	
2,4-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2,6-DIAMINO-4-NITROTOLUENE						0.24 U				0.25 U	
2,6-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2-AMINO-4,6-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
2-NITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
3,5-DINITROANILINE						0.24 U				0.25 U	
3-NITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
4-NITROTOLUENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
DNX						0.24 U				0.25 U	
HMX		2.8		0.265 U		0.67		1.2		1.2 J	
MNX						0.24 U				0.25 U	
NITROBENZENE		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
RDX		3.6		0.29 J		0.35 J		2.8		1.4	
TETRYL		0.5 U		0.265 U		0.24 U		0.29 U		0.25 U	
TNX						0.24 U				0.25 U	
Herbicides (ug/L)											
HEXACHLOROPHENE		0.025 U									
PENTACHLOROPHENOL		0.025 J									
Total Metals (ug/L)											
ALUMINUM		1740 J		19100 J		200 J		1650 J		53.4 U	
ANTIMONY		0.95 U		0.5 U		0.11 U		0.09 U		0.04 U	
ARSENIC		0.97 U		5.8 J		0.32 U		1.2 J		1.5 J	
BARIUM		84.7 J		247 J		57.8 J		88.4 J		92 J	
BERYLLIUM		0.04 U		0.49 U		0.03 U		0.08 U		0.03 U	
CADMIUM		0.08 U		0.56 U		0.13 U		0.06 U		0.04 U	
CALCIUM		58800 J		133000 J		64400 J		59900 J		76400 J	
CHROMIUM		2 J		20.5 J		0.43 U		1.9 J		0.44 U	
COBALT		1.2 J		5.2 J		0.21 U		0.72 U		3.2 J	
COPPER		4.6 J		17.6 J		2.3 J		1.9 J		0.38 U	
IRON		1380 J		16200 J		198 J		1140 J		2750 J	
LEAD		1.9 J		29.9 J		1.6 U		1.2 U		0.09 U	
LITHIUM		2.8 J		14.3 J				1.6 U			
MAGNESIUM		10900 J		18100 J		4700 J		10500 J		14200 U	
MANGANESE		89.6 J		195 J		34.2 J		118 J		3190 J	
MERCURY		0.02 U		0.02 U		0.02 U		0.2 U		0.02 U	
NICKEL		2.4 J		12.3 J		0.67 J		2 J		1.2	
POTASSIUM		1330 J		4380 J		621 J		1430 J		2180 J	
SELENIUM		0.55 U		0.51 U		0.09 U		0.19 U		0.16 U	
SILVER		0.04 U		0.2 U		0.03 U		0.04 U		0.03 U	
SODIUM		55500 J		325000 J		88300 J		33100 J		19900 J	
STRONTIUM		149 J		245 J				143 J			
THALLIUM		0.08 U		0.29 U		0.04 U		0.05 U		0.04 U	
TIN		0.07 U		0.62 U		0.1 U		0.09 U		0.1 U	
TITANIUM		33 J		356 J		4.7 J		24.2 J		1.3 J	
VANADIUM		3.1 J		38.1 J		0.61 U		3.2 J		0.27 U	
ZINC		9.8 J		79.3 J		10.8 J		7.8 J		17.7 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	108		57.1		56		52.8 U		24.8 U		7.6 U
ANTIMONY, FILTERED	0.19 U		0.92 U		0.24 U		0.19 U		0.38 U		0.11 U
ARSENIC, FILTERED	0.19 U		0.42 U		0.15 U		0.25 U		0.73 U		1 J
BARIUM, FILTERED	40 J		75.7 J		149 J		58.8 J		78.1 J		95.3 J
BERYLLIUM, FILTERED	0.03 U		0.03 U		0.03 U		0.03 U		0.25 U		0.03 U
CADMIUM, FILTERED	0.05 U		0.05 U		0.05 U		0.11 U		0.19 U		0.04 U
CALCIUM, FILTERED	28800 J		56900 J		121000 J		63400 J		5660 J		75300 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	02	02	01	01	02	02
LOCATION	13SW/SD05	13SW/SD06	13SW/SD06	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD07	13SW/SD08	13SW/SD08	13SW/SD08	13SW/SD08
SAMPLE NUMBER	13SW0501-F	13SW0601	13SW0601-F	13SW0701	13SW0701-F	13SW0702	13SW0702-F	13SW0801	13SW0801-F	13SW0802	13SW0802-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/27/2003	10/27/2003	5/8/2003	5/8/2003	10/23/2003	10/23/2003
CHROMIUM, FILTERED	0.21 U		0.38 U		0.39 U		0.22 U		0.33 U		0.26 U
COBALT, FILTERED	1.3 J		0.7 U		0.43 U		0.6 J		0.32 U		3.2 J
COPPER, FILTERED	3.5 J		2.3 J		2.2 J		1.4 J		1 U		0.3 U
IRON, FILTERED	120 J		43.4 J		26.9 U		41.6 U		14.9 U		1120 J
LEAD, FILTERED	0.28 U		0.14 U		0.18 U		0.13 U		0.2 U		0.27 U
LITHIUM, FILTERED	3.1 J		1.5 U		0.37 U				0.96 U		
MAGNESIUM, FILTERED	7210 J		11000 J		14400 J		5300 J		9870 J		13700 U
MANGANESE, FILTERED	64.9 J		63.3 J		20.4 J		28.7 J		84.4 J		3110 J
MERCURY, FILTERED	0.02 U		0.02 U		0.02 U		0.02 U		0.2 U		0.02 U
NICKEL, FILTERED	2.9 J		1.5 J		0.61 U		0.55 U		1.1 J		0.84 J
POTASSIUM, FILTERED	735 J		1080 J		1080 J		651 J		1100 J		2200 J
SELENIUM, FILTERED	0.21 U		0.59 U		0.17 U		0.09 U		0.36 U		0.14 U
SILVER, FILTERED	0.04 U		0.04 U		0.05 U		0.03 U		0.49 U		0.03 U
SODIUM, FILTERED	5350 J		55800 J		311000 J		106000 J		3190 J		18800 J
STRONTIUM, FILTERED	88 J		142 J		219 J				140 J		
THALLIUM, FILTERED	0.04 U		0.04 U		0.04 U		0.04 U		0.25 U		0.04 U
TIN, FILTERED	0.05 U		0.03 U		0.04 U		0.14 U		0.21 U		0.24 U
TITANIUM, FILTERED	3.2 J		1.4 J		1.1 U		1 U		1.1 U		0.59 J
VANADIUM, FILTERED	0.27 U		0.23 U		0.34 U		0.35 U		0.38 U		0.1 U
ZINC, FILTERED	19.8 J		5.3 U		3.8 U		17.4 J		3.4 J		16 U
Field Parameters (mg/L)											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER		9.62		8.13		5.19		6.91		6.03	
OXIDATION REDUCTION POTENTIAL (MV)		640		177		270		150.600000		-23.7	
PH (S.U.)		7.41		7.32		7.25		6.13		7.09	
SPECIFIC CONDUCTANCE (MS/CM)		0.543		1.394		0.55		0.462		0.46	
TEMPERATURE (C)		10.44		9.8		13.27		15.18		14.71	
TURBIDITY (NTU)				352		9.12		31		19.3	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.01 U		0.03 J		0.01 U		0.07		0.4 J	
NITRITE/NITRATE-N		0.54 J		0.18 J		0.15		0.64		0.62 J	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	01	01	02	02	01
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-D	13SW1001-F	13SW1001-F-D	13SW1002	13SW1002-F	13SW1201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	01	01	02	02	01
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-D	13SW1001-F	13SW1001-F-D	13SW1002	13SW1002-F	13SW1201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	01	01	02	02	01
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-D	13SW1001-F	13SW1001-F-D	13SW1002	13SW1002-F	13SW1201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
1,3-DINITROBENZENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U						0.53 U		
2,4,6-TRINITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		1.9 J
2,4-DIAMINO-6-NITROTOLUENE			0.25 U						0.27 U		
2,4-DINITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U						0.27 U		
2,6-DINITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
2-AMINO-4,6-DINITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.84 J
2-NITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
3,5-DINITROANILINE			0.25 U						0.27 U		
3-NITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE	0.65 U		0.25 U		0.55 U	0.4 J			0.27 U		2 J
4-NITROTOLUENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
DNX			0.25 U						0.59 J		
HMX	0.65 U		0.25 U		15 J	13			10		26
MNX			0.25 U						0.27 U		
NITROBENZENE	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	01	01	02	02	01
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-D	13SW1001-F	13SW1001-F-D	13SW1002	13SW1002-F	13SW1201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003
RDX	0.6 U		0.42 J		18	16			0.27 U		100
TETRYL	0.65 U		0.25 U		0.55 U	0.21 U			0.27 U		0.28 U
TNX			0.25 U						0.27 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	2700 J		139 J		2080 J	3260 J			106 U		1330 J
ANTIMONY	0.04 U		0.07 U		0.05 U	0.06 U			0.04 U		0.52 U
ARSENIC	0.91 U		0.33 U		0.8 U	0.98 U			0.35 U		4.2 J
BARIUM	38 J		61.1 J		44.1 J	50.3 J			49.6 J		80.7 J
BERYLLIUM	0.06 U		0.03 U		0.09 U	0.12 U			0.05 U		0.03 U
CADMIUM	0.08 U		0.05 U		0.1 U	0.1 U			0.19 U		0.16 U
CALCIUM	18900 J		82600 J		23500 J	23400 J			44600 J		55000 J
CHROMIUM	2.5 J		0.59 U		1.9 J	3 J			0.42 U		1.8 J
COBALT	0.65 U		0.18 U		2.6 J	2.7 J			5.1 J		1.2 J
COPPER	3.6 J		3 J		2.2 J	2.6 J			1.3 J		7.2 J
IRON	2350 J		152 J		1740 J	2280 J			406 J		1090 J
LEAD	1.5 J		0.41 U		1.3 J	1.5 J			0.27 U		0.92 U
LITHIUM	1.8 U				6.6 J	8.1 J					2 U
MAGNESIUM	3600 J		11400 J		6660 J	7050 J			8220 J		18600 J
MANGANESE	25 J		10.6 J		231 J	220 J			1900 J		69.9 J
MERCURY	0.02 U		0.02 U		0.02 U	0.02 U			0.02 U		0.02 U
NICKEL	2.1 J		1.1 J		4.5 J	5.2 J			4.7		4.5 J
POTASSIUM	1130 J		1320 J		7750 J	7850 J			730 J		97700 J
SELENIUM	0.1 U		0.09 U		0.1 U	0.1 U			0.06 U		0.5 U
SILVER	0.04 U		0.03 U		0.04 U	0.04 U			0.03 U		0.04 U
SODIUM	3020 J		9120 J		7780 J	8020 J			9750 J		28300 J
STRONTIUM	48 J				59 J	57.7 J					120 J
THALLIUM	0.04 U		0.04 U		0.04 U	0.04 U			0.04 U		0.06 U
TIN	0.13 U		0.1 U		0.04 U	0.08 U			0.1 U		0.1 U
TITANIUM	51 J		6.4 J		36.4 J	59.4 J			1.9 J		26.3 J
VANADIUM	4.9 J		0.57 U		3.6 J	5.5 J			0.3 U		5.2 J
ZINC	27 J		68.9 J		13.9 J	17 J			7.8 U		16.1 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		822		16.5 U			303	286		9.2 U	
ANTIMONY, FILTERED		0.13 U		0.17 U			0.21 U	0.17 U		0.23 U	
ARSENIC, FILTERED		0.47 U		0.26 U			0.37 U	0.29 U		0.25 U	
BARIUM, FILTERED		28.4 J		62.3 J			33.7 J	34 J		46.2 J	
BERYLLIUM, FILTERED		0.03 U		0.03 U			0.03 U	0.03 U		0.03 U	
CADMIUM, FILTERED		0.05 U		0.07 U			0.05 U	0.05 U		0.09 U	
CALCIUM, FILTERED		18600 J		81400 J			24300 J	23300 J		43000 J	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	02	02	01	01	01	01	02	02	01
LOCATION	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD09	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD10	13SW/SD12
SAMPLE NUMBER	13SW0901	13SW0901-F	13SW0902	13SW0902-F	13SW1001	13SW1001-D	13SW1001-F	13SW1001-F-D	13SW1002	13SW1002-F	13SW1201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	3/29/2003	3/29/2003	10/27/2003	10/27/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	10/23/2003	10/23/2003	3/30/2003
CHROMIUM, FILTERED		0.89 U		0.2 U			0.55 U	0.46 U		0.31 U	
COBALT, FILTERED		0.65 U		0.63 J			1.6 J	1.6 J		6.5 J	
COPPER, FILTERED		2.1 J		1.9 J			1.2 U	1.3 U		0.73 J	
IRON, FILTERED		750 J		22.4 U			343 J	256 J		47.3 U	
LEAD, FILTERED		0.38 U		0.02 U			0.18 U	0.3 U		0.05 U	
LITHIUM, FILTERED		0.66 U					5.5 J	5.5 J			
MAGNESIUM, FILTERED		3440 J		11900 J			6610 J	6780 J		7970 J	
MANGANESE, FILTERED		9.2 J		5 J			160 J	155 J		1670 J	
MERCURY, FILTERED		0.02 U		0.02 U			0.02 U	0.02 U		0.02 U	
NICKEL, FILTERED		1.1 J		0.7 J			3.3 J	3.3 J		4.1	
POTASSIUM, FILTERED		846 J		1370 J			7430 J	7320 J		600 J	
SELENIUM, FILTERED		0.08 U		0.15 U			0.13 U	0.09 U		0.08 U	
SILVER, FILTERED		0.04 U		0.03 U			0.12 U	0.04 U		0.03 U	
SODIUM, FILTERED		2920 J		9550 J			7840 J	7980 J		9570 J	
STRONTIUM, FILTERED		45.5 J					56.3 J	54.3 J			
THALLIUM, FILTERED		0.04 U		0.04 U			0.04 U	0.04 U		0.04 U	
TIN, FILTERED		0.03 U		0.1 U			0.03 U	0.05 U		0.1 U	
TITANIUM, FILTERED		19.5 J		0.74 U			8 J	7 J		0.11 J	
VANADIUM, FILTERED		1.6 J		0.34 U			0.73 U	0.65 U		0.06 U	
ZINC, FILTERED		10.1 J		54.5 J			8.6 J	10.4 J		7.8 U	
Field Parameters (mg/L)											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER	9.81		8.55		9.95				3.65		11.98
OXIDATION REDUCTION POTENTIAL (MV)	120		324.400000		145				178.700000		162
PH (S.U.)	8.48		7.8		7.74				6.17		7.92
SPECIFIC CONDUCTANCE (MS/CM)	0.138		0.436		0.199				0.27		0.64
TEMPERATURE (C)	11		11.8		9.3				12.77		6.85
TURBIDITY (NTU)	45		5.13		150				1.98		17
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 J		0.01		0.08 J	0.02 J			0.03 J		0.88 J
NITRITE/NITRATE-N	0.02 U		0.18		0.46 J	0.47 J			0.025 U		5.8 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	02	02	01	01	02	02	02	02	02	02
LOCATION	13SW/SD12	13SW/SD12	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14
SAMPLE NUMBER	13SW1201-F	13SW1202	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-D	13SW1302-F	13SW1302-F-D	13SW1401	13SW1401-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP
SAMPLE DATE	3/30/2003	10/22/2003	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	02	02	01	01	02	02	02	02	02	02
LOCATION	13SW/SD12	13SW/SD12	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14
SAMPLE NUMBER	13SW1201-F	13SW1202	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-D	13SW1302-F	13SW1302-F-D	13SW1401	13SW1401-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP
SAMPLE DATE	3/30/2003	10/22/2003	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	02	02	01	01	02	02	02	02	02	02
LOCATION	13SW/SD12	13SW/SD12	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14
SAMPLE NUMBER	13SW1201-F	13SW1202	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-D	13SW1302-F	13SW1302-F-D	13SW1401	13SW1401-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP
SAMPLE DATE	3/30/2003	10/22/2003	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
1,3-DINITROBENZENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.48 U				0.48 U	0.48 U			0.47 U	0.47 U
2,4,6-TRINITROTOLUENE		0.24 U		6.8		0.24 U	0.24 U			0.24 U	0.24 U
2,4-DIAMINO-6-NITROTOLUENE		0.24 U				0.24 U	0.24 U			0.24 U	0.24 U
2,4-DINITROTOLUENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
2,6-DIAMINO-4-NITROTOLUENE		0.24 U				0.44 J	0.62 J			0.24 U	0.24 U
2,6-DINITROTOLUENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
2-AMINO-4,6-DINITROTOLUENE		0.52 J		1.6 J		8.3 J	9.8 J			1.3	1.4 J
2-NITROTOLUENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
3,5-DINITROANILINE		0.24 U				0.24 UJ	0.24 U			0.24 U	0.24 U
3-NITROTOLUENE		0.24 U		0.6 U		0.31 J	0.24 U			0.24 U	0.24 U
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE		0.98 J		3.8 J		21 J	25			2.9	3
4-NITROTOLUENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
DNX		3.5 J				4.2 J	3.6 J			2.7 J	3.5 J
HMX		19		14		33 J	36			20	24
MNX		3.1				5.2 J	5.5			3.8 J	5.3 J
NITROBENZENE		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	02	02	01	01	02	02	02	02	02	02
LOCATION	13SW/SD12	13SW/SD12	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14
SAMPLE NUMBER	13SW1201-F	13SW1202	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-D	13SW1302-F	13SW1302-F-D	13SW1401	13SW1401-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP
SAMPLE DATE	3/30/2003	10/22/2003	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
RDX		57		84		180 J	210			77	97
TETRYL		0.24 U		0.6 U		0.24 U	0.24 U			0.24 U	0.24 U
TNX		0.81				1.1 J	1.3			0.62 J	1.1 J
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		1740 J		714 J		167 J	161 J			202 J	312 J
ANTIMONY		0.41 U		0.09 U		0.2 U	0.21 U			0.15 U	0.17 U
ARSENIC		2.2 J		0.95 U		1.3 J	1.4 J			0.85 J	0.88 J
BARIUM		68.5 J		58.8 J		94.3 J	93.4 J			78.6 J	76.3 J
BERYLLIUM		0.2 U		0.07 U		0.05 U	0.06 U			0.03 U	0.03 U
CADMIUM		0.19 U		0.11 U		0.12 U	0.12 U			0.04 U	0.04 U
CALCIUM		54700 J		38700 J		74800 J	73500 J			36700 J	40600 J
CHROMIUM		3.2 J		0.98 U		0.69 U	0.75 U			1 U	1.1 U
COBALT		2.4 J		1.9 J		1.2 J	1.3 J			0.19 U	0.25 U
COPPER		4.2 J		2.4 J		3.8 J	3.8 J			2.8 J	2.7 J
IRON		1920 J		673 J		337 J	357 J			147 U	285 J
LEAD		2 J		0.77 U		0.24 U	0.27 U			0.15 U	0.21 U
LITHIUM				3.9 J							
MAGNESIUM		13000 J		7480 J		12600 J	12300 J			10100 J	10800 J
MANGANESE		292 J		107 J		170 J	192 J			26.1 J	19.2 J
MERCURY		0.02 U		0.02 U		0.02 U	0.02 U			0.02 U	0.02 U
NICKEL		5.7		3.8 J		6.3	6.2			1.9	2
POTASSIUM		31800 J		15100 J		42400 J	42400 J			36000 J	40000 J
SELENIUM		0.41 U		0.15 U		0.36 U	0.37 U			0.21 U	0.2 U
SILVER		0.03 U		0.04 U		0.03 U	0.03 U			0.03 U	0.03 U
SODIUM		16700 J		8900 J		16700 J	16300 J			10600 J	11400 J
STRONTIUM				94.3 J							
THALLIUM		0.16 U		0.04 U		0.04 U	0.04 U			0.04 U	0.04 U
TIN		0.26 U		0.03 U		0.1 U	0.13 U			0.1 U	0.1 U
TITANIUM		31.8		11.6 J		3.6 J	3.5 J			4.5 J	5.1 J
VANADIUM		5.1 J		1.8 J		1.1 J	1 J			0.92 J	1.1 J
ZINC		18.1 J		21.2 J		18.3 J	20.7 J			2.5 U	2.7 U
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	137		43.2 U		103			35.3 U	35.7 U		
ANTIMONY, FILTERED	0.49 U		0.5 U		0.16 U			0.21 U	0.39 U		
ARSENIC, FILTERED	3.6 J		1.4 J		0.66 U			1.2 J	1.2 J		
BARIUM, FILTERED	74.6 J		51.7 J		53.7 J			94.5 J	92.9 J		
BERYLLIUM, FILTERED	0.03 U		0.09 U		0.03 U			0.03 U	0.04 U		
CADMIUM, FILTERED	0.06 U		0.05 U		0.05 U			0.06 U	0.07 U		
CALCIUM, FILTERED	51400 J		54500 J		37900 J			73100 J	73600 J		

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	02	02	01	01	02	02	02	02	02	02
LOCATION	13SW/SD12	13SW/SD12	13SW/SD12	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD13	13SW/SD14	13SW/SD14
SAMPLE NUMBER	13SW1201-F	13SW1202	13SW1202-F	13SW1301	13SW1301-F	13SW1302	13SW1302-D	13SW1302-F	13SW1302-F-D	13SW1401	13SW1401-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP
SAMPLE DATE	3/30/2003	10/22/2003	10/22/2003	3/30/2003	3/30/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
CHROMIUM, FILTERED	0.67 U		0.72 U		0.27 U			0.63 U	0.56 U		
COBALT, FILTERED	1.3 J		2.9 J		1.7 J			1 J	1.3 J		
COPPER, FILTERED	6.6 J		2.5 J		1.9 J			3.5 J	3.3 J		
IRON, FILTERED	193 J		44.2 U		82.5 J			122 U	87.5 U		
LEAD, FILTERED	0.22 U		0.13 U		0.08 U			0.09 U	0.08 U		
LITHIUM, FILTERED	1.2 U				3.5 J						
MAGNESIUM, FILTERED	18000 J		12900 J		7630 J			12300 J	12400 J		
MANGANESE, FILTERED	52.2 J		119 J		88.3 J			141 J	156 J		
MERCURY, FILTERED	0.02 U		0.02 U		0.02 U			0.02 U	0.02 U		
NICKEL, FILTERED	3.8 J		3.2		3.2 J			6.2	6.1		
POTASSIUM, FILTERED	97700 J		31100 J		15100 J			42100 J	42500 J		
SELENIUM, FILTERED	0.44 U		0.28 U		0.18 U			0.36 U	0.37 U		
SILVER, FILTERED	0.04 U		0.03 U		0.04 U			0.03 U	0.03 U		
SODIUM, FILTERED	27500 J		16500 J		9160 J			16400 J	16500 J		
STRONTIUM, FILTERED	117 J				91.8 J						
THALLIUM, FILTERED	0.04 U		0.08 U		0.04 U			0.04 U	0.04 U		
TIN, FILTERED	0.03 U		0.22 U		0.03 U			0.1 U	0.1 U		
TITANIUM, FILTERED	7.7 J		1.5 J		3 J			0.55 J	0.62 J		
VANADIUM, FILTERED	3.4 J		1.2 J		0.67 U			0.75 J	0.79 J		
ZINC, FILTERED	8.1 J		4.1 U		13.1 J			15.4 U	15.5 U		
Field Parameters (mg/L)											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER		9.5		12.32		2.19				5.93	
OXIDATION REDUCTION POTENTIAL (MV)		233.600000		157		255.600000				224.700000	
PH (S.U.)		7.51		8.07		7.42				7.33	
SPECIFIC CONDUCTANCE (MS/CM)		0.427		0.26		0.531				0.365	
TEMPERATURE (C)		12.25		6.52		13.33				12.14	
TURBIDITY (NTU)		6		12.6		3				4.4	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.005 UJ		0.14 J		0.04 J	0.01 J			0.005 UJ	0.005 UJ
NITRITE/NITRATE-N		0.13 U		1.6 J		3.6 J	3.7 J			0.54 J	0.55 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02	02
LOCATION	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18
SAMPLE NUMBER	13SW1401-F	13SW1401-F-D	13SW1402	13SW1501	13SW1501-F	13SW1502	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02	02
LOCATION	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18
SAMPLE NUMBER	13SW1401-F	13SW1401-F-D	13SW1402	13SW1501	13SW1501-F	13SW1502	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02	02
LOCATION	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18
SAMPLE NUMBER	13SW1401-F	13SW1401-F-D	13SW1402	13SW1501	13SW1501-F	13SW1502	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
1,3-DINITROBENZENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE				0.49 U			0.5 U			0.51 U	
2,4,6-TRINITROTOLUENE			0.42 J	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2,4-DIAMINO-6-NITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2,4-DINITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2,6-DIAMINO-4-NITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2,6-DINITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
2-AMINO-4,6-DINITROTOLUENE			1 J	0.24 U		0.26 J	0.8 J		0.35 J	0.25 U	
2-NITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
3,5-DINITROANILINE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
3-NITROTOLUENE			0.248 U	0.24 U		0.25 U	0.29 J		0.24 U	0.25 U	
4,4'-TN-AZOXY			0.495 U			0.5 U			0.48 U		
4-AMINO-2,6-DINITROTOLUENE			2.5	0.24 U		0.62	1.6		0.83	0.25 U	
4-NITROTOLUENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
DNX			1	23 J		1.8 J	3.6 J		0.24 U	0.25 U	
HMX			18	210		160	21		15	0.25 U	
MNX			1.9	47		22	3		1.2	0.25 U	
NITROBENZENE			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02	02
LOCATION	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18
SAMPLE NUMBER	13SW1401-F	13SW1401-F-D	13SW1402	13SW1501	13SW1501-F	13SW1502	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003
RDX			97	1500		1000	50		43	0.25 U	
TETRYL			0.248 U	0.24 U		0.25 U	0.25 U		0.24 U	0.25 U	
TNX			0.248 U	4		0.74 J	0.48 J		0.24 U	0.25 U	
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM				3760 J			5690 J			68.2 U	
ANTIMONY				0.13 U			0.09 U			0.03 U	
ARSENIC				4 J			1.4 J			0.14 U	
BARIUM				91.3 J			101 J			57 J	
BERYLLIUM				0.72 U			0.21 U			0.03 U	
CADMIUM				0.3 U			0.06 U			0.04 U	
CALCIUM				21900 J			29000 J			43800 J	
CHROMIUM				8.1 J			8.2 J			0.39 U	
COBALT				9 J			1.1 J			0.07 U	
COPPER				18 J			3.1 J			0.56 U	
IRON				6220 J			3600 J			47.8 U	
LEAD				9.7 J			1.8 J			0.07 U	
LITHIUM											
MAGNESIUM				9300 J			7980 J			8940 J	
MANGANESE				516 J			61.4 J			19.5 J	
MERCURY				0.047 J			0.02 U			0.02 U	
NICKEL				22 J			5.2			0.86 J	
POTASSIUM				30000 J			17500 J			1800 J	
SELENIUM				0.31 U			0.13 U			0.12 U	
SILVER				0.03 U			0.13 U			0.03 U	
SODIUM				6640 J			8500 J			28900 J	
STRONTIUM											
THALLIUM				0.07 U			0.11 U			0.04 U	
TIN				0.1 U			0.2 U			0.2 U	
TITANIUM				56.7 J			69.3			1.9 J	
VANADIUM				8.4 J			12 J			0.19 U	
ZINC				54.1 J			20.3 J			2.1 U	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	36.8 U	41 U			255 J			134 J			33.1 U
ANTIMONY, FILTERED	0.18 U	0.3 U			0.29 U			0.22 U			0.19 U
ARSENIC, FILTERED	0.8 J	0.85 J			0.64 J			0.26 U			0.09 U
BARIUM, FILTERED	75.9 J	77.3 J			40.5 J			70.1 J			58 J
BERYLLIUM, FILTERED	0.03 U	0.03 U			0.12 U			0.03 U			0.03 U
CADMIUM, FILTERED	0.04 U	0.04 U			0.12 U			0.04 U			0.04 U
CALCIUM, FILTERED	39800 J	39800 J			20400 J			28900 J			43600 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	03	02	02	03	02	02	03	02	02
LOCATION	13SW/SD14	13SW/SD14	13SW/SD14	13SW/SD15	13SW/SD15	13SW/SD15	13SW/SD16	13SW/SD16	13SW/SD16	13SW/SD18	13SW/SD18
SAMPLE NUMBER	13SW1401-F	13SW1401-F-D	13SW1402	13SW1501	13SW1501-F	13SW1502	13SW1601	13SW1601-F	13SW1602	13SW1801	13SW1801-F
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/27/2004	10/27/2003	10/27/2003	10/27/2004	10/22/2003	10/22/2003	10/27/2004	10/23/2003	10/23/2003
CHROMIUM, FILTERED	0.5 U	0.71 U			0.59 U			0.63 U			0.36 U
COBALT, FILTERED	0.21 U	3.5 J			0.97 J			3.3 J			2.7 J
COPPER, FILTERED	2.7 J	2.5 J			3.8 J			1.5 J			0.57 J
IRON, FILTERED	46 U	31.9 U			211 J			114 U			13.8 U
LEAD, FILTERED	0.08 U	0.06 U			0.17 U			0.11 U			0.04 U
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	10700 J	10800 J			8560 J			8100 J			8610 J
MANGANESE, FILTERED	10 J	14.8 J			4 J			25.9 J			17.8 J
MERCURY, FILTERED	0.02 U	0.02 U			0.02 U			0.02 U			0.02 U
NICKEL, FILTERED	1.8	2			3.8 J			1.2			0.96 J
POTASSIUM, FILTERED	39900 J	39200 J			28600 J			16200 J			1780 J
SELENIUM, FILTERED	0.24 U	0.25 U			0.26 U			0.12 U			0.13 U
SILVER, FILTERED	0.03 U	0.03 U			0.07 U			0.03 U			0.03 U
SODIUM, FILTERED	11400 J	11400 J			7110 J			9450 J			28200 J
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.04 U	0.04 U			0.04 U			0.04 U			0.04 U
TIN, FILTERED	0.1 U	0.1 U			0.1 U			0.1 U			0.1 U
TITANIUM, FILTERED	1 J	0.57 J			6.5 J			3.7 J			1.2 J
VANADIUM, FILTERED	0.6 J	0.65 J			0.69 J			0.44 J			0.12 U
ZINC, FILTERED	2.3 U	2.8 U			14.1 J			8.9 U			2.4 U
Field Parameters (mg/L)											
DISSOLVED OXYGEN			10.3			11.97			11.63		
DISSOLVED OXYGEN - METER				10.59			8.48			7.19	
OXIDATION REDUCTION POTENTIAL (MV)			81.7	290.5		101.4	213.700000		71.5	175.600000	
PH (S.U.)			7.45	7.43		7.41	7.17		7.61	7.12	
SPECIFIC CONDUCTANCE (MS/CM)			0.702	0.251		0.361	0.254		0.297	0.347	
TEMPERATURE (C)			14.69	8.93		14.22	12.18		14.56	12.11	
TURBIDITY (NTU)			12.8	10.4		23.8	6.5		12.7	1.03	
Miscellaneous Parameters (mg/L)											
AMMONIA-N				0.01			0.005 UJ			0.005 UJ	
NITRITE/NITRATE-N			7.4	0.14		3.4	0.66 J		1.3	0.025 U	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	03	03	02	02	02
LOCATION	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25
SAMPLE NUMBER	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											0.049 U
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	03	03	02	02	02
LOCATION	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25
SAMPLE NUMBER	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											0.049 U
ACENAPHTHYLENE											0.049 U
ACETOPHENONE											
ANILINE											
ANTHRACENE											0.049 U
ARAMITE											
BENZO(A)ANTHRACENE											0.049 U
BENZO(A)PYRENE											0.049 UJ
BENZO(B)FLUORANTHENE											0.049 U
BENZO(G,H,I)PERYLENE											0.049 U
BENZO(K)FLUORANTHENE											0.049 U
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											0.049 U
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											0.049 U
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											0.049 U
FLUORENE											0.049 U
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											0.049 U
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	03	03	02	02	02
LOCATION	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25
SAMPLE NUMBER	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											0.049 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											0.049 U
PHENOL											
PRONAMIDE											
PYRENE											0.049 U
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
1,3-DINITROBENZENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.49 U		0.54 U		0.52 U				0.51 U		0.5 U
2,4,6-TRINITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2,4-DINITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2,6-DINITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
2-NITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
3,5-DINITROANILINE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
3-NITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
4-NITROTOLUENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
DNX	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
HMX	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
MNX	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
NITROBENZENE	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	03	03	02	02	02
LOCATION	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25
SAMPLE NUMBER	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003
RDX	0.24 U		0.46 J		1.6				0.26 U		0.25 U
TETRYL	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
TNX	0.24 U		0.27 U		0.26 U				0.26 U		0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	95.4 U		437 J		392 J		680 J		482 J		41.9 U
ANTIMONY	0.03 U		0.04 U		0.11 U		0.26 U		0.02 U		0.02 U
ARSENIC	0.19 U		0.24 U		0.26 U		0.45 U		0.38 U		0.11 U
BARIUM	50.1 J		55.6 J		77.7 J		42.5 J		47.3 J		50.7 J
BERYLLIUM	0.03 U		0.04 U		0.16 U		0.08 U		0.26 U		0.03 U
CADMIUM	0.04 U		0.04 U		0.04 U		0.039 U		0.04 U		0.04 U
CALCIUM	72500 J		3040 J		62300 J		33000 J		17200 J		28100 J
CHROMIUM	0.58 U		0.95 U		0.45 U		1 J		0.62 U		0.19 U
COBALT	0.39 U		0.33 U		0.47 J		0.26 U		0.52 U		0.07 U
COPPER	0.89 J		1.3 J		1.3 J		3 J		3.4 J		0.89 U
IRON	74.8 U		455 J		116 U		767 J		432 J		34.7 U
LEAD	0.13 U		0.35 U		0.31 U		0.6 U		0.78 U		0.07 U
LITHIUM											
MAGNESIUM	15600 J		836 J		8520 J		5530 J		4770 J		7540 J
MANGANESE	26 J		41.4 J		136 J		9.4 U		111 J		7.5 J
MERCURY	0.02 U		0.02 U		0.02 U		0.03 U		0.02 U		0.02 U
NICKEL	1.5		1.2		1.6		2 U		1.8 J		0.76 J
POTASSIUM	2960 J		1980 J		2190 J		2130 J		3310 J		1700 J
SELENIUM	0.09 U		0.08 U		0.13 U		0.2 U		0.12 U		0.04 U
SILVER	0.03 U		0.03 U		0.03 U		0.028 U		0.03 U		0.03 U
SODIUM	41500 J		2260 J		29200 J		8920 J		17200 J		13900 J
STRONTIUM											
THALLIUM	0.04 U		0.04 U		0.04 U		0.043 U		0.04 U		0.04 U
TIN	0.1 U		0.1 U		0.1 U		0.048 UJ		0.1 U		0.1 U
TITANIUM	1.7 J		6.4		1.9 J				6.7 J		0.73 U
VANADIUM	0.22 U		1.1 J		0.42 J		1.3 J		0.88 J		0.11 U
ZINC	13.1 U		7.9 U		9.7 U		6.3 U		9.4 J		6.8 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		8.9 U		19.4 U		7.6 U		26.4 U		217 J	
ANTIMONY, FILTERED		0.17 U		0.18 U		0.25 U		0.29 U		0.09 U	
ARSENIC, FILTERED		0.11 U		0.13 U		0.2 U		0.23 U		0.18 U	
BARIUM, FILTERED		50 J		55.2 J		57.8 J		39.8 J		44.5 J	
BERYLLIUM, FILTERED		0.03 U		0.03 U		0.03 U		0.06 U		0.22 U	
CADMIUM, FILTERED		0.04 U		0.04 U		0.04 U		0.04 U		0.13 U	
CALCIUM, FILTERED		73800 J		30500 J		61300 J		33100 J		17500 J	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	03	03	02	02	02
LOCATION	13SW/SD19	13SW/SD19	13SW/SD20	13SW/SD20	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD22	13SW/SD24	13SW/SD24	13SW/SD25
SAMPLE NUMBER	13SW1901	13SW1901-F	13SW2001	13SW2001-F	13SW2201	13SW2201-F	13SW2202	13SW2202-F	13SW2401	13SW2401-F	13SW2501
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/27/2004	10/27/2004	10/27/2003	10/27/2003	10/27/2003
CHROMIUM, FILTERED		0.41 U		0.32 U		0.3 U		0.46 U		0.46 U	
COBALT, FILTERED		0.26 U		2.8 J		1.3 J		0.088 U		0.77 J	
COPPER, FILTERED		0.46 U		0.73 J		0.95 J		2.5 J		1.9 J	
IRON, FILTERED		7 U		11.6 U		9 U		43 U		137 J	
LEAD, FILTERED		0.04 U		0.06 U		0.07 U		0.23 U		0.09 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		15400 J		8290 J		8250 J		5410 J		4860 J	
MANGANESE, FILTERED		5.9 J		30.5 J		25.3 J		3.5 U		59.3 J	
MERCURY, FILTERED		0.02 U		0.02 U		0.02 U		0.03 U		0.02 U	
NICKEL, FILTERED		0.85 J		0.96 J		0.97 J		1.5 U		1.4 J	
POTASSIUM, FILTERED		2920 J		2000 J		2100 J		2080 J		3310 J	
SELENIUM, FILTERED		0.08 U		0.07 U		0.09 U		0.23 U		0.04 U	
SILVER, FILTERED		0.03 U		0.03 U		0.03 U		0.03 U		0.03 U	
SODIUM, FILTERED		41300 J		22100 J		29400 J		8840 J		18000 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED		0.04 U		0.04 U		0.04 U		0.043 U		0.04 U	
TIN, FILTERED		0.1 U		0.1 U		0.1 U		0.05 U		0.1 U	
TITANIUM, FILTERED		0.76 J		0.27 J		0.2 J				4.8 J	
VANADIUM, FILTERED		0.07 U		0.1 U		0.2 U		1.14 U		0.39 U	
ZINC, FILTERED		2.2 U		9.5 U		4.4 U		3 U		11.4 J	
Field Parameters (mg/L)											
DISSOLVED OXYGEN							10.84				
DISSOLVED OXYGEN - METER	6.03		4.39		3.71				8.29		8.64
OXIDATION REDUCTION POTENTIAL (MV)	203.5		158.3		264.700000		74.1		261.700000		288
PH (S.U.)	7.25		7.75		7.02		7.7		7.65		7.63
SPECIFIC CONDUCTANCE (MS/CM)	0.566		0.3		0.434		0.205		0.207		0.262
TEMPERATURE (C)	11.69		13.22		13.65		15.14		10.52		10.95
TURBIDITY (NTU)	1.93		6.25		1.5		21.3		22.7		0
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.04 J		0.005 UJ		0.005 UJ				0.04		0.01 U
NITRITE/NITRATE-N	0.13 U		0.11 U		0.025 U				200		0.05 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	02	02	02	01	01
LOCATION	13SW/SD25	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29	13SW/SD32	13SW11	13SW11
SAMPLE NUMBER	13SW2501-D	13SW2501-F	13SW2501-F-D	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901	13SW3201	13SW1101	13SW1101-F
SAMPLE CODE	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	DRY	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004	10/24/2003	5/8/2003	5/8/2003
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE	0.05 UJ								0.048 UJ		
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	02	02	02	01	01
LOCATION	13SW/SD25	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29	13SW/SD32	13SW11	13SW11
SAMPLE NUMBER	13SW2501-D	13SW2501-F	13SW2501-F-D	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901	13SW3201	13SW1101	13SW1101-F
SAMPLE CODE	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	DRY	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004	10/24/2003	5/8/2003	5/8/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE	0.05 UJ								0.048 UJ		
ACENAPHTHYLENE	0.05 UJ								0.048 UJ		
ACETOPHENONE											
ANILINE											
ANTHRACENE	0.05 UJ								0.048 UJ		
ARAMITE											
BENZO(A)ANTHRACENE	0.05 UJ								0.2 J		
BENZO(A)PYRENE	0.05 UJ								0.27 J		
BENZO(B)FLUORANTHENE	0.05 UJ								0.4 J		
BENZO(G,H,I)PERYLENE	0.05 UJ								0.22 J		
BENZO(K)FLUORANTHENE	0.05 UJ								0.19 J		
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE	0.05 UJ								0.33 J		
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE	0.05 UJ								0.048 UJ		
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE	0.05 UJ								0.77 J		
FLUORENE	0.05 UJ								0.048 UJ		
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE	0.05 UJ								0.21 J		
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	02	02	02	01	01
LOCATION	13SW/SD25	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29	13SW/SD32	13SW11	13SW11
SAMPLE NUMBER	13SW2501-D	13SW2501-F	13SW2501-F-D	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901	13SW3201	13SW1101	13SW1101-F
SAMPLE CODE	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	DRY	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004	10/24/2003	5/8/2003	5/8/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE	0.05 UJ								0.048 UJ		
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE	0.05 UJ								0.32 J		
PHENOL											
PRONAMIDE											
PYRENE	0.05 UJ								0.58 J		
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.25 U			0.25 U		0.26 U				0.21 U	
1,3-DINITROBENZENE	0.25 U			0.25 U		0.26 U				0.21 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.49 U			0.5 U		0.52 U					
2,4,6-TRINITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
2,4-DIAMINO-6-NITROTOLUENE	0.25 U			0.25 U		0.26 U					
2,4-DINITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
2,6-DIAMINO-4-NITROTOLUENE	0.25 U			0.25 U		0.26 U					
2,6-DINITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
2-AMINO-4,6-DINITROTOLUENE	0.25 U			0.25 U		0.26 U				0.25 R	
2-NITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
3,5-DINITROANILINE	0.25 U			0.25 U		0.26 U					
3-NITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
4,4'-TN-AZOXY											
4-AMINO-2,6-DINITROTOLUENE	0.25 U			0.25 U		0.46 J				1 J	
4-NITROTOLUENE	0.25 U			0.25 U		0.26 U				0.21 U	
DNX	0.25 U			0.25 U		0.86					
HMX	0.25 U			0.25 U		8.2				93	
MNX	0.25 U			0.25 U		1.2 J					
NITROBENZENE	0.25 U			0.25 U		0.26 U				0.21 U	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	02	02	02	01	01
LOCATION	13SW/SD25	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29	13SW/SD32	13SW11	13SW11
SAMPLE NUMBER	13SW2501-D	13SW2501-F	13SW2501-F-D	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901	13SW3201	13SW1101	13SW1101-F
SAMPLE CODE	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	DRY	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004	10/24/2003	5/8/2003	5/8/2003
RDX	0.25 U			0.25 U		22				610	
TETRYL	0.25 U			0.25 U		0.26 U				0.21 U	
TNX	0.25 U			0.25 U		0.26 U					
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	36.8 U			108 J		139 J				3080 J	
ANTIMONY	0.03 U			0.02 U		0.1 U				1.5 U	
ARSENIC	0.13 U			0.15 U		0.48 U				35.7 J	
BARIUM	59.5 J			62.5 J		54.6 J				25.3 J	
BERYLLIUM	0.03 U			0.03 U		0.03 U				0.16 U	
CADMIUM	0.04 U			0.04 U		0.04 U				0.29 U	
CALCIUM	31800 J			27900 J		26400 J				95400 J	
CHROMIUM	0.13 U			0.6 U		0.6 U				4.5 J	
COBALT	0.05 U			0.11 U		0.18 U				9.4 J	
COPPER	0.94 U			1.3 J		2.2 J				27.1 J	
IRON	28.1 U			75.4 U		162 U				2340 J	
LEAD	0.3 U			0.76 U		0.22 U				2.3 J	
LITHIUM										2.9 J	
MAGNESIUM	8290 J			6930 J		8260 J				92200 J	
MANGANESE	5.1 J			14.2 J		28.1 J				126 J	
MERCURY	1.1			0.02 U		0.02 U				0.2 U	
NICKEL	0.94 J			2.5 J		1.3				20.4 J	
POTASSIUM	1860 J			1750 J		20400 J				690000 J	
SELENIUM	0.07 U			0.09 U		0.11 U				2 J	
SILVER	0.03 U			0.03 U		0.03 U				0.1 U	
SODIUM	15500 J			16200 J		9470 J				72500 J	
STRONTIUM										82.4 J	
THALLIUM	0.04 U			0.04 U		0.04 U				0.17 U	
TIN	0.1 U			0.29 U		0.1 U				0.11 U	
TITANIUM	0.72 U			2.2 J		2 J				64.6 J	
VANADIUM	0.11 U			0.27 U		0.55 J				43.5 J	
ZINC	8.1 J			12.3 J		2.7 U				67.9 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		9.9 U	56.1 U		156 J		11 U				212 J
ANTIMONY, FILTERED		0.06 U	0.04 U		0.15 U		0.27 U				1.7 U
ARSENIC, FILTERED		0.11 U	0.12 U		0.17 U		0.42 U				35.3 J
BARIUM, FILTERED		55.1 J	54 J		65.2 J		54.8 J				10.1 J
BERYLLIUM, FILTERED		0.03 U	0.03 U		0.04 U		0.03 U				0.08 U
CADMIUM, FILTERED		0.04 U	0.04 U		0.07 U		0.04 U				0.18 U
CALCIUM, FILTERED		28200 J	27900 J		28800 J		26300 J				94400 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	02	02	02	02	02	02	02	02	02	01	01
LOCATION	13SW/SD25	13SW/SD25	13SW/SD25	13SW/SD26	13SW/SD26	13SW/SD27	13SW/SD27	13SW/SD29	13SW/SD32	13SW11	13SW11
SAMPLE NUMBER	13SW2501-D	13SW2501-F	13SW2501-F-D	13SW2601	13SW2601-F	13SW2701	13SW2701-F	13SW2901	13SW3201	13SW1101	13SW1101-F
SAMPLE CODE	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	DRY	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/27/2003	10/23/2003	10/23/2003	10/27/2004	10/24/2003	5/8/2003	5/8/2003
CHROMIUM, FILTERED		0.13 U	0.21 U		0.46 U		0.38 U				2 J
COBALT, FILTERED		0.52 U	0.06 U		0.64 J		3.1 J				8.8 J
COPPER, FILTERED		0.81 U	0.62 U		1.9 J		1.9 J				26.4 J
IRON, FILTERED		6.2 U	31.1 U		75.9 U		15.8 U				337 J
LEAD, FILTERED		0.02 U	0.02 U		0.19 U		0.09 U				0.26 U
LITHIUM, FILTERED											1.3 U
MAGNESIUM, FILTERED		7720 J	7440 J		7130 J		8050 J				92900 J
MANGANESE, FILTERED		2.1 U	1.5 U		11.7 J		13.3 J				72.5 J
MERCURY, FILTERED		0.02 U	0.02 U		0.02 U		0.02 U				0.2 U
NICKEL, FILTERED		0.89 J	0.78 J		2.4 J		1.4				18.6 J
POTASSIUM, FILTERED		1760 J	1720 J		1810 J		20700 J				700000 J
SELENIUM, FILTERED		0.04 U	0.11 U		0.1 U		0.11 U				2.2 J
SILVER, FILTERED		0.03 U	0.03 U		0.03 U		0.03 U				0.17 U
SODIUM, FILTERED		14600 J	14200 J		16800 J		9250 J				73200 J
STRONTIUM, FILTERED											79.9 J
THALLIUM, FILTERED		0.04 U	0.04 U		0.04 U		0.04 U				0.19 U
TIN, FILTERED		0.1 U	0.1 U		0.1 U		0.1 U				0.05 U
TITANIUM, FILTERED		0.34 U	1.5 J		2.8 J		0.1 J				18.6 J
VANADIUM, FILTERED		0.06 U	0.13 U		0.37 U		0.24 U				38.5 J
ZINC, FILTERED		6.9 J	3.2 J		6.6 J		2.1 U				30.6 J
Field Parameters (mg/L)											
DISSOLVED OXYGEN											
DISSOLVED OXYGEN - METER				6.7		8.2			9.15	4.35	
OXIDATION REDUCTION POTENTIAL (MV)				341.3		257.1			201.5	152.9	
PH (S.U.)				6.87		7.58			6.99	7.67	
SPECIFIC CONDUCTANCE (MS/CM)				0.26		0.264			0.578	2.743	
TEMPERATURE (C)				12.25		13.43			10.33	16.45	
TURBIDITY (NTU)				8.04		4			44	85	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U			0.01 U		0.005 UJ				3.4	
NITRITE/NITRATE-N	0.06			0.39		0.26 J				23	

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	02	02	03	03	03	03	03	03
LOCATION	13SW11	13SW11	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD35
SAMPLE NUMBER	13SW1102	13SW1102-F	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3501-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/18/2003	11/18/2003	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/6/2004
Semivolatile Organics (ug/L)										
1,2,4,5-TETRACHLOROBENZENE										
1,2,4-TRICHLOROBENZENE										
1,2-DICHLOROBENZENE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
1,4-NAPHTHOQUINONE										
1,4-PHENYLENEDIAMINE										
1-NAPHTHYLAMINE										
2,2'-OXYBIS(1-CHLOROPROPANE)										
2,3,4,6-TETRACHLOROPHENOL										
2,4,5-TRICHLOROPHENOL										
2,4,6-TRICHLOROPHENOL										
2,4-DICHLOROPHENOL										
2,4-DIMETHYLPHENOL										
2,4-DINITROPHENOL										
2,6-DICHLOROPHENOL										
2-ACETYLAMINOFLUORENE										
2-CHLORONAPHTHALENE										
2-CHLOROPHENOL										
2-METHYLNAPHTHALENE										
2-METHYLPHENOL										
2-NAPHTHYLAMINE										
2-NITROANILINE										
2-NITROPHENOL										
2-PICOLINE										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3,3'-DIMETHYLBENZIDINE										
3-METHYLCHOLANTHRENE										
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-AMINOBIPHENYL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-NITROANILINE										
4-NITROPHENOL										
4-NITROQUINOLINE-1-OXIDE										
5-NITRO-O-TOLUIDINE										
7,12-DIMETHYLBENZ(A)ANTHRACENE										

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	02	02	03	03	03	03	03	03
LOCATION	13SW11	13SW11	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD35
SAMPLE NUMBER	13SW1102	13SW1102-F	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3501-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/18/2003	11/18/2003	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/6/2004
A,A-DIMETHYLPHENETHYLAMINE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ACETOPHENONE										
ANILINE										
ANTHRACENE										
ARAMITE										
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE										
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
BENZYL ALCOHOL										
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CHLOROBENZILATE										
CHRYSENE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
DIALLATE										
DIBENZO(A,H)ANTHRACENE										
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DIPHENYLAMINE										
ETHYL METHANE SULFONATE										
FLUORANTHENE										
FLUORENE										
HEXACHLOROBENZENE										
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
HEXACHLOROPROPENE										
INDENO(1,2,3-CD)PYRENE										
ISODRIN										
ISOPHORONE										
ISOSAFROLE										
KEPONE										
METHAPYRILENE										
METHYL METHANE SULFONATE										

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	02	02	03	03	03	03	03	03
LOCATION	13SW11	13SW11	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD35
SAMPLE NUMBER	13SW1102	13SW1102-F	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3501-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/18/2003	11/18/2003	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/6/2004
N-NITROSO-DI-N-BUTYLAMINE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIETHYLAMINE										
N-NITROSODIMETHYLAMINE										
N-NITROSOMETHYLETHYLAMINE										
N-NITROSOMORPHOLINE										
N-NITROSOPIPERIDINE										
N-NITROSOPYRROLIDINE										
NAPHTHALENE										
O,O,O-TRIETHYL PHOSPHOROTHIOATE										
O-TOLUIDINE										
P-(DIMETHYLAMINO)AZOBENZENE										
PENTACHLOROBENZENE										
PENTACHLOROETHANE										
PENTACHLORONITROBENZENE										
PHENACETIN										
PHENANTHRENE										
PHENOL										
PRONAMIDE										
PYRENE										
PYRIDINE										
SAFROLE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
1,3-DINITROBENZENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.575 U		0.5 U							
2,4,6-TRINITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2,4-DIAMINO-6-NITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2,4-DINITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2,6-DIAMINO-4-NITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2,6-DINITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2-AMINO-4,6-DINITROTOLUENE	0.9 J		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
2-NITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
3,5-DINITROANILINE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
3-NITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
4,4'-TN-AZOXY					0.48 U		0.515 U	0.5 U	0.528 U	0.528 U
4-AMINO-2,6-DINITROTOLUENE	4.5 J		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
4-NITROTOLUENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
DNX	35		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
HMX	730		3.2 J		2.9		2.4	1.4	0.264 U	0.264 U
MNX	72		0.28 J		0.31 J		0.258 U	0.25 U	0.264 U	0.264 U
NITROBENZENE	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	02	02	03	03	03	03	03	03
LOCATION	13SW11	13SW11	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD35
SAMPLE NUMBER	13SW1102	13SW1102-F	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3501-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/18/2003	11/18/2003	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/6/2004
RDX	5500		6.2		9.9		8.6	1.3	0.264 U	0.264 U
TETRYL	0.287 U		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
TNX	4		0.25 U		0.24 U		0.258 U	0.25 U	0.264 U	0.264 U
Herbicides (ug/L)										
HEXACHLOROPHENE										
PENTACHLOROPHENOL										
Total Metals (ug/L)										
ALUMINUM	7250 J		40.9 U		68.7 U					
ANTIMONY	0.47 U		0.49 U		0.35 U					
ARSENIC	8.4 J		0.3 U		0.31 U					
BARIUM	53.3 J		54.1 J		57.8 J					
BERYLLIUM	0.25 U		0.03 U		0.02 U					
CADMIUM	0.24 U		0.24 U		0.19 U					
CALCIUM	45800 J		54800 J		50000 J					
CHROMIUM	8 J		0.84 U		0.68 J					
COBALT	3.2 J		0.07 U		0.16 U					
COPPER	13.9 J		1.4 J		1.3 J					
IRON	6180 J		175 J		70.1 U					
LEAD	3.5 J		0.12 U		0.11 U					
LITHIUM										
MAGNESIUM	15200 J		9770 J		8780 J					
MANGANESE	64 J		7.9 J		5.3 U					
MERCURY	0.007 U		0.02 U		0.03 U					
NICKEL	8.1 J		0.45 J		0.93 U					
POTASSIUM	126000 J		4850 J		6690 J					
SELENIUM	0.62 U		0.1 U		0.16 U					
SILVER	0.03 U		0.03 U		0.028 U					
SODIUM	17000 J		25600 J		18400 J					
STRONTIUM										
THALLIUM	0.11 U		0.04 U		0.043 U					
TIN	0.2 U		0.1 U		0.048 UJ					
TITANIUM	96.9 J		2.3 J							
VANADIUM	16.6 J		0.22 U		1.14 U					
ZINC	47.4 J		2.1 U		2.9 U					
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED		283 J		20.9 U		29.2 U				
ANTIMONY, FILTERED		0.71 U		0.3 U		0.34 U				
ARSENIC, FILTERED		6.7 J		0.19 U		0.26 U				
BARIUM, FILTERED		22 J		81.6 J		280 J				
BERYLLIUM, FILTERED		0.03 U		0.04 U		0.02 U				
CADMIUM, FILTERED		0.09 U		0.04 U		0.15 U				
CALCIUM, FILTERED		43300 J		29000 J		52400 J				

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD	DOWNGRAD
STREAM ORDER	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	02	02	03	03	03	03	03	03
LOCATION	13SW11	13SW11	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD35
SAMPLE NUMBER	13SW1102	13SW1102-F	13SW3001	13SW3001-F	13SW3002	13SW3002-F	13SW3301	13SW3401	13SW3501	13SW3501-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	11/18/2003	11/18/2003	10/22/2003	10/22/2003	10/26/2004	10/26/2004	10/26/2004	10/6/2004	10/6/2004	10/6/2004
CHROMIUM, FILTERED		1.5 U		0.3 U		0.6 J				
COBALT, FILTERED		4.9 J		2.8 J		0.088 U				
COPPER, FILTERED		8.3 J		1.5 J		1.2 J				
IRON, FILTERED		356 J		29.1 U		6.3 U				
LEAD, FILTERED		0.32 U		0.11 U		0.22 U				
LITHIUM, FILTERED										
MAGNESIUM, FILTERED		15000 J		9090 J		8840 J				
MANGANESE, FILTERED		10.7 U		23 J		3 U				
MERCURY, FILTERED		0.007 U		0.02 U		0.03 U				
NICKEL, FILTERED		4 J		1.4		0.84 U				
POTASSIUM, FILTERED		125000 J		15100 J		6780 J				
SELENIUM, FILTERED		0.46 U		0.09 U		0.12 U				
SILVER, FILTERED		0.03 U		0.03 U		0.028 U				
SODIUM, FILTERED		17600 J		9830 J		18700 J				
STRONTIUM, FILTERED										
THALLIUM, FILTERED		0.04 U		0.05 U		0.043 U				
TIN, FILTERED		0.1 U		0.59 U		0.048 U				
TITANIUM, FILTERED		8.7 J		0.6 J						
VANADIUM, FILTERED		6 J		0.18 U		1.14 U				
ZINC, FILTERED		9.3 J		7.6 U		2.1 U				
Field Parameters (mg/L)										
DISSOLVED OXYGEN					9.44		11.45	10.05	8.72	
DISSOLVED OXYGEN - METER	4.99		9.63							
OXIDATION REDUCTION POTENTIAL (MV)	216		222.100000		39.6		39.3	166.5	151	
PH (S.U.)	6.9		7.84		7.52		7.74	7.12	7.39	
SPECIFIC CONDUCTANCE (MS/CM)	1.024		0.395		0.359		0.347	373	512	
TEMPERATURE (C)	15.2		13.09		14.39		14.28	10.79	14.5	
TURBIDITY (NTU)	242		2.6		5.69		5.92	1.3	3.8	
Miscellaneous Parameters (mg/L)										
AMMONIA-N	0.26 J		0.005 UJ							
NITRITE/NITRATE-N	8.5 J		0.025 U		0.26		0.28	0.025 U	0.025 U	0.025 U

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	02	02	03	03
LOCATION	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW2801	13SW2801-F	13SW2802	13SW2802-D	13SW2802-F	13SW2802-F-D	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/26/2004	10/26/2004	10/26/2004	10/26/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
Semivolatile Organics (ug/L)										
1,2,4,5-TETRACHLOROBENZENE										
1,2,4-TRICHLOROBENZENE										
1,2-DICHLOROBENZENE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
1,4-NAPHTHOQUINONE										
1,4-PHENYLENEDIAMINE										
1-NAPHTHYLAMINE										
2,2'-OXYBIS(1-CHLOROPROPANE)										
2,3,4,6-TETRACHLOROPHENOL										
2,4,5-TRICHLOROPHENOL										
2,4,6-TRICHLOROPHENOL										
2,4-DICHLOROPHENOL										
2,4-DIMETHYLPHENOL										
2,4-DINITROPHENOL										
2,6-DICHLOROPHENOL										
2-ACETYLAMINOFLUORENE										
2-CHLORONAPHTHALENE										
2-CHLOROPHENOL										
2-METHYLNAPHTHALENE										
2-METHYLPHENOL										
2-NAPHTHYLAMINE										
2-NITROANILINE										
2-NITROPHENOL										
2-PICOLINE										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3,3'-DIMETHYLBENZIDINE										
3-METHYLCHOLANTHRENE										
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-AMINOBIPHENYL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-NITROANILINE										
4-NITROPHENOL										
4-NITROQUINOLINE-1-OXIDE										
5-NITRO-O-TOLUIDINE										
7,12-DIMETHYLBENZ(A)ANTHRACENE										

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	02	02	03	03
LOCATION	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW2801	13SW2801-F	13SW2802	13SW2802-D	13SW2802-F	13SW2802-F-D	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/26/2004	10/26/2004	10/26/2004	10/26/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
A,A-DIMETHYLPHENETHYLAMINE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ACETOPHENONE										
ANILINE										
ANTHRACENE										
ARAMITE										
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE										
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
BENZYL ALCOHOL										
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CHLOROBENZILATE										
CHRYSENE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
DIALLATE										
DIBENZO(A,H)ANTHRACENE										
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DIPHENYLAMINE										
ETHYL METHANE SULFONATE										
FLUORANTHENE										
FLUORENE										
HEXACHLOROBENZENE										
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
HEXACHLOROPROPENE										
INDENO(1,2,3-CD)PYRENE										
ISODRIN										
ISOPHORONE										
ISOSAFROLE										
KEPONE										
METHAPYRILENE										
METHYL METHANE SULFONATE										

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	02	02	03	03
LOCATION	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW2801	13SW2801-F	13SW2802	13SW2802-D	13SW2802-F	13SW2802-F-D	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/26/2004	10/26/2004	10/26/2004	10/26/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
N-NITROSO-DI-N-BUTYLAMINE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIETHYLAMINE										
N-NITROSODIMETHYLAMINE										
N-NITROSOMETHYLETHYLAMINE										
N-NITROSOMORPHOLINE										
N-NITROSOPIPERIDINE										
N-NITROSOPYRROLIDINE										
NAPHTHALENE										
O,O,O-TRIETHYL PHOSPHOROTHIOATE										
O-TOLUIDINE										
P-(DIMETHYLAMINO)AZOBENZENE										
PENTACHLOROBENZENE										
PENTACHLOROETHANE										
PENTACHLORONITROBENZENE										
PHENACETIN										
PHENANTHRENE										
PHENOL										
PRONAMIDE										
PYRENE										
PYRIDINE										
SAFROLE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.24 U						0.27 U			
1,3-DINITROBENZENE	0.24 U						0.27 U			
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.49 U						0.53 U			
2,4,6-TRINITROTOLUENE	0.24 U						0.27 U			
2,4-DIAMINO-6-NITROTOLUENE	0.24 U						0.27 U			
2,4-DINITROTOLUENE	0.24 U						0.27 U			
2,6-DIAMINO-4-NITROTOLUENE	0.24 U						0.27 U			
2,6-DINITROTOLUENE	0.24 U						0.27 U			
2-AMINO-4,6-DINITROTOLUENE	0.24 U						0.27 U			
2-NITROTOLUENE	0.24 U						0.27 U			
3,5-DINITROANILINE	0.24 U						0.27 U			
3-NITROTOLUENE	0.24 U						0.27 U			
4,4'-TN-AZOXY										
4-AMINO-2,6-DINITROTOLUENE	0.24 U						0.27 U			
4-NITROTOLUENE	0.24 U						0.27 U			
DNX	0.24 U						0.27 U			
HMX	0.24 U						0.27 U			
MNX	0.24 U						0.27 U			
NITROBENZENE	0.24 U						0.27 U			

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	02	02	03	03
LOCATION	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW2801	13SW2801-F	13SW2802	13SW2802-D	13SW2802-F	13SW2802-F-D	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/26/2004	10/26/2004	10/26/2004	10/26/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
RDX	0.24 U						0.27 U			
TETRYL	0.24 U						0.27 U			
TNX	0.24 U						0.27 U			
Herbicides (ug/L)										
HEXACHLOROPHENE										
PENTACHLOROPHENOL										
Total Metals (ug/L)										
ALUMINUM	486 J		1770 J	1560 J			30.6 U		1910 J	
ANTIMONY	0.02 U		0.085 UJ	0.23 U			0.36 U		0.21 U	
ARSENIC	0.35 U		0.8 J	0.74 J			0.23 U		1.7 J	
BARIUM	58.1 J		58.2 J	58.8 J			53.7 J		62.7 J	
BERYLLIUM	0.07 U		0.37 U	0.34 U			0.03 U		0.15 U	
CADMIUM	0.06 U		0.04 U	0.05 U			0.13 U		0.29 U	
CALCIUM	6550 J		5060 J	4930 J			55700 J		65300 J	
CHROMIUM	0.82 J		2.2 J	2 J			0.85 U		3.8 J	
COBALT	0.26 U		0.67 U	0.51 U			0.34 U		1.3	
COPPER	1.3 J		2.2 J	1.9 J			1.1 J		5.5	
IRON	415 J		1600 J	1360 J			24.5 U		2460	
LEAD	0.45 U		1.1 U	0.85 U			0.09 U		1.3 J	
LITHIUM										
MAGNESIUM	3600 J		2830 J	2740 J			9090 J		14500 J	
MANGANESE	122 J		60.1 J	50.9 J			2 U		23	
MERCURY	0.02 U		0.03 U	0.03 U			0.02 U		0.042 U	
NICKEL	2.3 J		4.3 U	3.9 U			0.77 J		6.9	
POTASSIUM	1800 J		2920 J	2760 J			2560 J		3860 J	
SELENIUM	0.06 U		0.094 U	0.1 U			0.11 U		0.14 U	
SILVER	0.03 U		0.028 U	0.06 U			0.03 U		0.03 U	
SODIUM	1540 J		1380 U	1360 U			34300 J		29900 J	
STRONTIUM										
THALLIUM	0.04 U		0.043 U	0.043 U			0.04 U		0.08 U	
TIN	0.1 U		0.048 UJ	0.08 U			0.1 U		0.24 U	
TITANIUM	10.1 J						0.31 J			
VANADIUM	0.89 J		2.9	2.5			0.16 U		3.6	
ZINC	8.8 J		8.2 U	6.3 U			6.8 U		29.5 J	
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED		254 J			938 J	657 J		7.6 U		101 J
ANTIMONY, FILTERED		0.08 U			0.085 U	0.21 U		0.59 U		0.22 U
ARSENIC, FILTERED		0.16 U			0.44 U	0.32 U		0.27 U		0.39 U
BARIUM, FILTERED		54.1 J			51.7 J	45.3 J		52.7 J		56 J
BERYLLIUM, FILTERED		0.05 U			0.33 U	0.31 U		0.03 U		0.02 U
CADMIUM, FILTERED		0.22 U			0.039 U	0.04 U		0.09 U		0.1 U
CALCIUM, FILTERED		6680 J			5120 J	5020 J		54900 J		75800 J

TABLE G-2

SUMMARY OF ANALYTIC RESULTS
SURFACE WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD	UPGRAD
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	02	03	03	03	03	02	02	03	03
LOCATION	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SW2801	13SW2801-F	13SW2802	13SW2802-D	13SW2802-F	13SW2802-F-D	13SW3101	13SW3101-F	13SW3102	13SW3102-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/27/2003	10/27/2003	10/26/2004	10/26/2004	10/26/2004	10/26/2004	10/22/2003	10/22/2003	10/6/2004	10/6/2004
CHROMIUM, FILTERED		0.44 U			1 J	0.67 J		0.73 U		0.49 U
COBALT, FILTERED		0.79 J			0.3 U	0.2 U		3.2 J		0.16 J
COPPER, FILTERED		0.93 U			1.5 J	1.2 J		1 J		1.6 J
IRON, FILTERED		155 J			645 J	335 J		5.7 U		101
LEAD, FILTERED		0.16 U			0.48 U	0.25 U		0.04 U		0.08 U
LITHIUM, FILTERED										
MAGNESIUM, FILTERED		3770 J			2740 J	2730 J		9630 J		15700
MANGANESE, FILTERED		112 J			39.4 U	34 U		6.1 J		4.9 J
MERCURY, FILTERED		0.02 U			0.03 U	0.03 U		0.02 U		0.095 U
NICKEL, FILTERED		1.8 J			3.1 U	2.8 U		0.87 J		1.8
POTASSIUM, FILTERED		1850 J			2700 J	2670 J		2470 J		3550 J
SELENIUM, FILTERED		0.04 U			0.094 U	0.094 U		0.13 U		0.1 U
SILVER, FILTERED		0.03 U			0.028 U	0.06 U		0.03 U		0.028 U
SODIUM, FILTERED		1660 J			1450 U	1440 U		33800 J		35700 J
STRONTIUM, FILTERED										
THALLIUM, FILTERED		0.04 U			0.043 U	0.043 U		0.04 U		0.043 U
TIN, FILTERED		0.1 U			0.048 U	0.06 U		0.1 U		0.048 U
TITANIUM, FILTERED		5.3 J						0.22 J		
VANADIUM, FILTERED		0.4 U			1.14 U	1.14 U		0.12 U		1.14 U
ZINC, FILTERED		18.6 J			5.1 U	4 U		1.7 U		3.1 U
Field Parameters (mg/L)										
DISSOLVED OXYGEN			8.05						9.34	
DISSOLVED OXYGEN - METER	7.97						9.4			
OXIDATION REDUCTION POTENTIAL (MV)	330.8		49				226.200000		130	
PH (S.U.)	6.37		7.99				7.88		7.63	
SPECIFIC CONDUCTANCE (MS/CM)	0.073		0.059				0.448		457	
TEMPERATURE (C)	8.84		13.75				14.25		12.5	
TURBIDITY (NTU)	221		56.4				1.1		119	
Miscellaneous Parameters (mg/L)										
AMMONIA-N	0.01 U						0.005 UJ			
NITRITE/NITRATE-N	4						0.025 U			

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEEP SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

SAMPLING ROUND	02	02	02	02	02	02	02	02
LOCATION	13SP01	13SP01	13SP02	13SP02	13SP03	13SP03	13SP04	13SP04
SAMPLE NUMBER	13SP0101	13SP0101-F	13SP0201	13SP0201-F	13SP0301	13SP0301-F	13SP0401	13SP0401-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
Energetics (ug/L)								
1,3,5-TRINITROBENZENE	0.26 U		0.26 U		0.47		0.25 U	
1,3-DINITROBENZENE	0.26 U		0.26 U		0.24 U		0.25 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.51 U		0.53 U		0.47 U		0.5 U	
2,4,6-TRINITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
2,4-DIAMINO-6-NITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
2,4-DINITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
2,6-DIAMINO-4-NITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
2,6-DINITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U		1.1 J		0.24 U		0.25 U	
2-NITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
3,5-DINITROANILINE	0.26 U		0.26 U		0.24 U		0.25 U	
3-NITROTOLUENE	0.26 U		0.35 J		0.24 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U		2.3		0.24 U		0.25 U	
4-NITROTOLUENE	0.26 U		0.26 U		0.24 U		0.25 U	
DNX	3 J		2.5		0.24 U		0.25 U	
HMX	9 J		20		0.24 U		0.25 U	
MNX	2.2		4		0.24 U		0.25 U	
NITROBENZENE	0.26 U		0.26 U		0.24 U		0.25 U	
RDX	21		77		0.24 U		1.9 J	
TETRYL	0.26 U		0.26 U		0.24 U		0.25 U	
TNX	0.45 J		0.59		0.24 U		0.25 U	
Total Metals (ug/L)								
ALUMINUM	142 J		220 J		2670 J		468 J	
ANTIMONY	0.17 U		0.16 U		0.13 U		0.06 U	
ARSENIC	0.21 U		1 J		1.3 J		0.69 J	
BARIUM	83.5 J		64.4 J		107 J		114 J	
BERYLLIUM	0.08 U		0.03 U		0.14 U		0.14 U	
CADMIUM	0.08 U		0.04 U		0.08 U		0.13 U	
CALCIUM	29200 J		39100 J		89700 J		38100 J	
CHROMIUM	0.47 U		1.6 U		4 J		0.86 U	
COBALT	0.11 U		0.23 U		0.97 J		5.8 J	
COPPER	1.4 J		3.6 J		2.4 J		2.9 J	
IRON	91.4 U		143 U		2070 J		922 J	
LEAD	0.2 U		0.31 U		1.4 J		1.9 J	
MAGNESIUM	8910 J		10100 J		11600 J		8750 U	
MANGANESE	5.8 J		15.6 J		49.1 J		3910 J	
MERCURY	0.02 U		0.02 U		0.02 U		0.02 U	
NICKEL	1.2		1.9		3.1		8.7	
POTASSIUM	15300 J		38200 J		2880 J		2730 J	
SELENIUM	0.15 U		0.2 U		0.27 U		0.12 U	
SILVER	0.33 U		0.04 U		0.03 U		0.03 U	
SODIUM	9370 J		10400 J		16000 J		20000 J	
THALLIUM	0.14 U		0.04 U		0.09 U		0.07 U	

TABLE G-3

SUMMARY OF ANALYTIC RESULTS
SEEP SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	02	02	02	02	02	02	02	02
LOCATION	13SP01	13SP01	13SP02	13SP02	13SP03	13SP03	13SP04	13SP04
SAMPLE NUMBER	13SP0101	13SP0101-F	13SP0201	13SP0201-F	13SP0301	13SP0301-F	13SP0401	13SP0401-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003	10/22/2003
TIN	0.1 U		0.1 U		0.16 U		0.1 U	
TITANIUM	1.5 J		2 J		32.4		8	
VANADIUM	0.35 U		0.98 J		5.4 J		1.5 J	
ZINC	3.1 U		4.6 U		11.9 U		14 U	
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED		17.7 U		25.1 U		30.2 U		16.1 U
ANTIMONY, FILTERED		0.56 U		0.37 U		0.28 U		0.19 U
ARSENIC, FILTERED		0.23 U		1.1 J		0.16 U		0.23 U
BARIUM, FILTERED		55.3 J		62.7 J		91.7 J		72.6 J
BERYLLIUM, FILTERED		0.04 U		0.03 U		0.03 U		0.03 U
CADMIUM, FILTERED		0.3 U		0.04 U		0.04 U		0.04 U
CALCIUM, FILTERED		53700 J		39500 J		87900 J		38900 J
CHROMIUM, FILTERED		0.76 U		0.48 U		0.38 U		0.34 U
COBALT, FILTERED		1.3 J		3 J		3 J		3.6 J
COPPER, FILTERED		0.87 J		3.2 J		0.7 J		0.69 J
IRON, FILTERED		8.7 U		17.9 U		20.3 U		25.1 U
LEAD, FILTERED		0.16 U		0.17 U		0.06 U		0.07 U
MAGNESIUM, FILTERED		9970 J		10900 J		12900 J		8370 J
MANGANESE, FILTERED		2.7 U		7.8 J		18.9 J		1090 J
MERCURY, FILTERED		0.02 U		0.02 U		0.02 U		0.02 U
NICKEL, FILTERED		0.46 J		1.8		1 J		4.8
POTASSIUM, FILTERED		4720 J		38500 J		2150 J		2300 J
SELENIUM, FILTERED		0.12 U		0.2 U		0.15 U		0.06 U
SILVER, FILTERED		0.03 U		0.03 U		0.03 U		0.03 U
SODIUM, FILTERED		25700 J		11400 J		18000 J		19900 J
THALLIUM, FILTERED		0.06 U		0.04 U		0.04 U		0.04 U
TIN, FILTERED		0.1 U		0.1 U		0.1 U		0.1 U
TITANIUM, FILTERED		0.11 J		0.94 J		0.69 J		0.47 J
VANADIUM, FILTERED		0.16 U		0.57 J		0.23 U		0.13 U
ZINC, FILTERED		2.2 U		3.2 U		3 U		4.9 U
Field Parameters								
DISSOLVED OXYGEN - METER (UG/L)	3.6		9.79		5.28		6.02	
OXIDATION REDUCTION POTENTIAL (MV)	202.600000		211		227.5		283.700000	
PH (S.U.)	6.8		7.7		7.03		6.44	
SPECIFIC CONDUCTANCE (MS/CM)	0.335		0.36		0.509		0.307	
TEMPERATURE (C)	11.81		12.16		14.54		14.08	
TURBIDITY (NTU)	2.6		5		40		0.01	
Miscellaneous Parameters (ug/L)								
AMMONIA-N	0.005 UJ		0.005 UJ		0.02 J		0.005 UJ	
NITRITE/NITRATE-N	0.06 U		0.58 J		0.06 U		0.025 U	

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
Semivolatile Organics (ug/kg)												
1,2,4,5-TETRACHLOROBENZENE					83 U	87 U		79 U				
1,2,4-TRICHLOROBENZENE					83 U	87 U		79 U				
1,2-DICHLOROBENZENE					83 U	87 U		79 U				
1,3-DICHLOROBENZENE					83 U	87 U		79 U				
1,4-DICHLOROBENZENE					83 U	87 U		79 U				
1,4-NAPHTHOQUINONE					83 U	87 U		79 U				
1,4-PHENYLENEDIAMINE					83 UJ	87 UJ		79 UJ				
1-NAPHTHYLAMINE					83 U	87 U		79 U				
2,2'-OXYBIS(1-CHLOROPROPANE)					83 U	87 U		79 U				
2,3,4,6-TETRACHLOROPHENOL					83 U	87 U		79 U				
2,4,5-TRICHLOROPHENOL					83 U	87 U		79 U				
2,4,6-TRICHLOROPHENOL					83 U	87 U		79 U				
2,4-DICHLOROPHENOL					83 U	87 U		79 U				
2,4-DIMETHYLPHENOL					83 U	87 U		79 U				
2,4-DINITROPHENOL					83 U	87 U		79 U				
2,6-DICHLOROPHENOL					83 U	87 U		79 U				
2-ACETYLAMINOFLUORENE					83 U	87 U		79 U				
2-CHLORONAPHTHALENE					83 U	87 U		79 U				
2-CHLOROPHENOL					83 U	87 U		79 U				
2-METHYLNAPHTHALENE					4.1 U	4.3 U		3.9 U				
2-METHYLPHENOL					83 U	87 U		79 U				
2-NAPHTHYLAMINE					83 U	87 U		79 U				
2-NITROANILINE					83 U	87 U		79 U				
2-NITROPHENOL					83 U	87 U		79 U				
2-PICOLINE					83 U	87 U		79 U				
3&4-METHYLPHENOL					83 U	87 U		79 U				
3,3'-DICHLOROBENZIDINE					83 U	87 U		79 U				
3,3'-DIMETHYLBENZIDINE					83 U	87 U		79 U				
3-METHYLCHOLANTHRENE					83 U	87 U		79 U				
3-NITROANILINE					83 U	87 U		79 U				
4,6-DINITRO-2-METHYLPHENOL					83 U	87 U		79 U				
4-AMINOBIPHENYL					83 U	87 U		79 U				
4-BROMOPHENYL PHENYL ETHER					83 U	87 U		79 U				
4-CHLORO-3-METHYLPHENOL					83 U	87 U		79 U				
4-CHLOROANILINE					83 U	87 U		79 U				
4-CHLOROPHENYL PHENYL ETHER					83 U	87 U		79 U				
4-NITROANILINE					83 U	87 U		79 U				
4-NITROPHENOL					83 U	87 U		79 U				
4-NITROQUINOLINE-1-OXIDE					83 UR	87 UR		79 UR				
5-NITRO-O-TOLUIDINE					83 U	87 U		79 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE					83 U	87 U		79 U				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
A,A-DIMETHYLPHENETHYLAMINE					83 UJ	87 UJ		79 UJ				
ACENAPHTHENE					4.1 U	43 J		24				
ACENAPHTHYLENE					4.1 U	4.3 U		3.9 U				
ACETOPHENONE					83 U	87 U		79 U				
ANILINE					83 U	87 U		79 U				
ANTHRACENE					4.1 U	88		72				
ARAMITE					83 UR	87 UR		79 UR				
BENZO(A)ANTHRACENE					11	330		290 J				
BENZO(A)PYRENE					15	360 J		390 J				
BENZO(B)FLUORANTHENE					18	420 J		460 J				
BENZO(G,H,I)PERYLENE					10	270 J		380 J				
BENZO(K)FLUORANTHENE					10	250 J		210 J				
BENZYL ALCOHOL					83 U	87 U		79 U				
BIS(2-CHLOROETHOXY)METHANE					83 U	87 U		79 U				
BIS(2-CHLOROETHYL)ETHER					83 U	87 U		79 U				
BIS(2-ETHYLHEXYL)PHTHALATE					83 U	390 BU		250 BU				
BUTYL BENZYL PHTHALATE					83 U	87 U		79 U				
CHLOROBENZILATE					83 U	87 U		79 U				
CHRYSENE					18	400		430 J				
DI-N-BUTYL PHTHALATE					83 U	87 U		86 J				
DI-N-OCTYL PHTHALATE					83 U	87 U		100 J				
DIALLATE					83 U	87 U		79 U				
DIBENZO(A,H)ANTHRACENE					4.1 U	66 J		74 J				
DIBENZOFURAN					83 U	87 U		79 U				
DIETHYL PHTHALATE					83 U	87 U		79 U				
DIMETHYL PHTHALATE					83 U	87 U		79 U				
DIPHENYLAMINE					83 U	87 U		79 U				
ETHYL METHANE SULFONATE					83 U	87 U		79 U				
FLUORANTHENE					44	860		830				
FLUORENE					4.1 U	42 J		33				
HEXACHLOROBENZENE					83 U	87 U		79 U				
HEXACHLOROBUTADIENE					83 U	87 U		79 U				
HEXACHLOROCYCLOPENTADIENE					83 U	87 UR		79 U				
HEXACHLOROETHANE					83 U	87 U		79 U				
HEXACHLOROPROPENE					83 U	87 U		79 U				
INDENO(1,2,3-CD)PYRENE					8 J	220 J		290 J				
ISODRIN					83 U	87 U		79 U				
ISOPHORONE					83 U	87 U		79 U				
ISOSAFROLE					83 U	87 U		79 U				
KEPONE					83 UJ	87 UJ		79 UJ				
METHAPYRILENE					83 UJ	87 UJ		79 UJ				
METHYL METHANE SULFONATE					83 U	87 U		79 U				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
N-NITROSO-DI-N-BUTYLAMINE					83 U	87 U		79 U				
N-NITROSO-DI-N-PROPYLAMINE					83 U	87 U		79 U				
N-NITROSODIETHYLAMINE					83 U	87 U		79 U				
N-NITROSODIMETHYLAMINE					83 U	87 U		79 U				
N-NITROSOMETHYLETHYLAMINE					83 U	87 U		79 U				
N-NITROSOMORPHOLINE					83 U	87 U		79 U				
N-NITROSOPIPERIDINE					83 U	87 U		79 U				
N-NITROSOPYRROLIDINE					83 U	87 U		79 U				
NAPHTHALENE					4.1 U	6 J		6 J				
O,O,O-TRIETHYL PHOSPHOROTHIOATE					83 U	87 U		79 U				
O-TOLUIDINE					83 U	87 U		79 U				
P-(DIMETHYLAMINO)AZOBENZENE					83 U	87 U		79 U				
PENTACHLOROBENZENE					83 U	87 U		79 U				
PENTACHLOROETHANE					83 U	87 U		79 U				
PENTACHLORONITROBENZENE					83 U	87 U		79 U				
PHENACETIN					83 U	87 U		79 U				
PHENANTHRENE					27	570		620				
PHENOL					83 U	87 U		79 U				
PRONAMIDE					83 U	87 U		79 U				
PYRENE					36	1000		1300 J				
PYRIDINE					83 U	87 U		79 U				
SAFROLE					83 U	87 U		79 U				
Energetics (mg/kg)												
1,3,5-TRINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U		0.25 U	0.44 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TETRYL	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)												
HEXACHLOROPHENE					0.75 U	0.75 U		0.71 U				
PENTACHLOROPHENOL					0.56 U	0.58 U		2.1 J				
Inorganics (mg/kg)												
ALUMINUM	9280	9230 J	8580 J	10900	4250 J	7000 J	4760 J	3920 J	4810	5550 J	6430	1480

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
ANTIMONY	1.8 J	2.2 J	0.38 U	0.27 U	0.51 U	0.19 U	0.74 U	0.8 J	0.27 U	0.34 U	0.45 U	0.16 U
ARSENIC	6.5 J	24.8 J	6.5 J	8.2 J	10.7 J	5.7 J	6.4 J	5.7 J	3.7 J	9.1 J	6.1 J	3.7 J
BARIUM	364 J	693 J	79.7 J	97.4 J	34.4 J	61.4 J	76.4 J	45.1 J	28.5 J	62.5 J	49.6 J	104 J
BERYLLIUM	0.52 U	0.65 U	0.79 J	0.67 J	1.3 J	0.63 J	0.38 U	0.37 U	0.18 U	0.71 J	0.74 J	0.88 J
CADMIUM	3.5 J	3.9 J	0.55 J	0.45 U	0.36 U	0.35 U	0.65 J	0.41 J	0.66 J	0.62 J	0.43 J	0.36 U
CALCIUM	38500 J	66000 J	2140 J	2020 J	1120 J	1490 J	116000 J	71000 J	45700 J	14800 J	6720 J	977 J
CHROMIUM	156 J	165 J	12.1 J	15.2 J	18 J	9 J	18 J	11.6 J	9.2 J	14.8 J	12.4 J	7.9 J
COBALT	8.1 J	11.1 J	10.9 J	18.5 J	9.3 J	15.9 J	9.6 J	10 J	3.5 J	8.2 J	11.7 J	10.3 J
COPPER	52.1 J	25.9 J	13.9 J	11.7 J	13.7 J	10.6 J	17.4 J	12.7 J	16.6 J	19.2 J	11.9 J	7 J
IRON	21300 J	55500 J	16700 J	22200 J	46100 J	20800 J	15600 J	17500 J	9900 J	26100 J	34800 J	1990 J
LEAD	471 J	521 J	18.6 J	21.4 J	15 J	11.7 J	64.9 J	23.9 J	31.4 J	17 J	17.6 J	11 J
LITHIUM	8.1 J		7.8 J	8.2 J	2.1 J	6.4 J	5.5 J	4.1 J	4.3 J	3.6 J	7.3 J	10.1 J
MAGNESIUM	3830 J	6640 J	969 J	1200 J	292 J	908 J	7490 J	4810 J	7540 J	2120 J	2450 J	983 J
MANGANESE	204 J	249 J	641 J	1580 J	302 J	747 J	570 J	773 J	147 J	591 J	284 J	67.5 J
MERCURY	0.16 J	0.076 U	0.044 U	0.037 J	0.01 U	0.024 U	0.022 U	0.015 U	0.015 J	0.036 U	0.013 J	0.029 J
NICKEL	16.1 J	17.6 J	11.3 J	12.8 J	13.5 J	13.5 J	13.6 J	10.4 J	7.9 J	12 J	13.5 J	19.3 J
POTASSIUM	614 J	806 J	394 J	561 J	417 J	319 J	303 J	252 J	317 J	451 J	413 J	442 J
SELENIUM	0.56 J	0.37 U	0.51 J	0.55 J	0.11 U	0.27 U	0.26 U	0.16 U	0.18 J	0.33 U	0.21 J	0.3 J
SILVER	0.1 U	0.07 U	0.39 U	0.03 U	0.08 U	0.06 U	0.04 U	0.13 U	0.02 UJ	0.09 U	0.02 UJ	0.02 UJ
SODIUM	41.9 U	79.6 U	75.9 U	126 U	25.2 U	29.7 U	126 J	81.3 J	334 J	71.4 U	22.6 U	25.8 U
STRONTIUM	39.9 J		7.3 J	6.5 J	4.5 J	5.5 J	122 J	70.2 J	52.5 J	18.1 J	8.5 J	5.5 J
THALLIUM	0.12 U	0.11 U	0.27 U	0.15 U	0.09 U	0.13 U	0.08 U	0.09 U	0.06 U	0.08 U	0.05 U	0.14 U
TIN	11.4 J	4.7 J	0.64 U	0.57 U	0.31 U	0.49 U	0.47 U	0.4 U	0.52 J	0.61 U	2 J	0.45 U
TITANIUM	68.1 J		93.1 J	92.4 J	27.4 J	91.5 J	84.5 J	67.2 J	78.2 J	52 J	42.8 J	68.6 J
VANADIUM	23.3 J	28.8 J	21.5 J	28.2 J	24.8 J	17.4 J	18.7 J	13.9 J	11.8 J	18.7 J	20.5 J	15.5 J
ZINC	541 J	490 J	67.8 J	41.4 J	40 J	97.2 J	52.9 J	43.1 J	58.1 J	78 J	386 U	37.7 J
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE, SEM			0.49 J			0.88 J	0.85 J			0.62 J		
CADMIUM, SEM			0.002 U			0.001 U	0.004			0.004		
COPPER, SEM			0.131 J			0.07 J	0.173 J			2.223 J		
LEAD, SEM			0.067 J			0.03 J	0.196 J			0.061 J		
MERCURY, SEM			0.00007 J			0.00004 J	0.00018 J			0.00004 UJ		
NICKEL, SEM			0.048			0.111	0.041			0.028		
SEM/AVS, SEM (S.U.)			1.54			0.7	0.49			3.74		
ZINC, SEM			0.503 J			0.407 J	0.296 U			0.426 U		
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)			15			9.9	10			12		
PH (S.U.)			7.2			5	7.6			7.4		
TOTAL ORGANIC CARBON (mg/kg)			15000 J			19000 J	3200 J			4400 J		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 5 OF 16

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
Semivolatile Organics (ug/kg)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (mg/kg)												
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	1.9 J	0.8 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	2.2	0.25 U	0.25 U	0.25 U	0.71 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TETRYL	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Inorganics (mg/kg)												
ALUMINUM	9260 J	6860	5010	4160 J	10300	9140	10200 J	9800	7650	16200	7090 J	6600

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21	
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101	
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003	
ANTIMONY	0.52 U	0.55 U	0.47 U	0.13 U	0.26 U	0.25 U	0.24 U	0.21 U	0.35 U	0.23 U	0.23 U	0.29 U	
ARSENIC	9.4 J	11.7 J	17.5 J	0.53 U	16.9 J	11.4 J	6.2 J	7 J	8.2 J	7.5 J	11 J	8 J	
BARIUM	67.6 J	257 J	152 J	148 J	65.4 J	113 J	94.1 J	109 J	79.5 J	102 J	77.9 J	102 J	
BERYLLIUM	0.63 J	1 J	0.96 J	0.53 J	1.4 J	1.4 J	0.7 J	0.79 J	0.93 J	1.6 J	0.95 J	0.77 J	
CADMIUM	0.91 J	0.81 J	4.1 J	0.17 U	0.25 U	0.37 U	0.38 U	0.5 J	0.39 U	0.45 U	0.46 J	0.52 J	
CALCIUM	33200 J	35400 J	89700 J	998 J	1650 J	767 J	6640 J	4220 J	1050 J	2440 J	1360 J	1560 J	
CHROMIUM	15.4 J	32.7 J	49.6 J	16.2 J	24.9 J	21.5 J	11.3 J	16.1 J	24.9 J	13.5 J	36.5 J	10.3 J	
COBALT	6.8 J	20.6 J	20 J	1.8 J	15 J	18.9 J	11.8 J	13.2 J	17.9 J	107 J	18.2 J	16 J	
COPPER	12.5 J	10.7 J	11.3 J	8.9 J	24.1 J	13.6 J	11.5 J	14.9 J	11.8 J	12.2 J	14.9 J	13.2 J	
IRON	25900 J	46300 J	83600 J	18400 J	25900 J	26900 J	18300 J	24800 J	24900 J	33100 J	36500 J	14900 J	
LEAD	20 J	21.4 J	38.1 J	4.2 J	14.8 J	20.5 J	13.7 J	15.5 J	19.2 J	20.1 J	20.7 J	19.2 J	
LITHIUM	7.2 J	6.5 J	4 J	4.3 J	28.4 J	17.5 J	7.7 J	7.7 J	6.1 J	38.8 J	9.7 J	5.3 J	
MAGNESIUM	2080 J	1450 J	5620 J	757 J	1840 J	1410 J	1990 J	1650 J	943 J	1050 J	717 J	825 J	
MANGANESE	372 J	6130 J	1760 J	65.3 J	247 J	1790 J	724 J	834 J	1290 J	2960 J	819 J	1440 J	
MERCURY	0.028 U	0.032 J	0.019 J	0.01 U	0.022 J	0.041 J	0.028 U	0.022 J	0.028 J	0.036 J	0.029 U	0.03 J	
NICKEL	8.6 J	14.9 J	13.6 J	8.6 J	35.5 J	33 J	12.8 J	15 J	13 J	45.5 J	18.6 J	11.7 J	
POTASSIUM	2260 J	1130 J	538 J	1660 J	2390 J	807 J	523 J	563 J	392 J	599 J	482 J	367 J	
SELENIUM	0.29 U	0.3 J	0.22 J	0.02 U	0.34 J	0.51 J	0.27 U	0.36 J	0.43 J	0.54 J	0.45 J	0.38 J	
SILVER	0.05 U	0.02 UJ	0.02 UJ	0.03 U	0.02 UJ	0.02 UJ	0.07 U	0.02 U	0.08 U	0.03 U	0.06 U	0.02 UJ	
SODIUM	113 J	47.1 U	39 U	38.8 U	53.5 U	26.2 U	30.7 U	29 U	43.8 U	63.6 U	48.3 U	62.5 U	
STRONTIUM	77.1 J	28.2 J	64.2 J	10.3 J	10.1 J	6.3 J	11 J	7.6 J	4.1 J	7.4 J	6.4 J	5.2 J	
THALLIUM	0.11 U	0.15 U	0.06 U	0.09 U	0.11 U	0.13 U	0.15 U	0.14 U	0.13 U	0.17 U	0.12 U	0.13 U	
TIN	0.53 U	12 J	0.46 U	0.75 J	0.66 J	0.5 U	0.52 U	0.51 J	0.46 U	0.46 U	0.4 U	0.42 U	
TITANIUM	62.7 J	60.2 J	67.9 J	72 J	13.8 J	45.1 J	110 J	81.4 J	72.3 J	67 J	66.6 J	77.4 J	
VANADIUM	23 J	39.1 J	44 J	16.2 J	17.6 J	21.7 J	21.9 J	25 J	26.1 J	21.5 J	26.2 J	19.7 J	
ZINC	116 J	138 U	216 U	7.9 J	65.3 J	46.3 J	62 J	77.1 J	31.7 J	75.9 J	40.4 J	33.4 U	
AVS/SEM Parameters (UMO/G)													
ACID VOLATILE SULFIDE, SEM	0.25 J			0.66 J			0.67 J				0.23 J		
CADMIUM, SEM	0.002			0.0014 U			0.001 U				0.001 U		
COPPER, SEM	0.055 J			0.036 J			0.061 J				0.075 J		
LEAD, SEM	0.033 J			0.006 U			0.035 J				0.047 J		
MERCURY, SEM	0.00003 UJ			0.00054 J			0.00005 J				0.00009 J		
NICKEL, SEM	0.021			0.022			0.02				0.078		
SEM/AVS, SEM (S.U.)	2.6			0.09			0.17				0.87		
ZINC, SEM	0.538 J			0.031 U			0.285 U				0.113 U		
Miscellaneous Parameters													
CATION EXCHANGE CAPACITY (MEQ/1)	18			13			16				12		
PH (S.U.)	7.9			7.1			7.8				7.2		
TOTAL ORGANIC CARBON (mg/kg)	2600 J			2500 J			17000 J				2600 J		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE					6 J					4.4 U	4.5 U
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE					4.3 U					4.4 U	4.5 U
ACENAPHTHYLENE					4.3 U					4.4 U	4.5 U
ACETOPHENONE											
ANILINE											
ANTHRACENE					4.3 U					4.4 U	4.5 U
ARAMITE											
BENZO(A)ANTHRACENE					10					19	25
BENZO(A)PYRENE					12					23	34
BENZO(B)FLUORANTHENE					21					32	44
BENZO(G,H,I)PERYLENE					12					19	27
BENZO(K)FLUORANTHENE					7 J					10 J	18 J
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE					15					24	39
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE					4.3 U					4.4 U	4.5 U
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE					29					54	72
FLUORENE					4.3 U					4.4 U	4.5 U
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE					9					16	20
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE					4.3 U					4.4 U	4.5 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE					17					24	29
PHENOL											
PRONAMIDE											
PYRENE					25					47	71
PYRIDINE											
SAFROLE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
1,3-DINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,4,6-TRINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,4-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2-AMINO-4,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
3-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
4-AMINO-2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
4-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
NITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
RDX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
TETRYL	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
Herbicides (ug/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Inorganics (mg/kg)											
ALUMINUM	18500	14400 J	11900	14100 J	13900 J	12500 J	8820 J	10300 J	12700 J		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE	SITE
STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
ANTIMONY	1.2 J	0.9 J	0.48 U	2.3 J	1.6 J	1.3 J	0.97 J	0.89 J	1.3 J		
ARSENIC	35.6 J	16.7 J	10.2 J	58.2 J	33.8 J	32.1 J	37.6 J	25.9 J	40.6 J		
BARIUM	203 J	113 J	165 J	101 J	121 J	154 J	202 J	129 J	132 J		
BERYLLIUM	4.3 J	1.4 J	0.95 J	2.9 J	3.6 J	3.3 J	1.8 J	1.9 J	3.1 J		
CADMIUM	1.8 J	0.65 J	0.82 J	1.1 J	0.88 J	0.95 J	0.54 J	0.66 J	0.81 J		
CALCIUM	2310 J	1630 J	3400 J	766 J	1170 J	2670 J	892 J	1280 J	1300 J		
CHROMIUM	140 J	35.4 J	12.7 J	228 J	57.6 J	86.9 J	46.7 J	37.7 J	80.6 J		
COBALT	70.2 J	58.1 J	28.5 J	24.2 J	63.5 J	68.7 J	34.6 J	36.9 J	37.3 J		
COPPER	32.4 J	12.1 J	17.8 J	21.6 J	19.7 J	18.3 J	17.6 J	14.4 J	18.7 J		
IRON	171000 J	41900 J	19900 J	195000 J	121000 J	135000 J	81000 J	74300 J	123000 J		
LEAD	87.7 J	46.5 J	34.8 J	54.8 J	49.5 J	46.6 J	46.2 J	32.9 J	43.8 J		
LITHIUM	10.9 J		9.2 J								
MAGNESIUM	1110 J	1260 J	1290 J	457 J	823 J	735 J	513 J	825 J	693 J		
MANGANESE	4580 J	2980 J	4220 J	2220 J	4000 J	3580 J	3040 J	2700 J	3160 J		
MERCURY	0.031 J	0.059 U	0.042 J	0.044 J	0.043 J	0.024 J	0.04 J	0.045 J	0.049 J		
NICKEL	83.9 J	28.7 J	19.3 J	28.1 J	63.9 J	65.3 J	38.6 J	45.4 J	50.5 J		
POTASSIUM	482 J	1130 J	629 J	622 J	1050 J	831 J	729 J	971 J	844 J		
SELENIUM	0.69 J	0.71 J	0.45 J	1.1 J	0.98 J	0.91 J	0.96 J	0.98 J	1.4 J		
SILVER	0.23 U	0.05 U	0.06 U	0.04 U	0.01 U	0.03 U	0.02 U	0.01 U	0.01 U		
SODIUM	58.2 U	43.5 U	26.3 U	28.1 U	31.9 U	43 J	21.8 U	31.7 J	27.5 U		
STRONTIUM	8.6 J		8.5 J								
THALLIUM	0.34 U	0.19 U	0.19 U	0.13 U	0.19 U	0.21 U	0.28 U	0.16 U	0.18 U		
TIN	0.82 J	0.43 U	0.82 J	0.38 U	0.46 U	0.3 U	0.31 U	0.39 U	0.38 U		
TITANIUM	112 J		62.3 J	164 J	76.8 J	62.9 J	40.9 J	42.6 J	53.1 J		
VANADIUM	115 J	45.6 J	24.6 J	144 J	59.7 J	70.8 J	43.3 J	43.4 J	66.3 J		
ZINC	273 U	120 J	64.5 J	68.4 J	142 J	151 J	69.5 J	139 J	175 J		
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SEM (S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
Semivolatile Organics (ug/kg)										
1,2,4,5-TETRACHLOROBENZENE										
1,2,4-TRICHLOROBENZENE										
1,2-DICHLOROBENZENE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
1,4-NAPHTHOQUINONE										
1,4-PHENYLENEDIAMINE										
1-NAPHTHYLAMINE										
2,2'-OXYBIS(1-CHLOROPROPANE)										
2,3,4,6-TETRACHLOROPHENOL										
2,4,5-TRICHLOROPHENOL										
2,4,6-TRICHLOROPHENOL										
2,4-DICHLOROPHENOL										
2,4-DIMETHYLPHENOL										
2,4-DINITROPHENOL										
2,6-DICHLOROPHENOL										
2-ACETYLAMINOFLUORENE										
2-CHLORONAPHTHALENE										
2-CHLOROPHENOL										
2-METHYLNAPHTHALENE										
2-METHYLPHENOL										
2-NAPHTHYLAMINE										
2-NITROANILINE										
2-NITROPHENOL										
2-PICOLINE										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3,3'-DIMETHYLBENZIDINE										
3-METHYLCHOLANTHRENE										
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-AMINOBIPHENYL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-NITROANILINE										
4-NITROPHENOL										
4-NITROQUINOLINE-1-OXIDE										
5-NITRO-O-TOLUIDINE										
7,12-DIMETHYLBENZ(A)ANTHRACENE										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
A,A-DIMETHYLPHENETHYLAMINE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ACETOPHENONE										
ANILINE										
ANTHRACENE										
ARAMITE										
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE										
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
BENZYL ALCOHOL										
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CHLOROBENZILATE										
CHRYSENE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
DIALLATE										
DIBENZO(A,H)ANTHRACENE										
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DIPHENYLAMINE										
ETHYL METHANE SULFONATE										
FLUORANTHENE										
FLUORENE										
HEXACHLOROBENZENE										
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
HEXACHLOROPROPENE										
INDENO(1,2,3-CD)PYRENE										
ISODRIN										
ISOPHORONE										
ISOSAFROLE										
KEPONE										
METHAPYRILENE										
METHYL METHANE SULFONATE										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
N-NITROSO-DI-N-BUTYLAMINE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIETHYLAMINE										
N-NITROSODIMETHYLAMINE										
N-NITROSOMETHYLETHYLAMINE										
N-NITROSOMORPHOLINE										
N-NITROSOPIPERIDINE										
N-NITROSOPYRROLIDINE										
NAPHTHALENE										
O,O,O-TRIETHYL PHOSPHOROTHIOATE										
O-TOLUIDINE										
P-(DIMETHYLAMINO)AZOBENZENE										
PENTACHLOROBENZENE										
PENTACHLOROETHANE										
PENTACHLORONITROBENZENE										
PHENACETIN										
PHENANTHRENE										
PHENOL										
PRONAMIDE										
PYRENE										
PYRIDINE										
SAFROLE										
Energetics (mg/kg)										
1,3,5-TRINITROBENZENE	0.25 U					0.25 U		0.25 U		
1,3-DINITROBENZENE	0.25 U					0.25 U		0.25 U		
2,4,6-TRINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2,4-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2-AMINO-4,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
3-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
4-AMINO-2,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
4-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
HMX	0.25 U					0.25 U		0.28 J		
NITROBENZENE	0.25 U					0.25 U		0.25 U		
RDX	0.25 U					0.25 U		0.25 U		
TETRYL	0.25 U					0.25 U		0.25 U		
Herbicides (ug/kg)										
HEXACHLOROPHENE										
PENTACHLOROPHENOL										
Inorganics (mg/kg)										
ALUMINUM	11600 J	12100 J	12700 J	11500 J	13700 J	13400 J	17100 J	14400 J	22100 J	21300 J

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

CLASSIFICATION	SITE	SITE	SITE	SITE	SITE	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
ANTIMONY	4.7 J	2 J	2.2 J	2.1 J	1.9 J	1.1 J	0.98 J	2.1 J	1.8 J	1.7 J
ARSENIC	56.9 J	43.4 J	36.7 J	42 J	23.9 J	22.2 J	28.7 J	25.6 J	33.3 J	34.6 J
BARIUM	125 J	207 J	83.8 J	77.4 J	169 J	199 J	129 J	90.8 J	137 J	178 J
BERYLLIUM	3.7 J	3.4 J	3 J	3.1 J	1.9 J	2.1 J	2 J	2 J	2.3 J	2.3 J
CADMIUM	17.1 J	9.4 J	14.6 J	10.3 J	10.4 J	0.63 J	0.59 J	4.3 J	1.8 J	2.4 J
CALCIUM	1290 J	1850 J	1510 J	1320 J	12200 J	799 J	845 J	2010 J	2500 J	19500 J
CHROMIUM	192 J	124 J	95.7 J	150 J	51.7 J	38.7 J	55 J	49.1 J	77.2 J	45.5 J
COBALT	19 J	28.6 J	22.9 J	22.5 J	29.9 J	40.7 J	31.3 J	27.5 J	20.4 J	33.6 J
COPPER	16.4 J	18.4 J	17.1 J	18.3 J	17.1 J	27.8 J	17.3 J	18.4 J	22 J	25 J
IRON	299000 J	210000 J	243000 J	202000 J	89600 J	112000 J	93700 J	121000 J	120000 J	69200 J
LEAD	45.6 J	39.1 J	38.9 J	40.6 J	25.6 J	35.7 J	37.2 J	20.6 J	25.2 J	34.5 J
LITHIUM										
MAGNESIUM	610 J	707 J	702 J	611 J	2110 J	1470 J	1580 J	1490 J	1940 J	6620 J
MANGANESE	2140 J	3960 J	1550 J	1450 J	2610 J	3240 J	2570 J	1330 J	1250 J	2020 J
MERCURY	0.016 J	0.034 U	0.044 U	0.026 U	0.039 U	0.026 J	0.057 U	0.021 J	0.052 U	0.049 U
NICKEL	42.2 J	47.8 J	35.8 J	44.5 J	41.2 J	33.5 J	36.6 J	54.1 J	41.5 J	42.1 J
POTASSIUM	452 J	664 J	763 J	695 J	1680 J	1340 J	2000 J	2080 J	3190 J	3520 J
SELENIUM	0.62 J	0.96 J	0.63 J	1.5 J	0.74 J	0.56 J	0.61 J	0.48 J	0.85 J	0.81 J
SILVER	0.02 U	0.06 U	0.08 U	0.06 U	0.049 U	0.01 U	0.044 U	0.02 U	0.052 U	0.07 U
SODIUM	28.4 U	144 J	298 J	91.1 J	77.4 U	31.6 J	183 J	92.3 J	126 J	158 J
STRONTIUM										
THALLIUM	0.12 U	0.2 U	0.1 U	0.09 U	0.17 U	0.21 U	0.19 U	0.18 U	0.21 U	0.22 U
TIN	0.42 U	0.41 U	0.44 U	0.39 U	1.1 U	0.4 U	0.53 U	0.46 U	0.55 U	0.54 U
TITANIUM	65.6 J					40.9 J		26.4 J		
VANADIUM	101 J	67.5 J	74.8 J	75.8 J	48.3 J	46.2 J	53.8 J	47.6 J	61.6 J	44.4 J
ZINC	186 J	152 J	195 J	152 J	121 J	72.8 J	79.7 J	98.3 J	73.1 J	77.6 J
AVS/SEM Parameters (UMO/G)										
ACID VOLATILE SULFIDE, SEM										
CADMIUM, SEM										
COPPER, SEM										
LEAD, SEM										
MERCURY, SEM										
NICKEL, SEM										
SEM/AVS, SEM (S.U.)										
ZINC, SEM										
Miscellaneous Parameters										
CATION EXCHANGE CAPACITY (MEQ/1)										
PH (S.U.)										
TOTAL ORGANIC CARBON (mg/kg)										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
Semivolatile Organics (ug/kg)												
1,2,4,5-TETRACHLOROBENZENE					83 U	87 U		79 U				
1,2,4-TRICHLOROBENZENE					83 U	87 U		79 U				
1,2-DICHLOROBENZENE					83 U	87 U		79 U				
1,3-DICHLOROBENZENE					83 U	87 U		79 U				
1,4-DICHLOROBENZENE					83 U	87 U		79 U				
1,4-NAPHTHOQUINONE					83 U	87 U		79 U				
1,4-PHENYLENEDIAMINE					83 UJ	87 UJ		79 UJ				
1-NAPHTHYLAMINE					83 U	87 U		79 U				
2,2'-OXYBIS(1-CHLOROPROPANE)					83 U	87 U		79 U				
2,3,4,6-TETRACHLOROPHENOL					83 U	87 U		79 U				
2,4,5-TRICHLOROPHENOL					83 U	87 U		79 U				
2,4,6-TRICHLOROPHENOL					83 U	87 U		79 U				
2,4-DICHLOROPHENOL					83 U	87 U		79 U				
2,4-DIMETHYLPHENOL					83 U	87 U		79 U				
2,4-DINITROPHENOL					83 U	87 U		79 U				
2,6-DICHLOROPHENOL					83 U	87 U		79 U				
2-ACETYLAMINOFLUORENE					83 U	87 U		79 U				
2-CHLORONAPHTHALENE					83 U	87 U		79 U				
2-CHLOROPHENOL					83 U	87 U		79 U				
2-METHYLNAPHTHALENE					4.1 U	4.3 U		3.9 U				
2-METHYLPHENOL					83 U	87 U		79 U				
2-NAPHTHYLAMINE					83 U	87 U		79 U				
2-NITROANILINE					83 U	87 U		79 U				
2-NITROPHENOL					83 U	87 U		79 U				
2-PICOLINE					83 U	87 U		79 U				
3&4-METHYLPHENOL					83 U	87 U		79 U				
3,3'-DICHLOROBENZIDINE					83 U	87 U		79 U				
3,3'-DIMETHYLBENZIDINE					83 U	87 U		79 U				
3-METHYLCHOLANTHRENE					83 U	87 U		79 U				
3-NITROANILINE					83 U	87 U		79 U				
4,6-DINITRO-2-METHYLPHENOL					83 U	87 U		79 U				
4-AMINOBIPHENYL					83 U	87 U		79 U				
4-BROMOPHENYL PHENYL ETHER					83 U	87 U		79 U				
4-CHLORO-3-METHYLPHENOL					83 U	87 U		79 U				
4-CHLOROANILINE					83 U	87 U		79 U				
4-CHLOROPHENYL PHENYL ETHER					83 U	87 U		79 U				
4-NITROANILINE					83 U	87 U		79 U				
4-NITROPHENOL					83 U	87 U		79 U				
4-NITROQUINOLINE-1-OXIDE					83 UR	87 UR		79 UR				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
5-NITRO-O-TOLUIDINE					83 U	87 U		79 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE					83 U	87 U		79 U				
A,A-DIMETHYLPHENETHYLAMINE					83 UJ	87 UJ		79 UJ				
ACENAPHTHENE					4.1 U	43 J		24				
ACENAPHTHYLENE					4.1 U	4.3 U		3.9 U				
ACETOPHENONE					83 U	87 U		79 U				
ANILINE					83 U	87 U		79 U				
ANTHRACENE					4.1 U	88		72				
ARAMITE					83 UR	87 UR		79 UR				
BENZO(A)ANTHRACENE					11	330		290 J				
BENZO(A)PYRENE					15	360 J		390 J				
BENZO(B)FLUORANTHENE					18	420 J		460 J				
BENZO(G,H,I)PERYLENE					10	270 J		380 J				
BENZO(K)FLUORANTHENE					10	250 J		210 J				
BENZYL ALCOHOL					83 U	87 U		79 U				
BIS(2-CHLOROETHOXY)METHANE					83 U	87 U		79 U				
BIS(2-CHLOROETHYL)ETHER					83 U	87 U		79 U				
BIS(2-ETHYLHEXYL)PHTHALATE					83 U	390 BU		250 BU				
BUTYL BENZYL PHTHALATE					83 U	87 U		79 U				
CHLOROBENZILATE					83 U	87 U		79 U				
CHRYSENE					18	400		430 J				
DI-N-BUTYL PHTHALATE					83 U	87 U		86 J				
DI-N-OCTYL PHTHALATE					83 U	87 U		100 J				
DIALLATE					83 U	87 U		79 U				
DIBENZO(A,H)ANTHRACENE					4.1 U	66 J		74 J				
DIBENZOFURAN					83 U	87 U		79 U				
DIETHYL PHTHALATE					83 U	87 U		79 U				
DIMETHYL PHTHALATE					83 U	87 U		79 U				
DIPHENYLAMINE					83 U	87 U		79 U				
ETHYL METHANE SULFONATE					83 U	87 U		79 U				
FLUORANTHENE					44	860		830				
FLUORENE					4.1 U	42 J		33				
HEXACHLOROBENZENE					83 U	87 U		79 U				
HEXACHLOROBUTADIENE					83 U	87 U		79 U				
HEXACHLOROCYCLOPENTADIENE					83 U	87 UR		79 U				
HEXACHLOROETHANE					83 U	87 U		79 U				
HEXACHLOROPROPENE					83 U	87 U		79 U				
INDENO(1,2,3-CD)PYRENE					8 J	220 J		290 J				
ISODRIN					83 U	87 U		79 U				
ISOPHORONE					83 U	87 U		79 U				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
ISOSAFROLE					83 U	87 U		79 U				
KEPONE					83 UJ	87 UJ		79 UJ				
METHAPYRILENE					83 UJ	87 UJ		79 UJ				
METHYL METHANE SULFONATE					83 U	87 U		79 U				
N-NITROSO-DI-N-BUTYLAMINE					83 U	87 U		79 U				
N-NITROSO-DI-N-PROPYLAMINE					83 U	87 U		79 U				
N-NITROSODIETHYLAMINE					83 U	87 U		79 U				
N-NITROSODIMETHYLAMINE					83 U	87 U		79 U				
N-NITROSOMETHYLETHYLAMINE					83 U	87 U		79 U				
N-NITROSOMORPHOLINE					83 U	87 U		79 U				
N-NITROSOPIPERIDINE					83 U	87 U		79 U				
N-NITROSOPYRROLIDINE					83 U	87 U		79 U				
NAPHTHALENE					4.1 U	6 J		6 J				
O,O,O-TRIETHYL PHOSPHOROTHIOATE					83 U	87 U		79 U				
O-TOLUIDINE					83 U	87 U		79 U				
P-(DIMETHYLAMINO)AZOBENZENE					83 U	87 U		79 U				
PENTACHLOROBENZENE					83 U	87 U		79 U				
PENTACHLOROETHANE					83 U	87 U		79 U				
PENTACHLORONITROBENZENE					83 U	87 U		79 U				
PHENACETIN					83 U	87 U		79 U				
PHENANTHRENE					27	570		620				
PHENOL					83 U	87 U		79 U				
PRONAMIDE					83 U	87 U		79 U				
PYRENE					36	1000		1300 J				
PYRIDINE					83 U	87 U		79 U				
SAFROLE					83 U	87 U		79 U				
Energetics (mg/kg)												
1,3,5-TRINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	0.25 U		0.25 U	0.44 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
TETRYL	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)												
HEXACHLOROPHENE					0.75 U	0.75 U		0.71 U				
PENTACHLOROPHENOL					0.56 U	0.58 U		2.1 J				
PCBs (ug/kg)												
AROCLOR-1016												
AROCLOR-1221												
AROCLOR-1232												
AROCLOR-1242												
AROCLOR-1248												
AROCLOR-1254												
AROCLOR-1260												
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS												
GASOLINE RANGE ORGANICS												
OIL RANGE ORGANICS (C24-C40)												
Field PCB Results (mg/kg)												
TOTAL PCBS AS AROCLOR-1254												
Inorganics (mg/kg)												
ALUMINUM	9280	9230 J	8580 J	10900	4250 J	7000 J	4760 J	3920 J	4810	5550 J	6430	1480
ANTIMONY	1.8 J	2.2 J	0.38 U	0.27 U	0.51 U	0.19 U	0.74 U	0.8 J	0.27 U	0.34 U	0.45 U	0.16 U
ARSENIC	6.5 J	24.8 J	6.5 J	8.2 J	10.7 J	5.7 J	6.4 J	5.7 J	3.7 J	9.1 J	6.1 J	3.7 J
BARIUM	364 J	693 J	79.7 J	97.4 J	34.4 J	61.4 J	76.4 J	45.1 J	28.5 J	62.5 J	49.6 J	104 J
BERYLLIUM	0.52 U	0.65 U	0.79 J	0.67 J	1.3 J	0.63 J	0.38 U	0.37 U	0.18 U	0.71 J	0.74 J	0.88 J
CADMIUM	3.5 J	3.9 J	0.55 J	0.45 U	0.36 U	0.35 U	0.65 J	0.41 J	0.66 J	0.62 J	0.43 J	0.36 U
CALCIUM	38500 J	66000 J	2140 J	2020 J	1120 J	1490 J	116000 J	71000 J	45700 J	14800 J	6720 J	977 J
CHROMIUM	156 J	165 J	12.1 J	15.2 J	18 J	9 J	18 J	11.6 J	9.2 J	14.8 J	12.4 J	7.9 J
COBALT	8.1 J	11.1 J	10.9 J	18.5 J	9.3 J	15.9 J	9.6 J	10 J	3.5 J	8.2 J	11.7 J	10.3 J
COPPER	52.1 J	25.9 J	13.9 J	11.7 J	13.7 J	10.6 J	17.4 J	12.7 J	16.6 J	19.2 J	11.9 J	7 J
IRON	21300 J	55500 J	16700 J	22200 J	46100 J	20800 J	15600 J	17500 J	9900 J	26100 J	34800 J	1990 J
LEAD	471 J	521 J	18.6 J	21.4 J	15 J	11.7 J	64.9 J	23.9 J	31.4 J	17 J	17.6 J	11 J
LITHIUM	8.1 J		7.8 J	8.2 J	2.1 J	6.4 J	5.5 J	4.1 J	4.3 J	3.6 J	7.3 J	10.1 J
MAGNESIUM	3830 J	6640 J	969 J	1200 J	292 J	908 J	7490 J	4810 J	7540 J	2120 J	2450 J	983 J
MANGANESE	204 J	249 J	641 J	1580 J	302 J	747 J	570 J	773 J	147 J	591 J	284 J	67.5 J
MERCURY	0.16 J	0.076 U	0.044 U	0.037 J	0.01 U	0.024 U	0.022 U	0.015 U	0.015 J	0.036 U	0.013 J	0.029 J
NICKEL	16.1 J	17.6 J	11.3 J	12.8 J	13.5 J	13.5 J	13.6 J	10.4 J	7.9 J	12 J	13.5 J	19.3 J
POTASSIUM	614 J	806 J	394 J	561 J	417 J	319 J	303 J	252 J	317 J	451 J	413 J	442 J
SELENIUM	0.56 J	0.37 U	0.51 J	0.55 J	0.11 U	0.27 U	0.26 U	0.16 U	0.18 J	0.33 U	0.21 J	0.3 J
SILVER	0.1 U	0.07 U	0.39 U	0.03 U	0.08 U	0.06 U	0.04 U	0.13 U	0.02 UJ	0.09 U	0.02 UJ	0.02 UJ
SODIUM	41.9 U	79.6 U	75.9 U	126 U	25.2 U	29.7 U	126 J	81.3 J	334 J	71.4 U	22.6 U	25.8 U

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	01	01	01	01	01	01	01	01	01
LOCATION	13SW/SD01	13SW/SD01	13SW/SD02	13SW/SD03	13SW/SD04	13SW/SD05	13SW/SD05	13SW/SD06	13SW/SD07	13SW/SD08	13SW/SD09	13SW/SD10
SAMPLE NUMBER	13SD0101	13SD0102	13SD0201	13SD0301	13SD0401	13SD0501	13SD0501-D	13SD0601	13SD0701	13SD0801	13SD0901	13SD1001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003	3/29/2003
STRONTIUM	39.9 J		7.3 J	6.5 J	4.5 J	5.5 J	122 J	70.2 J	52.5 J	18.1 J	8.5 J	5.5 J
THALLIUM	0.12 U	0.11 U	0.27 U	0.15 U	0.09 U	0.13 U	0.08 U	0.09 U	0.06 U	0.08 U	0.05 U	0.14 U
TIN	11.4 J	4.7 J	0.64 U	0.57 U	0.31 U	0.49 U	0.47 U	0.4 U	0.52 J	0.61 U	2 J	0.45 U
TITANIUM	68.1 J		93.1 J	92.4 J	27.4 J	91.5 J	84.5 J	67.2 J	78.2 J	52 J	42.8 J	68.6 J
VANADIUM	23.3 J	28.8 J	21.5 J	28.2 J	24.8 J	17.4 J	18.7 J	13.9 J	11.8 J	18.7 J	20.5 J	15.5 J
ZINC	541 J	490 J	67.8 J	41.4 J	40 J	97.2 J	52.9 J	43.1 J	58.1 J	78 J	386 U	37.7 J
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE, SEM			0.49 J			0.88 J	0.85 J			0.62 J		
CADMIUM, SEM			0.002 U			0.001 U	0.004			0.004		
COPPER, SEM			0.131 J			0.07 J	0.173 J			2.223 J		
LEAD, SEM			0.067 J			0.03 J	0.196 J			0.061 J		
MERCURY, SEM			0.00007 J			0.00004 J	0.00018 J			0.00004 UJ		
NICKEL, SEM			0.048			0.111	0.041			0.028		
SEM/AVS, SEM (S.U.)			1.54			0.7	0.49			3.74		
ZINC, SEM			0.503 J			0.407 J	0.296 U			0.426 U		
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)			15			9.9	10			12		
PH (S.U.)			7.2			5	7.6			7.4		
TOTAL ORGANIC CARBON (mg/kg)			15000 J			19000 J	3200 J			4400 J		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
Semivolatile Organics (ug/kg)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (mg/kg)												
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	1.9 J	0.8 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	2.2	0.25 U	0.25 U	0.25 U	0.71 J	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
TETRYL	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Herbicides (ug/kg)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
PCBs (ug/kg)												
AROCLOR-1016												
AROCLOR-1221												
AROCLOR-1232												
AROCLOR-1242												
AROCLOR-1248												
AROCLOR-1254												
AROCLOR-1260												
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS												
GASOLINE RANGE ORGANICS												
OIL RANGE ORGANICS (C24-C40)												
Field PCB Results (mg/kg)												
TOTAL PCBS AS AROCLOR-1254												
Inorganics (mg/kg)												
ALUMINUM	9260 J	6860	5010	4160 J	10300	9140	10200 J	9800	7650	16200	7090 J	6600
ANTIMONY	0.52 U	0.55 U	0.47 U	0.13 U	0.26 U	0.25 U	0.24 U	0.21 U	0.35 U	0.23 U	0.23 U	0.29 U
ARSENIC	9.4 J	11.7 J	17.5 J	0.53 U	16.9 J	11.4 J	6.2 J	7 J	8.2 J	7.5 J	11 J	8 J
BARIUM	67.6 J	257 J	152 J	148 J	65.4 J	113 J	94.1 J	109 J	79.5 J	102 J	77.9 J	102 J
BERYLLIUM	0.63 J	1 J	0.96 J	0.53 J	1.4 J	1.4 J	0.7 J	0.79 J	0.93 J	1.6 J	0.95 J	0.77 J
CADMIUM	0.91 J	0.81 J	4.1 J	0.17 U	0.25 U	0.37 U	0.38 U	0.5 J	0.39 U	0.45 U	0.46 J	0.52 J
CALCIUM	33200 J	35400 J	89700 J	998 J	1650 J	767 J	6640 J	4220 J	1050 J	2440 J	1360 J	1560 J
CHROMIUM	15.4 J	32.7 J	49.6 J	16.2 J	24.9 J	21.5 J	11.3 J	16.1 J	24.9 J	13.5 J	36.5 J	10.3 J
COBALT	6.8 J	20.6 J	20 J	1.8 J	15 J	18.9 J	11.8 J	13.2 J	17.9 J	107 J	18.2 J	16 J
COPPER	12.5 J	10.7 J	11.3 J	8.9 J	24.1 J	13.6 J	11.5 J	14.9 J	11.8 J	12.2 J	14.9 J	13.2 J
IRON	25900 J	46300 J	83600 J	18400 J	25900 J	26900 J	18300 J	24800 J	24900 J	33100 J	36500 J	14900 J
LEAD	20 J	21.4 J	38.1 J	4.2 J	14.8 J	20.5 J	13.7 J	15.5 J	19.2 J	20.1 J	20.7 J	19.2 J
LITHIUM	7.2 J	6.5 J	4 J	4.3 J	28.4 J	17.5 J	7.7 J	7.7 J	6.1 J	38.8 J	9.7 J	5.3 J
MAGNESIUM	2080 J	1450 J	5620 J	757 J	1840 J	1410 J	1990 J	1650 J	943 J	1050 J	717 J	825 J
MANGANESE	372 J	6130 J	1760 J	65.3 J	247 J	1790 J	724 J	834 J	1290 J	2960 J	819 J	1440 J
MERCURY	0.028 U	0.032 J	0.019 J	0.01 U	0.022 J	0.041 J	0.028 U	0.022 J	0.028 J	0.036 J	0.029 U	0.03 J
NICKEL	8.6 J	14.9 J	13.6 J	8.6 J	35.5 J	33 J	12.8 J	15 J	13 J	45.5 J	18.6 J	11.7 J
POTASSIUM	2260 J	1130 J	538 J	1660 J	2390 J	807 J	523 J	563 J	392 J	599 J	482 J	367 J
SELENIUM	0.29 U	0.3 J	0.22 J	0.02 U	0.34 J	0.51 J	0.27 U	0.36 J	0.43 J	0.54 J	0.45 J	0.38 J
SILVER	0.05 U	0.02 UJ	0.02 UJ	0.03 U	0.02 UJ	0.02 UJ	0.07 U	0.02 U	0.08 U	0.03 U	0.06 U	0.02 UJ
SODIUM	113 J	47.1 U	39 U	38.8 U	53.5 U	26.2 U	30.7 U	29 U	43.8 U	63.6 U	48.3 U	62.5 U

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	01	01	01	01	01	01	01	01	01	01	01
LOCATION	13SD11	13SW/SD12	13SW/SD13	13SW/SD14	13SW/SD15	13SW/SD16	13SD17	13SD17	13SW/SD18	13SW/SD19	13SW/SD20	13SD21
SAMPLE NUMBER	13SD1101	13SD1201	13SD1301	13SD1401	13SD1501	13SD1601	13SD1701	13SD1701-D	13SD1801	13SD1901	13SD2001	13SD2101
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/30/2003	3/29/2003	3/29/2003	3/29/2003	3/30/2003	3/30/2003	3/30/2003
STRONTIUM	77.1 J	28.2 J	64.2 J	10.3 J	10.1 J	6.3 J	11 J	7.6 J	4.1 J	7.4 J	6.4 J	5.2 J
THALLIUM	0.11 U	0.15 U	0.06 U	0.09 U	0.11 U	0.13 U	0.15 U	0.14 U	0.13 U	0.17 U	0.12 U	0.13 U
TIN	0.53 U	12 J	0.46 U	0.75 J	0.66 J	0.5 U	0.52 U	0.51 J	0.46 U	0.46 U	0.4 U	0.42 U
TITANIUM	62.7 J	60.2 J	67.9 J	72 J	13.8 J	45.1 J	110 J	81.4 J	72.3 J	67 J	66.6 J	77.4 J
VANADIUM	23 J	39.1 J	44 J	16.2 J	17.6 J	21.7 J	21.9 J	25 J	26.1 J	21.5 J	26.2 J	19.7 J
ZINC	116 J	138 U	216 U	7.9 J	65.3 J	46.3 J	62 J	77.1 J	31.7 J	75.9 J	40.4 J	33.4 U
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE, SEM	0.25 J			0.66 J			0.67 J				0.23 J	
CADMIUM, SEM	0.002			0.0014 U			0.001 U				0.001 U	
COPPER, SEM	0.055 J			0.036 J			0.061 J				0.075 J	
LEAD, SEM	0.033 J			0.006 U			0.035 J				0.047 J	
MERCURY, SEM	0.00003 UJ			0.00054 J			0.00005 J				0.00009 J	
NICKEL, SEM	0.021			0.022			0.02				0.078	
SEM/AVS, SEM (S.U.)	2.6			0.09			0.17				0.87	
ZINC, SEM	0.538 J			0.031 U			0.285 U				0.113 U	
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)	18			13			16				12	
PH (S.U.)	7.9			7.1			7.8				7.2	
TOTAL ORGANIC CARBON (mg/kg)	2600 J			2500 J			17000 J				2600 J	

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE					6 J					4.4 U	4.5 U
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE					4.3 U					4.4 U	4.5 U
ACENAPHTHYLENE					4.3 U					4.4 U	4.5 U
ACETOPHENONE											
ANILINE											
ANTHRACENE					4.3 U					4.4 U	4.5 U
ARAMITE											
BENZO(A)ANTHRACENE					10					19	25
BENZO(A)PYRENE					12					23	34
BENZO(B)FLUORANTHENE					21					32	44
BENZO(G,H,I)PERYLENE					12					19	27
BENZO(K)FLUORANTHENE					7 J					10 J	18 J
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE					15					24	39
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE					4.3 U					4.4 U	4.5 U
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE					29					54	72
FLUORENE					4.3 U					4.4 U	4.5 U
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE					9					16	20
ISODRIN											
ISOPHORONE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE					4.3 U					4.4 U	4.5 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE					17					24	29
PHENOL											
PRONAMIDE											
PYRENE					25					47	71
PYRIDINE											
SAFROLE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
1,3-DINITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,4,6-TRINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,4-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2-AMINO-4,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
2-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
3-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
4-AMINO-2,6-DINITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
4-NITROTOLUENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
HMX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
NITROBENZENE	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
RDX	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
TETRYL	0.25 U		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U		
Herbicides (ug/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
PCBs (ug/kg)											
AROCLOR-1016											
AROCLOR-1221											
AROCLOR-1232											
AROCLOR-1242											
AROCLOR-1248											
AROCLOR-1254											
AROCLOR-1260											
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS											
GASOLINE RANGE ORGANICS											
OIL RANGE ORGANICS (C24-C40)											
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254											
Inorganics (mg/kg)											
ALUMINUM	18500	14400 J	11900	14100 J	13900 J	12500 J	8820 J	10300 J	12700 J		
ANTIMONY	1.2 J	0.9 J	0.48 U	2.3 J	1.6 J	1.3 J	0.97 J	0.89 J	1.3 J		
ARSENIC	35.6 J	16.7 J	10.2 J	58.2 J	33.8 J	32.1 J	37.6 J	25.9 J	40.6 J		
BARIUM	203 J	113 J	165 J	101 J	121 J	154 J	202 J	129 J	132 J		
BERYLLIUM	4.3 J	1.4 J	0.95 J	2.9 J	3.6 J	3.3 J	1.8 J	1.9 J	3.1 J		
CADMIUM	1.8 J	0.65 J	0.82 J	1.1 J	0.88 J	0.95 J	0.54 J	0.66 J	0.81 J		
CALCIUM	2310 J	1630 J	3400 J	766 J	1170 J	2670 J	892 J	1280 J	1300 J		
CHROMIUM	140 J	35.4 J	12.7 J	228 J	57.6 J	86.9 J	46.7 J	37.7 J	80.6 J		
COBALT	70.2 J	58.1 J	28.5 J	24.2 J	63.5 J	68.7 J	34.6 J	36.9 J	37.3 J		
COPPER	32.4 J	12.1 J	17.8 J	21.6 J	19.7 J	18.3 J	17.6 J	14.4 J	18.7 J		
IRON	171000 J	41900 J	19900 J	195000 J	121000 J	135000 J	81000 J	74300 J	123000 J		
LEAD	87.7 J	46.5 J	34.8 J	54.8 J	49.5 J	46.6 J	46.2 J	32.9 J	43.8 J		
LITHIUM	10.9 J		9.2 J								
MAGNESIUM	1110 J	1260 J	1290 J	457 J	823 J	735 J	513 J	825 J	693 J		
MANGANESE	4580 J	2980 J	4220 J	2220 J	4000 J	3580 J	3040 J	2700 J	3160 J		
MERCURY	0.031 J	0.059 U	0.042 J	0.044 J	0.043 J	0.024 J	0.04 J	0.045 J	0.049 J		
NICKEL	83.9 J	28.7 J	19.3 J	28.1 J	63.9 J	65.3 J	38.6 J	45.4 J	50.5 J		
POTASSIUM	482 J	1130 J	629 J	622 J	1050 J	831 J	729 J	971 J	844 J		
SELENIUM	0.69 J	0.71 J	0.45 J	1.1 J	0.98 J	0.91 J	0.96 J	0.98 J	1.4 J		
SILVER	0.23 U	0.05 U	0.06 U	0.04 U	0.01 U	0.03 U	0.02 U	0.01 U	0.01 U		
SODIUM	58.2 U	43.5 U	26.3 U	28.1 U	31.9 U	43 J	21.8 U	31.7 J	27.5 U		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SAMPLING ROUND	01	03	01	02	02	02	02	02	02	02	02
LOCATION	13SW/SD22	13SW/SD22	13SD23	13SW/SD24	13SW/SD25	13SW/SD26	13SW/SD27	13SW/SD29	13SW/SD29	13SW/SD32	13SW/SD32
SAMPLE NUMBER	13SD2201	13SD2202	13SD2301	13SD2401	13SD2501	13SD2601	13SD2701	13SD2901	13SD2901-D	13SD3201	13SD3201-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3	0 - 0.3
SAMPLE DATE	3/29/2003	10/7/2004	3/29/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/22/2003	10/22/2003	10/24/2003	10/24/2003
STRONTIUM	8.6 J		8.5 J								
THALLIUM	0.34 U	0.19 U	0.19 U	0.13 U	0.19 U	0.21 U	0.28 U	0.16 U	0.18 U		
TIN	0.82 J	0.43 U	0.82 J	0.38 U	0.46 U	0.3 U	0.31 U	0.39 U	0.38 U		
TITANIUM	112 J		62.3 J	164 J	76.8 J	62.9 J	40.9 J	42.6 J	53.1 J		
VANADIUM	115 J	45.6 J	24.6 J	144 J	59.7 J	70.8 J	43.3 J	43.4 J	66.3 J		
ZINC	273 U	120 J	64.5 J	68.4 J	142 J	151 J	69.5 J	139 J	175 J		
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SEM (S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
Semivolatile Organics (ug/kg)										
1,2,4,5-TETRACHLOROBENZENE										
1,2,4-TRICHLOROBENZENE										
1,2-DICHLOROBENZENE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
1,4-NAPHTHOQUINONE										
1,4-PHENYLENEDIAMINE										
1-NAPHTHYLAMINE										
2,2'-OXYBIS(1-CHLOROPROPANE)										
2,3,4,6-TETRACHLOROPHENOL										
2,4,5-TRICHLOROPHENOL										
2,4,6-TRICHLOROPHENOL										
2,4-DICHLOROPHENOL										
2,4-DIMETHYLPHENOL										
2,4-DINITROPHENOL										
2,6-DICHLOROPHENOL										
2-ACETYLAMINOFLUORENE										
2-CHLORONAPHTHALENE										
2-CHLOROPHENOL										
2-METHYLNAPHTHALENE										
2-METHYLPHENOL										
2-NAPHTHYLAMINE										
2-NITROANILINE										
2-NITROPHENOL										
2-PICOLINE										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3,3'-DIMETHYLBENZIDINE										
3-METHYLCHOLANTHRENE										
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-AMINOBIPHENYL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-NITROANILINE										
4-NITROPHENOL										
4-NITROQUINOLINE-1-OXIDE										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
5-NITRO-O-TOLUIDINE										
7,12-DIMETHYLBENZ(A)ANTHRACENE										
A,A-DIMETHYLPHENETHYLAMINE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ACETOPHENONE										
ANILINE										
ANTHRACENE										
ARAMITE										
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE										
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
BENZYL ALCOHOL										
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CHLOROBENZILATE										
CHRYSENE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
DIALLATE										
DIBENZO(A,H)ANTHRACENE										
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DIPHENYLAMINE										
ETHYL METHANE SULFONATE										
FLUORANTHENE										
FLUORENE										
HEXACHLOROBENZENE										
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
HEXACHLOROPROPENE										
INDENO(1,2,3-CD)PYRENE										
ISODRIN										
ISOPHORONE										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
ISOSAFROLE										
KEPONE										
METHAPYRILENE										
METHYL METHANE SULFONATE										
N-NITROSO-DI-N-BUTYLAMINE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIETHYLAMINE										
N-NITROSODIMETHYLAMINE										
N-NITROSOMETHYLETHYLAMINE										
N-NITROSOMORPHOLINE										
N-NITROSOPIPERIDINE										
N-NITROSOPYRROLIDINE										
NAPHTHALENE										
O,O,O-TRIETHYL PHOSPHOROTHIOATE										
O-TOLUIDINE										
P-(DIMETHYLAMINO)AZOBENZENE										
PENTACHLOROBENZENE										
PENTACHLOROETHANE										
PENTACHLORONITROBENZENE										
PHENACETIN										
PHENANTHRENE										
PHENOL										
PRONAMIDE										
PYRENE										
PYRIDINE										
SAFROLE										
Energetics (mg/kg)										
1,3,5-TRINITROBENZENE	0.25 U					0.25 U		0.25 U		
1,3-DINITROBENZENE	0.25 U					0.25 U		0.25 U		
2,4,6-TRINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2,4-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2-AMINO-4,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
2-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
3-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
4-AMINO-2,6-DINITROTOLUENE	0.25 U					0.25 U		0.25 U		
4-NITROTOLUENE	0.25 U					0.25 U		0.25 U		
HMX	0.25 U					0.25 U		0.28 J		
NITROBENZENE	0.25 U					0.25 U		0.25 U		
RDX	0.25 U					0.25 U		0.25 U		

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
TETRYL	0.25 U					0.25 U		0.25 U		
Herbicides (ug/kg)										
HEXACHLOROPHENE										
PENTACHLOROPHENOL										
PCBs (ug/kg)										
AROCLOR-1016										
AROCLOR-1221										
AROCLOR-1232										
AROCLOR-1242										
AROCLOR-1248										
AROCLOR-1254										
AROCLOR-1260										
Petroleum Hydrocarbons (mg/kg)										
DIESEL RANGE ORGANICS										
GASOLINE RANGE ORGANICS										
OIL RANGE ORGANICS (C24-C40)										
Field PCB Results (mg/kg)										
TOTAL PCBS AS AROCLOR-1254										
Inorganics (mg/kg)										
ALUMINUM	11600 J	12100 J	12700 J	11500 J	13700 J	13400 J	17100 J	14400 J	22100 J	21300 J
ANTIMONY	4.7 J	2 J	2.2 J	2.1 J	1.9 J	1.1 J	0.98 J	2.1 J	1.8 J	1.7 J
ARSENIC	56.9 J	43.4 J	36.7 J	42 J	23.9 J	22.2 J	28.7 J	25.6 J	33.3 J	34.6 J
BARIUM	125 J	207 J	83.8 J	77.4 J	169 J	199 J	129 J	90.8 J	137 J	178 J
BERYLLIUM	3.7 J	3.4 J	3 J	3.1 J	1.9 J	2.1 J	2 J	2 J	2.3 J	2.3 J
CADMIUM	17.1 J	9.4 J	14.6 J	10.3 J	10.4 J	0.63 J	0.59 J	4.3 J	1.8 J	2.4 J
CALCIUM	1290 J	1850 J	1510 J	1320 J	12200 J	799 J	845 J	2010 J	2500 J	19500 J
CHROMIUM	192 J	124 J	95.7 J	150 J	51.7 J	38.7 J	55 J	49.1 J	77.2 J	45.5 J
COBALT	19 J	28.6 J	22.9 J	22.5 J	29.9 J	40.7 J	31.3 J	27.5 J	20.4 J	33.6 J
COPPER	16.4 J	18.4 J	17.1 J	18.3 J	17.1 J	27.8 J	17.3 J	18.4 J	22 J	25 J
IRON	299000 J	210000 J	243000 J	202000 J	89600 J	112000 J	93700 J	121000 J	120000 J	69200 J
LEAD	45.6 J	39.1 J	38.9 J	40.6 J	25.6 J	35.7 J	37.2 J	20.6 J	25.2 J	34.5 J
LITHIUM										
MAGNESIUM	610 J	707 J	702 J	611 J	2110 J	1470 J	1580 J	1490 J	1940 J	6620 J
MANGANESE	2140 J	3960 J	1550 J	1450 J	2610 J	3240 J	2570 J	1330 J	1250 J	2020 J
MERCURY	0.016 J	0.034 U	0.044 U	0.026 U	0.039 U	0.026 J	0.057 U	0.021 J	0.052 U	0.049 U
NICKEL	42.2 J	47.8 J	35.8 J	44.5 J	41.2 J	33.5 J	36.6 J	54.1 J	41.5 J	42.1 J
POTASSIUM	452 J	664 J	763 J	695 J	1680 J	1340 J	2000 J	2080 J	3190 J	3520 J
SELENIUM	0.62 J	0.96 J	0.63 J	1.5 J	0.74 J	0.56 J	0.61 J	0.48 J	0.85 J	0.81 J
SILVER	0.02 U	0.06 U	0.08 U	0.06 U	0.049 U	0.01 U	0.044 U	0.02 U	0.052 U	0.07 U
SODIUM	28.4 U	144 J	298 J	91.1 J	77.4 U	31.6 J	183 J	92.3 J	126 J	158 J

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	MAINSTREAM	GULLY	GULLY	MAINSTREAM	MAINSTREAM	MAINSTREAM
SAMPLING ROUND	02	03	03	03	03	02	03	02	03	03
LOCATION	13SW/SD30	13SW/SD30	13SW/SD33	13SW/SD34	13SW/SD35	13SW/SD28	13SW/SD28	13SW/SD31	13SW/SD31	13SW/SD31
SAMPLE NUMBER	13SD3001	13SD3002	13SD3301	13SD3401	13SD3501	13SD2801	13SD2802	13SD3101	13SD3102	13SD3102-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
DEPTH RANGE	0 - 0.3	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.3	0 - 0.33	0 - 0.33
SAMPLE DATE	10/22/2003	10/6/2004	10/6/2004	10/6/2004	10/6/2004	10/22/2003	10/6/2004	10/22/2003	10/6/2004	10/6/2004
STRONTIUM										
THALLIUM	0.12 U	0.2 U	0.1 U	0.09 U	0.17 U	0.21 U	0.19 U	0.18 U	0.21 U	0.22 U
TIN	0.42 U	0.41 U	0.44 U	0.39 U	1.1 U	0.4 U	0.53 U	0.46 U	0.55 U	0.54 U
TITANIUM	65.6 J					40.9 J		26.4 J		
VANADIUM	101 J	67.5 J	74.8 J	75.8 J	48.3 J	46.2 J	53.8 J	47.6 J	61.6 J	44.4 J
ZINC	186 J	152 J	195 J	152 J	121 J	72.8 J	79.7 J	98.3 J	73.1 J	77.6 J
AVS/SEM Parameters (UMO/G)										
ACID VOLATILE SULFIDE, SEM										
CADMIUM, SEM										
COPPER, SEM										
LEAD, SEM										
MERCURY, SEM										
NICKEL, SEM										
SEM/AVS, SEM (S.U.)										
ZINC, SEM										
Miscellaneous Parameters										
CATION EXCHANGE CAPACITY (MEQ/1)										
PH (S.U.)										
TOTAL ORGANIC CARBON (mg/kg)										

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - TURKEY CREEK
SAMPLING ROUND	05	05	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42	13SW/SD43
SAMPLE NUMBER	13SD3601	13SD3601-D	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201	13SD4301
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
Semivolatile Organics (ug/kg)									
1,2,4,5-TETRACHLOROBENZENE									
1,2,4-TRICHLOROBENZENE									
1,2-DICHLOROBENZENE									
1,3-DICHLOROBENZENE									
1,4-DICHLOROBENZENE									
1,4-NAPHTHOQUINONE									
1,4-PHENYLENEDIAMINE									
1-NAPHTHYLAMINE									
2,2'-OXYBIS(1-CHLOROPROPANE)									
2,3,4,6-TETRACHLOROPHENOL									
2,4,5-TRICHLOROPHENOL									
2,4,6-TRICHLOROPHENOL									
2,4-DICHLOROPHENOL									
2,4-DIMETHYLPHENOL									
2,4-DINITROPHENOL									
2,6-DICHLOROPHENOL									
2-ACETYLAMINOFLUORENE									
2-CHLORONAPHTHALENE									
2-CHLOROPHENOL									
2-METHYLNAPHTHALENE									
2-METHYLPHENOL									
2-NAPHTHYLAMINE									
2-NITROANILINE									
2-NITROPHENOL									
2-PICOLINE									
3&4-METHYLPHENOL									
3,3'-DICHLOROBENZIDINE									
3,3'-DIMETHYLBENZIDINE									
3-METHYLCHOLANTHRENE									
3-NITROANILINE									
4,6-DINITRO-2-METHYLPHENOL									
4-AMINOBIPHENYL									
4-BROMOPHENYL PHENYL ETHER									
4-CHLORO-3-METHYLPHENOL									
4-CHLOROANILINE									
4-CHLOROPHENYL PHENYL ETHER									
4-NITROANILINE									
4-NITROPHENOL									
4-NITROQUINOLINE-1-OXIDE									

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - TURKEY CREEK
SAMPLING ROUND	05	05	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42	13SW/SD43
SAMPLE NUMBER	13SD3601	13SD3601-D	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201	13SD4301
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
5-NITRO-O-TOLUIDINE									
7,12-DIMETHYLBENZ(A)ANTHRACENE									
A,A-DIMETHYLPHENETHYLAMINE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ACETOPHENONE									
ANILINE									
ANTHRACENE									
ARAMITE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
BENZYL ALCOHOL									
BIS(2-CHLOROETHOXY)METHANE									
BIS(2-CHLOROETHYL)ETHER									
BIS(2-ETHYLHEXYL)PHTHALATE									
BUTYL BENZYL PHTHALATE									
CHLOROBENZILATE									
CHRYSENE									
DI-N-BUTYL PHTHALATE									
DI-N-OCTYL PHTHALATE									
DIALLATE									
DIBENZO(A,H)ANTHRACENE									
DIBENZOFURAN									
DIETHYL PHTHALATE									
DIMETHYL PHTHALATE									
DIPHENYLAMINE									
ETHYL METHANE SULFONATE									
FLUORANTHENE									
FLUORENE									
HEXACHLOROBENZENE									
HEXACHLOROBUTADIENE									
HEXACHLOROCYCLOPENTADIENE									
HEXACHLOROETHANE									
HEXACHLOROPROPENE									
INDENO(1,2,3-CD)PYRENE									
ISODRIN									
ISOPHORONE									

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - TURKEY CREEK
SAMPLING ROUND	05	05	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42	13SW/SD43
SAMPLE NUMBER	13SD3601	13SD3601-D	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201	13SD4301
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
ISOSAFROLE									
KEPONE									
METHAPYRILENE									
METHYL METHANE SULFONATE									
N-NITROSO-DI-N-BUTYLAMINE									
N-NITROSO-DI-N-PROPYLAMINE									
N-NITROSODIETHYLAMINE									
N-NITROSODIMETHYLAMINE									
N-NITROSOMETHYLETHYLAMINE									
N-NITROSOMORPHOLINE									
N-NITROSOPIPERIDINE									
N-NITROSOPYRROLIDINE									
NAPHTHALENE									
O,O,O-TRIETHYL PHOSPHOROTHIOATE									
O-TOLUIDINE									
P-(DIMETHYLAMINO)AZOBENZENE									
PENTACHLOROBENZENE									
PENTACHLOROETHANE									
PENTACHLORONITROBENZENE									
PHENACETIN									
PHENANTHRENE									
PHENOL									
PRONAMIDE									
PYRENE									
PYRIDINE									
SAFROLE									
Energetics (mg/kg)									
1,3,5-TRINITROBENZENE									
1,3-DINITROBENZENE									
2,4,6-TRINITROTOLUENE									
2,4-DINITROTOLUENE									
2,6-DINITROTOLUENE									
2-AMINO-4,6-DINITROTOLUENE									
2-NITROTOLUENE									
3-NITROTOLUENE									
4-AMINO-2,6-DINITROTOLUENE									
4-NITROTOLUENE									
HMX									
NITROBENZENE									
RDX									

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - TURKEY CREEK
SAMPLING ROUND	05	05	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42	13SW/SD43
SAMPLE NUMBER	13SD3601	13SD3601-D	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201	13SD4301
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
TETRYL									
Herbicides (ug/kg)									
HEXACHLOROPHENE									
PENTACHLOROPHENOL									
PCBs (ug/kg)									
AROCLOR-1016									
AROCLOR-1221									
AROCLOR-1232									
AROCLOR-1242									
AROCLOR-1248									
AROCLOR-1254									
AROCLOR-1260									
Petroleum Hydrocarbons (mg/kg)									
DIESEL RANGE ORGANICS									
GASOLINE RANGE ORGANICS									
OIL RANGE ORGANICS (C24-C40)									
Field PCB Results (mg/kg)									
TOTAL PCBS AS AROCLOR-1254									
Inorganics (mg/kg)									
ALUMINUM	4370 J	10200 J	10700 J	7640 J	8320 J	9680 J	5470 J	4020 J	30500 J
ANTIMONY	0.21 U	0.28 U	1.4 J	0.86 U	0.47 U	0.73 U	0.44 U	0.67 U	1.1 U
ARSENIC	6.8 J	7.3 J	8.8 J	11.7 J	9.8 J	8.9 J	5.9 J	7.9 J	10.5 J
BARIUM	30.6 J	48.5 J	64.8 J	77.5 J	51.9 J	71.3 J	45.4 J	39.2 J	127 J
BERYLLIUM	0.48 J	0.65	1	0.9	0.99	0.89	0.52 J	0.65	1.4
CADMIUM	0.12 J	0.15 J	0.31 J	5.1	0.61	1.8	0.83	1.1	8.4
CALCIUM	1120 J	1250 J	1090 J	1980 J	942 J	1260 J	497 J	367 J	1920 J
CHROMIUM	15.3 J	17.8 J	24.6 J	25.6 J	29.5 J	28.9 J	15.6 J	19.6 J	38.4 J
COBALT	7.8 J	12.2 J	17.3 J	17.8 J	10.5 J	13.7 J	7.2 J	10.4 J	11.8 J
COPPER	5.9 J	5.8 J	10.8 J	9.5 J	8.4 J	13.3 J	4.7 J	7.1 J	245 J
IRON	18700 J	22800 J	25700 J	33600 J	31200 J	24100 J	16600 J	24500 J	36000 J
LEAD	7.5 J	12.1 J	19.9 J	16.8 J	12.7 J	24.3 J	8.3 J	11.5 J	35.6 J
LITHIUM	#N/A								
MAGNESIUM	386 J	579 J	913 J	861 J	706 J	908 J	479 J	336 J	2660 J
MANGANESE	490	812	380	1090	456	728	470	721	524
MERCURY	#N/A								
NICKEL	10.5 J	14.6 J	21.6 J	20.4 J	17.4 J	17.7 J	11.1 J	12.9 J	31.7 J
POTASSIUM	548 J	730 J	1140 J	1090 J	895 J	1160 J	679 J	456 J	3740 J
SELENIUM	0.19 J	0.26 J	0.35 J	0.31 J	0.31 J	0.33 J	0.15 J	0.17 J	0.49 J
SILVER	0.055 U	0.055 U	1.9	0.057 U	0.14 J	1	0.06 J	0.06 J	0.78 J
SODIUM	4.24 U	4.23 U	24.2 J	7.2 J	9.6 J	23.9 J	8.5 J	4.14 U	61.9 J

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	UPSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - BOGGS CREEK	DOWNSTREAM - TURKEY CREEK
SAMPLING ROUND	05	05	05	05	05	05	05	05	05
LOCATION	13SW/SD36	13SW/SD36	13SW/SD37	13SW/SD38	13SW/SD39	13SW/SD40	13SW/SD41	13SW/SD42	13SW/SD43
SAMPLE NUMBER	13SD3601	13SD3601-D	13SD3701	13SD3801	13SD3901	13SD4001	13SD4101	13SD4201	13SD4301
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
SAMPLE DATE	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005	5/17/2005
STRONTIUM	#N/A								
THALLIUM	0.1 U	0.13 J	0.17 J	0.13 J	0.12 J	0.16 J	0.08 U	0.07 U	0.43 J
TIN	0.37 U	0.44 U	0.6 U	0.46 U	0.51 U	1.1 U	0.48 U	0.46 U	3 J
TITANIUM	#N/A								
VANADIUM	14.8 J	19.1 J	26.7 J	26.7 J	28.8 J	23.8 J	16.4 J	17.9 J	46.8 J
ZINC	23.6 J	29.2 J	45.9 J	53.3 J	35.4 J	175 J	28.2 J	38.4 J	262 J
AVS/SEM Parameters (UMO/G)									
ACID VOLATILE SULFIDE, SEM									
CADMIUM, SEM									
COPPER, SEM									
LEAD, SEM									
MERCURY, SEM									
NICKEL, SEM									
SEM/AVS, SEM (S.U.)									
ZINC, SEM									
Miscellaneous Parameters									
CATION EXCHANGE CAPACITY (MEQ/1)									
PH (S.U.)									
TOTAL ORGANIC CARBON (mg/kg)									

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	DOWNSTREAM - TURKEY CREEK	UPSTREAM - TURKEY CREEK									
SAMPLING ROUND	05	05	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SW/SD44	13SW/SD45	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52
SAMPLE NUMBER	13SD4401	13SD4501	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD520024-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	0 - 2
SAMPLE DATE	5/17/2005	5/17/2005	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	DOWNSTREAM - TURKEY CREEK	UPSTREAM - TURKEY CREEK									
SAMPLING ROUND	05	05	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SW/SD44	13SW/SD45	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52
SAMPLE NUMBER	13SD4401	13SD4501	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD520024-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	0 - 2
SAMPLE DATE	5/17/2005	5/17/2005	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	DOWNSTREAM - TURKEY CREEK	UPSTREAM - TURKEY CREEK									
SAMPLING ROUND	05	05	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SW/SD44	13SW/SD45	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52
SAMPLE NUMBER	13SD4401	13SD4501	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD520024-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	0 - 2
SAMPLE DATE	5/17/2005	5/17/2005	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2,6-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
2-NITROTOLUENE											
3-NITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
4-NITROTOLUENE											
HMX											
NITROBENZENE											
RDX											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	DOWNSTREAM - TURKEY CREEK	UPSTREAM - TURKEY CREEK									
SAMPLING ROUND	05	05	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SW/SD44	13SW/SD45	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52
SAMPLE NUMBER	13SD4401	13SD4501	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD520024-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	0 - 2
SAMPLE DATE	5/17/2005	5/17/2005	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
TETRYL											
Herbicides (ug/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
PCBs (ug/kg)											
AROCLOR-1016			11.4 U	120 U	200 U	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
AROCLOR-1221			11.4 U	120 U	200 U	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
AROCLOR-1232			11.4 U	120 U	200 U	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
AROCLOR-1242			11.4 U	120 U	200 U	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
AROCLOR-1248			11.4 U	1700	200 U	8000 J	36000	1200	800 J	17000 J	46000 J
AROCLOR-1254			11.4 U	120 U	200 U	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
AROCLOR-1260			11.4 U	120 U	1900	612 U	14.3 U	110 U	108 U	11.2 U	11.2 UJ
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS								240	46	3.12 U	
GASOLINE RANGE ORGANICS								17	12	3.12 U	
OIL RANGE ORGANICS (C24-C40)								240	46	12.5 U	
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254					3.28						
Inorganics (mg/kg)											
ALUMINUM	5520 J	5360 J									
ANTIMONY	0.2 U	0.18 U									
ARSENIC	5 J	4.5 J									
BARIUM	51.6 J	52.1 J									
BERYLLIUM	0.49 J	0.43 J									
CADMIUM	0.19 J	0.17 J									
CALCIUM	835 J	703 J									
CHROMIUM	12.1 J	11.8 J									
COBALT	11.3 J	7 J									
COPPER	7.5 J	6.3 J									
IRON	15700 J	14100 J									
LEAD	10.6 J	9.4 J									
LITHIUM											
MAGNESIUM	612 J	565 J									
MANGANESE	564	444									
MERCURY											
NICKEL	13.7 J	10.7 J									
POTASSIUM	788 J	748 J									
SELENIUM	0.16 J	0.13 J									
SILVER	0.053 U	0.052 U									
SODIUM	4.1 U	3.97 U									

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER	DOWNSTREAM - TURKEY CREEK	UPSTREAM - TURKEY CREEK									
SAMPLING ROUND	05	05	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SW/SD44	13SW/SD45	13SD46	13SD48	13SD48	13SD49	13SD50	13SD51	13SD51	13SD52	13SD52
SAMPLE NUMBER	13SD4401	13SD4501	13SD460024	13SD480006	13SD480612	13SD490012	13SD500012	13SD510024	13SD512448	13SD520024	13SD520024-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
DEPTH RANGE	0 - 0.33	0 - 0.33	0 - 2	0 - 0.5	0.5 - 1	0 - 1	0 - 1	0 - 2	2 - 4	0 - 2	0 - 2
SAMPLE DATE	5/17/2005	5/17/2005	6/5/2006	6/5/2006	8/25/2006	6/5/2006	6/5/2006	6/6/2006	6/6/2006	6/6/2006	6/6/2006
STRONTIUM											
THALLIUM	0.09 U	0.1 U									
TIN	0.38 U	0.35 U									
TITANIUM											
VANADIUM	14.5 J	14 J									
ZINC	32 J	27.2 J									
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SEM (S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER											
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD52	13SD53	13SD53	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60
SAMPLE NUMBER	13SD522448	13SD530024	13SD532436	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	0 - 2	2 - 3	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1
SAMPLE DATE	6/6/2006	6/6/2006	6/6/2006	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
Semivolatile Organics (ug/kg)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER											
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD52	13SD53	13SD53	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60
SAMPLE NUMBER	13SD522448	13SD530024	13SD532436	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	0 - 2	2 - 3	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1
SAMPLE DATE	6/6/2006	6/6/2006	6/6/2006	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER											
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD52	13SD53	13SD53	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60
SAMPLE NUMBER	13SD522448	13SD530024	13SD532436	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	0 - 2	2 - 3	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1
SAMPLE DATE	6/6/2006	6/6/2006	6/6/2006	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (mg/kg)											
1,3,5-TRINITROBENZENE											
1,3-DINITROBENZENE											
2,4,6-TRINITROTOLUENE											
2,4-DINITROTOLUENE											
2,6-DINITROTOLUENE											
2-AMINO-4,6-DINITROTOLUENE											
2-NITROTOLUENE											
3-NITROTOLUENE											
4-AMINO-2,6-DINITROTOLUENE											
4-NITROTOLUENE											
HMX											
NITROBENZENE											
RDX											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER											
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD52	13SD53	13SD53	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60
SAMPLE NUMBER	13SD522448	13SD530024	13SD532436	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	0 - 2	2 - 3	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1
SAMPLE DATE	6/6/2006	6/6/2006	6/6/2006	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
TETRYL											
Herbicides (ug/kg)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
PCBs (ug/kg)											
AROCLOR-1016	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
AROCLOR-1221	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
AROCLOR-1232	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
AROCLOR-1242	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
AROCLOR-1248	2400	17000 J	1300 J	1100				36000 J	2700 J		12000 J
AROCLOR-1254	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
AROCLOR-1260	237 U	12 U	118 U	134 U				30000 U	800 U		1000 U
Petroleum Hydrocarbons (mg/kg)											
DIESEL RANGE ORGANICS	3.23 U										
GASOLINE RANGE ORGANICS	3.23 U										
OIL RANGE ORGANICS (C24-C40)	12.9 U										
Field PCB Results (mg/kg)											
TOTAL PCBS AS AROCLOR-1254					0.5 U	0.5 U	0.5 U	3.47	0.64	0.5 U	3.95
Inorganics (mg/kg)											
ALUMINUM											
ANTIMONY											
ARSENIC											
BARIUM											
BERYLLIUM											
CADMIUM											
CALCIUM											
CHROMIUM											
COBALT											
COPPER											
IRON											
LEAD											
LITHIUM											
MAGNESIUM											
MANGANESE											
MERCURY											
NICKEL											
POTASSIUM											
SELENIUM											
SILVER											
SODIUM											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER											
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD52	13SD53	13SD53	13SD54	13SD55	13SD55	13SD56	13SD57	13SD59	13SD59	13SD60
SAMPLE NUMBER	13SD522448	13SD530024	13SD532436	13SD540006	13SD550012	13SD551224	13SD560012	13SD570006	13SD590012	13SD591224	13SD600012
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	2 - 4	0 - 2	2 - 3	0 - 0.5	0 - 1	1 - 2	0 - 1	0 - 0.5	0 - 1	1 - 2	0 - 1
SAMPLE DATE	6/6/2006	6/6/2006	6/6/2006	6/5/2006	8/25/2006	8/25/2006	8/25/2006	8/24/2006	8/23/2006	8/23/2006	8/23/2006
STRONTIUM											
THALLIUM											
TIN											
TITANIUM											
VANADIUM											
ZINC											
AVS/SEM Parameters (UMO/G)											
ACID VOLATILE SULFIDE, SEM											
CADMIUM, SEM											
COPPER, SEM											
LEAD, SEM											
MERCURY, SEM											
NICKEL, SEM											
SEM/AVS, SEM (S.U.)											
ZINC, SEM											
Miscellaneous Parameters											
CATION EXCHANGE CAPACITY (MEQ/1)											
PH (S.U.)											
TOTAL ORGANIC CARBON (mg/kg)											

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER												
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD60	13SD61	13SD62	13SD62	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65
SAMPLE NUMBER	13SD601224	13SD610012	13SD620012	13SD621224	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 1	0 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1
SAMPLE DATE	8/23/2006	8/24/2006	8/24/2006	8/24/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
Semivolatile Organics (ug/kg)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER												
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD60	13SD61	13SD62	13SD62	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65
SAMPLE NUMBER	13SD601224	13SD610012	13SD620012	13SD621224	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 1	0 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1
SAMPLE DATE	8/23/2006	8/24/2006	8/24/2006	8/24/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER												
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD60	13SD61	13SD62	13SD62	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65
SAMPLE NUMBER	13SD601224	13SD610012	13SD620012	13SD621224	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 1	0 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1
SAMPLE DATE	8/23/2006	8/24/2006	8/24/2006	8/24/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (mg/kg)												
1,3,5-TRINITROBENZENE												
1,3-DINITROBENZENE												
2,4,6-TRINITROTOLUENE												
2,4-DINITROTOLUENE												
2,6-DINITROTOLUENE												
2-AMINO-4,6-DINITROTOLUENE												
2-NITROTOLUENE												
3-NITROTOLUENE												
4-AMINO-2,6-DINITROTOLUENE												
4-NITROTOLUENE												
HMX												
NITROBENZENE												
RDX												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER												
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD60	13SD61	13SD62	13SD62	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65
SAMPLE NUMBER	13SD601224	13SD610012	13SD620012	13SD621224	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 1	0 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1
SAMPLE DATE	8/23/2006	8/24/2006	8/24/2006	8/24/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
TETRYL												
Herbicides (ug/kg)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
PCBs (ug/kg)												
AROCLOR-1016			11 UJ	11 UJ	190 U			3900 U				
AROCLOR-1221			11 UJ	11 UJ	190 U			3900 U				
AROCLOR-1232			11 UJ	11 UJ	190 U			3900 U				
AROCLOR-1242			11 UJ	11 UJ	190 U			3900 U				
AROCLOR-1248			23 J	11 UJ	470 J			17000 J				
AROCLOR-1254			11 UJ	11 UJ	190 U			3900 U				
AROCLOR-1260			11 UJ	11 UJ	190 U			3900 U				
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS												
GASOLINE RANGE ORGANICS												
OIL RANGE ORGANICS (C24-C40)												
Field PCB Results (mg/kg)												
TOTAL PCBS AS AROCLOR-1254	0.5 U	0.5 U	0.5 U	0.02 J	0.5 U	0.5 U	0.5 U	3.45	0.5 U	0.5 U	0.5 U	0.5 U
Inorganics (mg/kg)												
ALUMINUM												
ANTIMONY												
ARSENIC												
BARIUM												
BERYLLIUM												
CADMIUM												
CALCIUM												
CHROMIUM												
COBALT												
COPPER												
IRON												
LEAD												
LITHIUM												
MAGNESIUM												
MANGANESE												
MERCURY												
NICKEL												
POTASSIUM												
SELENIUM												
SILVER												
SODIUM												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER												
SAMPLING ROUND	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
LOCATION	13SD60	13SD61	13SD62	13SD62	13SD63	13SD63	13SD63	13SD64	13SD64	13SD64	13SD65	13SD65
SAMPLE NUMBER	13SD601224	13SD610012	13SD620012	13SD621224	13SD630006	13SD630612	13SD631224	13SD640006	13SD640612	13SD641224	13SD650006	13SD650612
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 1	0 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1	1 - 2	0 - 0.5	0.5 - 1
SAMPLE DATE	8/23/2006	8/24/2006	8/24/2006	8/24/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006	8/26/2006
STRONTIUM												
THALLIUM												
TIN												
TITANIUM												
VANADIUM												
ZINC												
AVS/SEM Parameters (UMO/G)												
ACID VOLATILE SULFIDE, SEM												
CADMIUM, SEM												
COPPER, SEM												
LEAD, SEM												
MERCURY, SEM												
NICKEL, SEM												
SEM/AVS, SEM (S.U.)												
ZINC, SEM												
Miscellaneous Parameters												
CATION EXCHANGE CAPACITY (MEQ/1)												
PH (S.U.)												
TOTAL ORGANIC CARBON (mg/kg)												

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER				
SAMPLING ROUND	PCB	PCB	PCB	PCB
LOCATION	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/27/2006	8/28/2006	8/28/2006
Semivolatile Organics (ug/kg)				
1,2,4,5-TETRACHLOROBENZENE				
1,2,4-TRICHLOROBENZENE				
1,2-DICHLOROBENZENE				
1,3-DICHLOROBENZENE				
1,4-DICHLOROBENZENE				
1,4-NAPHTHOQUINONE				
1,4-PHENYLENEDIAMINE				
1-NAPHTHYLAMINE				
2,2'-OXYBIS(1-CHLOROPROPANE)				
2,3,4,6-TETRACHLOROPHENOL				
2,4,5-TRICHLOROPHENOL				
2,4,6-TRICHLOROPHENOL				
2,4-DICHLOROPHENOL				
2,4-DIMETHYLPHENOL				
2,4-DINITROPHENOL				
2,6-DICHLOROPHENOL				
2-ACETYLAMINOFLUORENE				
2-CHLORONAPHTHALENE				
2-CHLOROPHENOL				
2-METHYLNAPHTHALENE				
2-METHYLPHENOL				
2-NAPHTHYLAMINE				
2-NITROANILINE				
2-NITROPHENOL				
2-PICOLINE				
3&4-METHYLPHENOL				
3,3'-DICHLOROBENZIDINE				
3,3'-DIMETHYLBENZIDINE				
3-METHYLCHOLANTHRENE				
3-NITROANILINE				
4,6-DINITRO-2-METHYLPHENOL				
4-AMINOBIPHENYL				
4-BROMOPHENYL PHENYL ETHER				
4-CHLORO-3-METHYLPHENOL				
4-CHLOROANILINE				
4-CHLOROPHENYL PHENYL ETHER				
4-NITROANILINE				
4-NITROPHENOL				
4-NITROQUINOLINE-1-OXIDE				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER				
SAMPLING ROUND	PCB	PCB	PCB	PCB
LOCATION	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/27/2006	8/28/2006	8/28/2006
5-NITRO-O-TOLUIDINE				
7,12-DIMETHYLBENZ(A)ANTHRACENE				
A,A-DIMETHYLPHENETHYLAMINE				
ACENAPHTHENE				
ACENAPHTHYLENE				
ACETOPHENONE				
ANILINE				
ANTHRACENE				
ARAMITE				
BENZO(A)ANTHRACENE				
BENZO(A)PYRENE				
BENZO(B)FLUORANTHENE				
BENZO(G,H,I)PERYLENE				
BENZO(K)FLUORANTHENE				
BENZYL ALCOHOL				
BIS(2-CHLOROETHOXY)METHANE				
BIS(2-CHLOROETHYL)ETHER				
BIS(2-ETHYLHEXYL)PHTHALATE				
BUTYL BENZYL PHTHALATE				
CHLOROBENZILATE				
CHRYSENE				
DI-N-BUTYL PHTHALATE				
DI-N-OCTYL PHTHALATE				
DIALLATE				
DIBENZO(A,H)ANTHRACENE				
DIBENZOFURAN				
DIETHYL PHTHALATE				
DIMETHYL PHTHALATE				
DIPHENYLAMINE				
ETHYL METHANE SULFONATE				
FLUORANTHENE				
FLUORENE				
HEXACHLOROBENZENE				
HEXACHLOROBUTADIENE				
HEXACHLOROCYCLOPENTADIENE				
HEXACHLOROETHANE				
HEXACHLOROPROPENE				
INDENO(1,2,3-CD)PYRENE				
ISODRIN				
ISOPHORONE				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER				
SAMPLING ROUND	PCB	PCB	PCB	PCB
LOCATION	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/27/2006	8/28/2006	8/28/2006
ISOSAFROLE				
KEPONE				
METHAPYRILENE				
METHYL METHANE SULFONATE				
N-NITROSO-DI-N-BUTYLAMINE				
N-NITROSO-DI-N-PROPYLAMINE				
N-NITROSODIETHYLAMINE				
N-NITROSODIMETHYLAMINE				
N-NITROSOMETHYLETHYLAMINE				
N-NITROSOMORPHOLINE				
N-NITROSOPIPERIDINE				
N-NITROSOPYRROLIDINE				
NAPHTHALENE				
O,O,O-TRIETHYL PHOSPHOROTHIOATE				
O-TOLUIDINE				
P-(DIMETHYLAMINO)AZOBENZENE				
PENTACHLOROBENZENE				
PENTACHLOROETHANE				
PENTACHLORONITROBENZENE				
PHENACETIN				
PHENANTHRENE				
PHENOL				
PRONAMIDE				
PYRENE				
PYRIDINE				
SAFROLE				
Energetics (mg/kg)				
1,3,5-TRINITROBENZENE				
1,3-DINITROBENZENE				
2,4,6-TRINITROTOLUENE				
2,4-DINITROTOLUENE				
2,6-DINITROTOLUENE				
2-AMINO-4,6-DINITROTOLUENE				
2-NITROTOLUENE				
3-NITROTOLUENE				
4-AMINO-2,6-DINITROTOLUENE				
4-NITROTOLUENE				
HMX				
NITROBENZENE				
RDX				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER				
SAMPLING ROUND	PCB	PCB	PCB	PCB
LOCATION	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/27/2006	8/28/2006	8/28/2006
TETRYL				
Herbicides (ug/kg)				
HEXACHLOROPHENE				
PENTACHLOROPHENOL				
PCBs (ug/kg)				
AROCLOR-1016		4000 U		
AROCLOR-1221		4000 U		
AROCLOR-1232		4000 U		
AROCLOR-1242		4000 U		
AROCLOR-1248		7700 J		
AROCLOR-1254		4000 U		
AROCLOR-1260		4000 U		
Petroleum Hydrocarbons (mg/kg)				
DIESEL RANGE ORGANICS				
GASOLINE RANGE ORGANICS				
OIL RANGE ORGANICS (C24-C40)				
Field PCB Results (mg/kg)				
TOTAL PCBS AS AROCLOR-1254	0.5 U	1.15	0.31 J	0.18 J
Inorganics (mg/kg)				
ALUMINUM				
ANTIMONY				
ARSENIC				
BARIUM				
BERYLLIUM				
CADMIUM				
CALCIUM				
CHROMIUM				
COBALT				
COPPER				
IRON				
LEAD				
LITHIUM				
MAGNESIUM				
MANGANESE				
MERCURY				
NICKEL				
POTASSIUM				
SELENIUM				
SILVER				
SODIUM				

TABLE G-4

SUMMARY OF ANALYTIC RESULTS
SEDIMENT SAMPLES ROUNDS 1 THROUGH 3, ROUND 5, AND PCB DELINEATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

STREAM ORDER				
SAMPLING ROUND	PCB	PCB	PCB	PCB
LOCATION	13SD65	13SD66	13SD67	13SD68
SAMPLE NUMBER	13SD651224	13SD660006	13SD670006	13SD680006
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	1 - 2	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	8/26/2006	8/27/2006	8/28/2006	8/28/2006
STRONTIUM				
THALLIUM				
TIN				
TITANIUM				
VANADIUM				
ZINC				
AVS/SEM Parameters (UMO/G)				
ACID VOLATILE SULFIDE, SEM				
CADMIUM, SEM				
COPPER, SEM				
LEAD, SEM				
MERCURY, SEM				
NICKEL, SEM				
SEM/AVS, SEM (S.U.)				
ZINC, SEM				
Miscellaneous Parameters				
CATION EXCHANGE CAPACITY (MEQ/1)				
PH (S.U.)				
TOTAL ORGANIC CARBON (mg/kg)				

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004	7/24/2004
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
1,3-DINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.526 U			0.556 U				0.51 U			
2,4,6-TRINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
2,4-DIAMINO-6-NITROTOLUENE		0.263 U			0.278 U				0.255 U			
2,4-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
2,6-DIAMINO-4-NITROTOLUENE		0.263 U			0.278 U				0.255 U			
2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
2-AMINO-4,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
2-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
3,5-DINITROANILINE		0.263 U			0.278 U				0.255 U			
3-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
4-AMINO-2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 5 OF 90

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
4-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
DNX		0.263 U			0.278 U				0.255 U		
HMX	1	1	1.3	0.495 U	0.278 U	0.26 U	0.29 J		0.51 J		0.38 J
MNX		0.263 U			0.278 U				0.255 U		
NITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
PICRAMIC ACID											
PICRIC ACID											
RDX	0.44 U	0.35 J	0.3 J	0.465 U	0.278 U	0.26 U	0.25 U		0.3 J		0.33 J
TETRYL	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
TNX		0.263 U			0.278 U				0.255 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	598 J	699 J		659 J	244 J		3990 J		627 J		
ANTIMONY	0.24 U	0.02 U		0.06 U	0.06 U		0.13 U		0.02 U		
ARSENIC	0.23 U	0.17 U		0.65 J	0.87 U		1 J		0.31 U		
BARIUM	55.4 J	46.8 J		27.5 J	18.1 J		74.5 J		62.1 J		
BERYLLIUM	1.2 U	1.2 U		0.63 U	0.3 U		1.2 U		1.8 U		
CADMIUM	0.18 U	0.06 U		0.38 U	0.34 U		0.82 U		0.37 U		
CALCIUM	9720 J	7190 J		94100 J	113000 J		34800 J		26100 J		
CHROMIUM	0.2 U	0.73 U		1.1 J	0.71 U		7.1 J		1.4 U		
COBALT	36 J	29.9 J		119 J	71 J		48.8 J		25 J		
COPPER	2.9 J	1.4 U		2.7 J	2 J		5.6 J		3.2 J		
IRON	135 J	61.7 U		10500 J	15200 J		1910 J		344 U		
LEAD	1.4 U	1.2 U		0.53 U	0.36 U		2 U		0.67 U		
LITHIUM	21.1 J			208 J			74 J				
MAGNESIUM	6790 J	5850 J		60200 J	69800 J		17000 J		15800 J		
MANGANESE	689 J	566 U		4580 J	5100 J		302 J		211 J		
MERCURY	0.16 J	0.39		0.02 U	0.007 U		0.02 U		0.02 U		
NICKEL	26.6 J	21.1 J		289 J	170 J		99.7 J		76.3 J		
POTASSIUM	494 J	403 J		6910 J	7090 J		2860 J		1040 J		
SELENIUM	0.17 U	0.05 U		0.91 U	0.27 U		0.32 U		0.04 U		
SILVER	0.18 U	0.03 U		0.12 U	0.03 U		0.43 U		0.03 U		
SODIUM	24300 J	26100 J		102000 J	129000 J		37400 J		40700 J		
STRONTIUM	53.3 J			396 J			97.8 J				
THALLIUM	0.11 U	0.08 U		0.13 U	0.15 U		0.23 U		0.04 U		
TIN	0.1 U	0.1 U		0.33 U	0.14 U		0.34 U		0.1 U		
TITANIUM	4 J	0.21 U		5.8 J	2.2 U		32 J		8.5 J		
VANADIUM	0.08 U	0.06 U		0.68 J	0.39 U		5.8 J		0.76 U		
ZINC	29.7 J	29.9 J		140 J	96.7 J		161 J		97.7 J		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED								226 J		790 J	
ANTIMONY, FILTERED								0.36 U		0.08 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 6 OF 90

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
ARSENIC, FILTERED								0.5 U		0.5 U	
BARIUM, FILTERED								71.1 J		55.8 J	
BERYLLIUM, FILTERED								1.1 U		2.5 J	
CADMIUM, FILTERED								0.97 U		0.76 U	
CALCIUM, FILTERED								30900 J		27100 J	
CHROMIUM, FILTERED								0.48 U		0.24 U	
COBALT, FILTERED								55.7 J		43.4 J	
COPPER, FILTERED								4.5 J		6.2 J	
IRON, FILTERED								344 J		219 U	
LEAD, FILTERED								0.25 U		0.82 U	
LITHIUM, FILTERED								78.5 J			
MAGNESIUM, FILTERED								16800 J		16000 J	
MANGANESE, FILTERED								300 J		278 J	
MERCURY, FILTERED								0.02 U		0.02 U	
NICKEL, FILTERED								107 J		107 J	
POTASSIUM, FILTERED								1890 J		1440 J	
SELENIUM, FILTERED								0.33 U		0.07 U	
SILVER, FILTERED								0.25 U		0.03 U	
SODIUM, FILTERED								35000 J		40600 J	
STRONTIUM, FILTERED								97.1 J			
THALLIUM, FILTERED								0.25 U		0.07 U	
TIN, FILTERED								0.19 U		0.1 U	
TITANIUM, FILTERED								2.6 J		3.8 U	
VANADIUM, FILTERED								0.31 U		0.1 U	
ZINC, FILTERED								178		158 J	
Field Parameters (mg/L)											
ALKALINITY					10 U				10 U		
CARBON DIOXIDE					40				50		
DISSOLVED OXYGEN			4.2		4	2.19			6		3.66
DISSOLVED OXYGEN - METER	1.28	1.4		1.98	5.75		4.5		4.45		
HYDROGEN SULFIDE (H2S)					0				0		
IRON(+2)					2.05				0.03		
MANGANESE(+2)					5.4				0.1		
NITRITE-N					0.003				0.006		
OXIDATION REDUCTION POTENTIAL (MV)	220	385.4	461.2	191	157.9	616.2	152.7		345		107.4
PH (S.U.)	4.68	4.17	3.57	4.61	5.25	3.39	5.56		5.32		5.52
SPECIFIC CONDUCTANCE (MS/CM)	0.229	0.233	0.255	1.244	1.23	1.501	0.445		0.487		0.528
SULFIDE					0				0.06		
TEMPERATURE (C)	12.59	17.04	18.75	15.28	10.43	19.59	13.14		18		19.98
TURBIDITY (NTU)	3.8	4.39	9.5	6.8	6.62	2.3	38		328 >		9.2
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U	0.005 UJ		0.13	0.24 J		0.12		0.07		
NITRITE/NITRATE-N	0.07	0.15 J		0.02 U	0.05 UJ		0.07		0.09		
TOTAL ORGANIC CARBON									0.5 U		

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
1,3-DINITROBENZENE	0.26 U	0.281 U	0.27 U	0.3 J		0.263 U		0.26 U		0.19 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.562 U				0.526 U					
2,4,6-TRINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,4-DIAMINO-6-NITROTOLUENE		0.281 U				0.263 U					
2,4-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,6-DIAMINO-4-NITROTOLUENE		0.281 U				0.263 U					
2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
3,5-DINITROANILINE		0.281 U				0.263 U					
3-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
4-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
DNX		0.281 U				0.31 J					
HMX	3.3	4.1	4.7	13		10		12		0.97	
MNX		0.281 U				0.263 U					
NITROBENZENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
PICRAMIC ACID											
PICRIC ACID											
RDX	4.1	3.4	3.1	0.77 J		1.4		0.85		2	
TETRYL	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
TNX		0.281 U				0.263 U					
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	8050 J	1530 J		21700 J		139000 J		510 J		12300 J	
ANTIMONY	0.19 U	0.02 U		0.09 U		0.32 U		0.57 U		0.19 U	
ARSENIC	1.8 J	0.5 U		4.7 J		24.1 J		0.8 U		4 J	
BARIUM	154 J	91.8 J		126 J		727 J		31.9 J		178 J	
BERYLLIUM	3.5 J	1.2 U		1.2 U		5.9 J		1.4 U		0.58 U	
CADMIUM	1.9 U	0.52 U		0.39 U		0.69 U		0.6 U		0.56 U	
CALCIUM	34800 J	19000 J		40200 J		35300 J		30900 J		36700 J	
CHROMIUM	1.5 J	0.49 U		36.4 J		145 J		2 U		18.7 J	
COBALT	111 J	38.8 J		34.2 J		48.6 J		43.2 J		3.6 J	
COPPER	3.8 J	2.1 J		10.1 J		48.3 J		4.1 U		7.3 J	
IRON	5400 J	1530 J		9860 J		68900 J		485 J		12000 J	
LEAD	3.2 J	0.94 U		8.1 J		46.5 J		1.5 U		7.1 J	
LITHIUM	126 J			40 J						15.7 J	
MAGNESIUM	16700 J	8720 J		35700 J		35400 J		24200 J		17700 J	
MANGANESE	1330 J	441 U		172 J		209 J		135 J		505 J	
MERCURY	0.02 U	0.007 U		0.02 U		0.097 J		0.03 U		0.02 U	
NICKEL	314 J	107 J		96.2 J		153 J		99.4 J		11.7 J	
POTASSIUM	7760 J	3920 J		8390 J		27500 J		1750 J		10300 J	
SELENIUM	0.61 U	0.23 U		0.42 U		1.3 U		0.3 U		0.69 U	
SILVER	0.24 U	0.03 U		0.05 U		0.2 U		0.55 U		0.49 U	
SODIUM	22800 J	19000 J		57900 J		49600 J		50800 J		58000 J	
STRONTIUM	101 J			189 J						203 J	
THALLIUM	0.6 U	0.16 U		0.2 U		1.2 U		0.35 U		0.11 U	
TIN	0.22 U	0.1 U		0.67 U		1.6 U		0.41 U		1.3 U	
TITANIUM	7.8 J	4.7 J		180 J		659 J				85 J	
VANADIUM	0.79 J	0.32 U		34.3 J		135 J		1.1 J		15.8 J	
ZINC	358 J	97.3 J		114 J		334 J		183 J		30.3 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED					254 J		164 U		124 J		826 J
ANTIMONY, FILTERED					0.1 U		0.28 U		0.23 U		0.17 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 12 OF 90

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
ARSENIC, FILTERED					0.8 J		0.32 U		0.44 U		0.51 U
BARIUM, FILTERED					22.8 J		26.2 J		27.9 J		41.6 J
BERYLLIUM, FILTERED					0.46 U		0.5 U		0.93 U		0.05 U
CADMIUM, FILTERED					0.26 U		0.47 U		0.26 U		0.17 U
CALCIUM, FILTERED					39800 J		33900 J		26100 J		34900 J
CHROMIUM, FILTERED					2.6 J		0.39 U		1.2 U		1.3 J
COBALT, FILTERED					35 J		39.3 J		38.2 J		1.3 J
COPPER, FILTERED					3.4 J		2.5 J		5.2 U		0.63 U
IRON, FILTERED					93.8 J		184 U		55.3 U		772 J
LEAD, FILTERED					0.21 U		0.37 U		0.53 U		0.3 U
LITHIUM, FILTERED					27.4 J						9.7 J
MAGNESIUM, FILTERED					32200 J		26000 J		20000 J		16700 J
MANGANESE, FILTERED					133 J		141 J		111 J		543 J
MERCURY, FILTERED					0.02 U		0.02 U		0.03 U		0.2 U
NICKEL, FILTERED					90.5 J		93.8 J		87.6 J		3.2 J
POTASSIUM, FILTERED					4540 J		2050 J		1540 J		7110 J
SELENIUM, FILTERED					0.28 U		0.17 U		0.1 U		0.29 U
SILVER, FILTERED					0.53 U		0.03 U		0.06 U		0.04 U
SODIUM, FILTERED					55000 J		50500 J		40500 J		49700 J
STRONTIUM, FILTERED					188 J						159 J
THALLIUM, FILTERED					0.06 U		0.04 U		0.04 U		0.05 U
TIN, FILTERED					0.11 U		0.1 U		0.07 U		0.34 U
TITANIUM, FILTERED					4.5 J		3.3 U				9.3 J
VANADIUM, FILTERED					0.46 U		0.11 U		0.15 U		1.1 J
ZINC, FILTERED					111 J		190 J		168 J		3.6 J
Field Parameters (mg/L)											
ALKALINITY						10 U					
CARBON DIOXIDE						33					
DISSOLVED OXYGEN			1.62			4		0.87			
DISSOLVED OXYGEN - METER	4.3	4.14		0.6		3.96				3.15	
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0.11					
MANGANESE(+2)						1.3					
NITRITE-N						0.012					
OXIDATION REDUCTION POTENTIAL (MV)	216.1	243.6	455.2	76		432		97		88	
PH (S.U.)	4.77	5.24	5.03	5.83		5.4		6.6		6.63	
SPECIFIC CONDUCTANCE (MS/CM)	0.316	0.228	0.201	0.632		0.558		0.468		0.495	
SULFIDE						0.09					
TEMPERATURE (C)	13.73	16.45	18.86	15.18		15.42		20.05		12.46	
TURBIDITY (NTU)	6	6.85	7.9	8.8		18.6		75		650	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.39	0.08 J		0.05		0.65				0.02	
NITRITE/NITRATE-N	0.24	0.27 J		0.03		0.09				0.03	
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.543 U				0.51 U	0.51 U				0.5 U	0.5 U
2,4,6-TRINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
2,4-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
3,5-DINITROANILINE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
3-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
4-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
DNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
HMX	1.2		1.9 J	0.6 U	0.51	0.6	0.26 U	0.25 U	0.345 U	0.3 J	0.36 J
MNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
NITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX	1.7		1.9 J	7.2	7.9	8.5	9.3	9.2	0.325 U	0.61 J	0.76 J
TETRYL	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
TNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	1960 J			4320 J	4630 J	4660 J			907 J	5280 J	7660 J
ANTIMONY	0.13 U			0.03 U	0.02 U	0.02 U			0.03 U	0.09 U	0.06 U
ARSENIC	0.61 U			1.6 J	1.6 J	1.7 J			0.2 U	0.79 U	1.4 U
BARIUM	47.3 J			10.4 J	11.3 J	10.3 J			24.5 J	40 J	51.7 J
BERYLLIUM	0.11 U			8.4 J	9.3 J	9.4 J			0.14 U	0.26 U	0.36 U
CADMIUM	0.15 U			0.64 U	0.46 U	0.55 U			0.05 UJ	0.07 U	0.04 U
CALCIUM	27600 J			69400 J	76700 J	78800 J			2580 U	2030 J	2110 J
CHROMIUM	3.7 J			0.71 U	0.71 U	0.85 U			0.99 J	5.7 J	8.9 J
COBALT	0.48 U			140 J	121 J	123 J			2.2 J	2.4 J	3.2 J
COPPER	1.3 U			5 J	5.1 J	5.1 J			1 J	2.9 J	4.2 J
IRON	1520 J			128 J	683 J	737 J			600 J	3520 J	6090 J
LEAD	1.1 U			8.4 J	9.2 J	9.5 J			0.34 U	1.7 U	2.7 J
LITHIUM				154 J					6.6 J		
MAGNESIUM	13000 J			54300 J	56300 J	58100 J			2230 J	2540 J	2750 J
MANGANESE	33.6 J			1800 J	1810 J	1840 J			57.6 U	38.3 J	57.3 J
MERCURY	0.007 U			0.16 J	0.19 J	0.23			0.02 U	0.007 U	0.007 U
NICKEL	2.9 J			299 J	315 J	314 J			4.2 J	6.1 J	7.6 J
POTASSIUM	4010 J			4380 J	4660 J	4790 J			240 J	718 J	1080 J
SELENIUM	0.16 U			0.13 U	0.12 U	0.18 U			0.08 U	0.08 U	0.07 U
SILVER	0.16 U			0.04 U	0.03 U	0.03 U			0.14 U	0.09 U	0.03 U
SODIUM	44500 J			82300 J	92000 J	95300 J			8360 J	8580 J	8530 J
STRONTIUM				163 J					14.5 J		
THALLIUM	0.08 U			0.21 U	0.19 U	0.23 U			0.04 U	0.12 U	0.11 U
TIN	0.32 U			0.13 U	0.1 U	0.1 U			0.04 U	0.25 U	0.24 U
TITANIUM	22.2 J			4.4 J	2 U	3.9 U			16.8 J	87.5 J	127 J
VANADIUM	2.7 J			0.14 U	0.2 U	0.28 U			1.4 J	8.3 J	12.5 J
ZINC	4.8 J			382 J	408 J	437 J			7.4 J	10.9 J	13.9 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		18.3 U									
ANTIMONY, FILTERED		0.34 U									

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
ARSENIC, FILTERED		0.36 U									
BARIUM, FILTERED		31.5 J									
BERYLLIUM, FILTERED		0.03 U									
CADMIUM, FILTERED		0.06 U									
CALCIUM, FILTERED		26900 J									
CHROMIUM, FILTERED		0.53 U									
COBALT, FILTERED		0.11 U									
COPPER, FILTERED		0.87 U									
IRON, FILTERED		27.1 U									
LEAD, FILTERED		0.04 U									
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		12600 J									
MANGANESE, FILTERED		20.9 J									
MERCURY, FILTERED		0.007 U									
NICKEL, FILTERED		1.6 U									
POTASSIUM, FILTERED		3760 J									
SELENIUM, FILTERED		0.15 U									
SILVER, FILTERED		0.03 U									
SODIUM, FILTERED		45800 J									
STRONTIUM, FILTERED											
THALLIUM, FILTERED		0.04 U									
TIN, FILTERED		0.24 U									
TITANIUM, FILTERED		0.47 U									
VANADIUM, FILTERED		0.41 U									
ZINC, FILTERED		2.1 J									
Field Parameters (mg/L)											
ALKALINITY										10 U	
CARBON DIOXIDE										45	
DISSOLVED OXYGEN			6.73				2.28			5	
DISSOLVED OXYGEN - METER	7.35			0.34	1.32				2.45	6.44	
HYDROGEN SULFIDE (H2S)										0	
IRON(+2)										0.21	
MANGANESE(+2)										0	
NITRITE-N										0.001	
OXIDATION REDUCTION POTENTIAL (MV)	180.4		441.2	278	383.6		159		206	266.7	
PH (S.U.)	6.45		6.08	3.98	3.9		4.12		5.06	5	
SPECIFIC CONDUCTANCE (MS/CM)	0.363		0.399	1.03	1.054		1.078		0.74	0.076	
SULFIDE										0	
TEMPERATURE (C)	12.5		18.85	15.6	18.45		19.8		14.65	15.18	
TURBIDITY (NTU)	22		26	6.8	3.01		1.5		10	36	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.14			0.03	0.005 U	0.005 U			0.01 U	0.005 UJ	0.005 UJ
NITRITE/NITRATE-N	0.7			0.07	0.025 U	0.025 U			0.02 U	0.025 U	0.05 J
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE				0.3 U	0.3 U						
1,1,1-TRICHLOROETHANE				0.3 U	0.3 U						
1,1,2,2-TETRACHLOROETHANE				0.3 U	0.3 U						
1,1,2-TRICHLOROETHANE				0.3 U	0.3 U						
1,1-DICHLOROETHANE				0.3 U	0.3 U						
1,1-DICHLOROETHENE				0.3 U	0.3 U						
1,2,3-TRICHLOROPROPANE				0.3 U	0.3 U						
1,2-DIBROMO-3-CHLOROPROPANE				0.3 U	0.3 U						
1,2-DIBROMOETHANE				0.3 U	0.3 U						
1,2-DICHLOROETHANE				0.3 U	0.3 U						
1,2-DICHLOROPROPANE				0.3 U	0.3 U						
1,4-DIOXANE				50 U	50 U						
2-BUTANONE				0.5 U	0.5 U						
2-HEXANONE				0.5 UJ	0.5 UJ						
3-CHLOROPROPENE				0.5 U	0.5 U						
4-METHYL-2-PENTANONE				0.5 U	0.5 U						
ACETONE				0.5 UJ	0.5 UJ						
ACETONITRILE				20 U	20 U						
ACROLEIN				0.5 UR	0.5 UR						
ACRYLONITRILE				0.5 U	0.5 U						
BENZENE				0.3 U	0.3 U						
BROMODICHLOROMETHANE				0.3 U	0.3 U						
BROMOFORM				0.3 U	0.3 U						
BROMOMETHANE				0.3 UJ	0.3 UJ						
CARBON DISULFIDE				0.3 U	0.3 U						
CARBON TETRACHLORIDE				0.3 U	0.3 U						
CHLOROBENZENE				0.3 U	0.3 U						
CHLORODIBROMOMETHANE				0.3 U	0.3 U						
CHLOROETHANE				0.5 U	0.5 U						
CHLOROFORM				0.3 U	0.3 U						
CHLOROMETHANE				0.3 U	0.3 U						
CHLOROPRENE				0.5 U	0.5 U						
CIS-1,2-DICHLOROETHENE				0.3 U	0.3 U						
CIS-1,3-DICHLOROPROPENE				0.3 U	0.3 U						
DIBROMOMETHANE				0.3 U	0.3 U						
DICHLORODIFLUOROMETHANE				0.3 U	0.3 U						
ETHYL METHACRYLATE				0.5 U	0.5 U						
ETHYLBENZENE				0.3 U	0.3 U						
ISOBUTANOL				20 U	20 U						
METHACRYLONITRILE				0.3 U	0.3 U						
METHYL IODIDE				0.5 U	0.5 U						
METHYL METHACRYLATE				0.5 U	0.5 U						
METHYLENE CHLORIDE				0.3 U	0.3 U						

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
PROPIONITRILE				20 U	20 U						
STYRENE				0.3 U	0.3 U						
TETRACHLOROETHENE				0.3 U	0.3 U						
TOLUENE				0.3 U	0.3 U						
TOTAL XYLENES				0.3 U	0.3 U						
TRANS-1,2-DICHLOROETHENE				0.3 U	0.3 U						
TRANS-1,3-DICHLOROPROPENE				0.3 U	0.3 U						
TRANS-1,4-DICHLORO-2-BUTENE				0.5 U	0.5 U						
TRICHLOROETHENE				0.3 U	0.3 U						
TRICHLOROFLUOROMETHANE				0.3 U	0.3 U						
VINYL ACETATE				0.5 U	0.5 U						
VINYL CHLORIDE				0.3 U	0.3 U						
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE				1 U	1 U	1 U	1 U				
1,2,4-TRICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,2-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,3-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,4-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,4-NAPHTHOQUINONE				1 UJ	1 UJ	1 U	1 U				
1,4-PHENYLENEDIAMINE				1 UJ	1 UJ	1 UJ	1 UJ				
1-NAPHTHYLAMINE				1 U	1 U	1 U	1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)				1 U	1 U	1 U	1 U				
2,3,4,6-TETRACHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4,5-TRICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4,6-TRICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4-DICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4-DIMETHYLPHENOL				1 UR	1 U	1 U	1 U				
2,4-DINITROPHENOL				1 UR	1 UR	1 UJ	1 UJ				
2,6-DICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2-ACETYLAMINOFLUORENE				1 U	1 U	1 U	1 U				
2-CHLORONAPHTHALENE				1 UJ	1 UJ	1 U	1 U				
2-CHLOROPHENOL				1 UR	1 U	1 U	1 U				
2-METHYLNAPHTHALENE				0.05 U	0.05 U						
2-METHYLPHENOL				1 UR	1 U	1 U	1 U				
2-NAPHTHYLAMINE				1 U	1 U	1 U	1 U				
2-NITROANILINE				1 U	1 U	1 U	1 U				
2-NITROPHENOL				1 UR	1 U	1 U	1 U				
2-PICOLINE				1 U	1 U	1 U	1 U				
3&4-METHYLPHENOL				1 UR	1 U	1 U	1 U				
3,3'-DICHLOROBENZIDINE				1 U	1 U	1 U	1 U				
3,3'-DIMETHYLBENZIDINE				1 U	1 U	1 U	1 U				
3-METHYLCHOLANTHRENE				1 U	1 U	1 U	1 U				
3-NITROANILINE				1 U	1 U	1 U	1 U				
4,6-DINITRO-2-METHYLPHENOL				1 UR	1 UJ	1 U	1 U				

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
4-AMINOBIPHENYL				1 U	1 U	1 U	1 U				
4-BROMOPHENYL PHENYL ETHER				1 U	1 U	1 U	1 U				
4-CHLORO-3-METHYLPHENOL				1 UR	1 U	1 U	1 U				
4-CHLOROANILINE				1 U	1 U	1 U	1 U				
4-CHLOROPHENYL PHENYL ETHER				1 U	1 U	1 U	1 U				
4-NITROANILINE				1 U	1 U	1 U	1 U				
4-NITROPHENOL				1 UR	1 UR	1 U	1 U				
4-NITROQUINOLINE-1-OXIDE				1 UR	1 UR	1 UR	1 UR				
5-NITRO-O-TOLUIDINE				1 U	1 U	1 U	1 U				
7,12-DIMETHYLBENZ(A)ANTHRACENE				1 U	1 U	1 U	1 U				
A,A-DIMETHYLPHENETHYLAMINE				1 U	1 U	1 U	1 U				
ACENAPHTHENE				0.05 U	0.05 U						
ACENAPHTHYLENE				0.05 U	0.05 U						
ACETOPHENONE				1 U	1 U	1 U	1 U				
ANILINE				1 U	1 U	1 UJ	1 UJ				
ANTHRACENE				0.05 U	0.05 U						
ARAMITE				1 UR	1 UR	1 UR	1 UR				
BENZO(A)ANTHRACENE				0.05 U	0.05 U						
BENZO(A)PYRENE				0.05 U	0.05 U						
BENZO(B)FLUORANTHENE				0.05 U	0.05 U						
BENZO(G,H,I)PERYLENE				0.05 U	0.05 U						
BENZO(K)FLUORANTHENE				0.05 U	0.05 U						
BENZYL ALCOHOL				1 U	1 U	1 U	1 U				
BIS(2-CHLOROETHOXY)METHANE				1 U	1 U	1 U	1 U				
BIS(2-CHLOROETHYL)ETHER				1 U	1 U	1 U	1 U				
BIS(2-ETHYLHEXYL)PHTHALATE				1 U	1 U	1 U	1 U				
BUTYL BENZYL PHTHALATE				1 U	1 U	1 U	1 U				
CHLOROBENZILATE				1 U	1 U	1 U	1 U				
CHRYSENE				0.05 U	0.05 U						
DI-N-BUTYL PHTHALATE				1 U	1 U	1 U	1 U				
DI-N-OCTYL PHTHALATE				1 U	1 U	1 U	1 U				
DIALLATE				1 U	1 U	1 U	1 U				
DIBENZO(A,H)ANTHRACENE				0.05 U	0.05 U						
DIBENZOFURAN				1 U	1 U	1 U	1 U				
DIETHYL PHTHALATE				1 U	1 U	1 U	1 U				
DIMETHYL PHTHALATE				1 U	1 U	1 U	1 U				
DIPHENYLAMINE				1 U	1 U	1 U	1 U				
ETHYL METHANE SULFONATE				1 U	1 U	1 U	1 U				
FLUORANTHENE				0.05 U	0.05 U						
FLUORENE				0.05 U	0.05 U						
HEXACHLOROBENZENE				1 U	1 U	1 U	1 U				
HEXACHLOROBUTADIENE				1 U	1 U	1 U	1 U				
HEXACHLOROCYCLOPENTADIENE				1 UR	1 UR	1 UR	1 UR				
HEXACHLOROETHANE				1 U	1 U	1 U	1 U				

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
HEXACHLOROPROPENE				1 U	1 U	1 U	1 U				
INDENO(1,2,3-CD)PYRENE				0.05 U	0.05 U						
ISODRIN				1 U	1 U	1 U	1 U				
ISOPHORONE				1 U	1 U	1 U	1 U				
ISOSAFROLE				1 U	1 U	1 U	1 U				
KEPONE				1 UJ	1 UJ	1 UR	1 UR				
METHAPYRILENE				1 U	1 U	1 U	1 U				
METHYL METHANE SULFONATE				1 U	1 U	1 U	1 U				
N-NITROSO-DI-N-BUTYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSO-DI-N-PROPYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSODIETHYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSODIMETHYLAMINE				1 U	1 U	1 UJ	1 UJ				
N-NITROSOMETHYLETHYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSOMORPHOLINE				1 U	1 U	1 U	1 U				
N-NITROSOPIPERIDINE				1 U	1 U	1 U	1 U				
N-NITROSOPYRROLIDINE				1 U	1 U	1 U	1 U				
NAPHTHALENE				0.05 U	0.05 U						
O,O,O-TRIETHYL PHOSPHOROTHIOATE				1 U	1 U	1 U	1 U				
O-TOLUIDINE				1 U	1 U	1 U	1 U				
P-(DIMETHYLAMINO)AZOBENZENE				1 U	1 U	1 U	1 U				
PENTACHLOROBENZENE				1 U	1 U	1 U	1 U				
PENTACHLOROETHANE				1 U	1 U	1 U	1 U				
PENTACHLORONITROBENZENE				1 U	1 U	1 U	1 U				
PHENACETIN				1 U	1 U	1 U	1 U				
PHENANTHRENE				0.05 U	0.05 U						
PHENOL				1 UR	1 U	1 U	1 U				
PRONAMIDE				1 U	1 U	1 U	1 U				
PYRENE				0.05 U	0.05 U						
PYRIDINE				1 U	1 U	1 U	1 U				
SAFROLE				1 U	1 U	1 U	1 U				
Energetics (ug/L)											
1,3,5-TRINITROBENZENE			0.25 U	0.215 U	0.385 U			1.3	1.4 J	1.1	0.265 U
1,3-DINITROBENZENE			0.25 U	1.4 J	1.5 J			2.4	2.2	2.1	0.265 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE								0.505 U	0.633 U		
2,4,6-TRINITROTOLUENE			0.25 U	19	20 J			25	20	24	0.265 U
2,4-DIAMINO-6-NITROTOLUENE								3.9	3.8 J		
2,4-DINITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	1.4 J	0.265 U
2,6-DIAMINO-4-NITROTOLUENE								0.253 U	0.316 U		
2,6-DINITROTOLUENE			0.25 U	0.215 U	0.385 U			9.9	8.2	8.8 J	0.265 U
2-AMINO-4,6-DINITROTOLUENE			0.25 U	8.6 J	8.6 J			13	18	15 J	0.265 U
2-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
3,5-DINITROANILINE								0.253 U	0.316 U		
3-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
4-AMINO-2,6-DINITROTOLUENE			0.25 U	18	18			18	15 J	19	0.265 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
4-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
DNX								4 J	2.6 J		
HMX			0.3 J	84	66			130	92	140	0.265 U
MNX								7.1 J	5.5 J		
NITROBENZENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
PICRAMIC ACID											
PICRIC ACID											
RDX			0.25 U	1100	1100			1700	1300	1500	0.25 U
TETRYL			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
TNX								1.5 J	0.58 J		
Herbicides (ug/L)											
HEXACHLOROPHENE				0.025 U	0.025 U						
PENTACHLOROPHENOL				0.013 U	0.013 U						
Total Metals (ug/L)											
ALUMINUM				297 J	278 J			62.3 U	56.4 U		1430 J
ANTIMONY				0.03 U	0.03 U			0.02 U	0.04 U		0.03 U
ARSENIC				0.09 U	0.07 U			0.07 U	0.1 U		1.1 J
BARIUM				155 J	159 J			137 J	138 J		18.3 J
BERYLLIUM				0.41 U	0.42 U			0.14 U	0.16 U		4.3 J
CADMIUM				0.05 UJ	0.05 U			0.04 U	0.04 U		0.94 U
CALCIUM				48600 J	50100 J			48500 J	47500 J		26700 J
CHROMIUM				0.02 U	0.02 U			0.28 U	0.21 U		1 J
COBALT				17.2 J	17.6 J			14.3 J	14.6 J		246 J
COPPER				1.2 J	1.4 J			0.65 U	0.56 U		4.3 J
IRON				25 U	24.7 U			38.2 U	28.6 U		3560 J
LEAD				0.44 U	0.46 U			0.29 U	0.22 U		7.7 J
LITHIUM				31.1 J	31.8 J						158 J
MAGNESIUM				38700 J	39900 J			36500 J	35200 J		22200 J
MANGANESE				608 J	624 J			510 J	515 J		1580 J
MERCURY				0.034 J	0.026 J			0.091 J	0.1 J		0.02 U
NICKEL				23.7 J	25.3 J			18.5 J	19.2 J		371 J
POTASSIUM				983 J	1010 J			848 J	905 J		2570 J
SELENIUM				0.05 U	0.07 U			0.1 U	0.06 U		0.07 U
SILVER				0.04 U	0.06 U			0.03 U	0.03 U		0.04 U
SODIUM				35000 J	36700 J			33900 J	34800 J		25500 J
STRONTIUM				229 J	236 J						86.9 J
THALLIUM				0.34 U	0.35 U			0.36 U	0.35 U		0.25 U
TIN				0.03 U	0.04 U			0.12 U	0.14 U		0.13 U
TITANIUM				2.5 J	2.4 J			0.65 U	1 U		5.9 J
VANADIUM				0.05 U	0.05 U			0.07 U	0.06 U		0.58 U
ZINC				22 J	22.9 J			14.5 J	15.4 J		208 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	92.7 U	91.2 U									
ANTIMONY, FILTERED	0.02 U	0.44 U									

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT0904	13GWT1001
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	7/31/2004	4/27/2003
ARSENIC, FILTERED	0.12 U	0.36 U										
BARIUM, FILTERED	21.1 J	19.6 J										
BERYLLIUM, FILTERED	0.12 U	0.37 U										
CADMIUM, FILTERED	0.04 U	0.22 U										
CALCIUM, FILTERED	2250 J	2000 J										
CHROMIUM, FILTERED	0.13 U	0.39 U										
COBALT, FILTERED	1.9 J	3.1 J										
COPPER, FILTERED	0.35 U	0.64 U										
IRON, FILTERED	122 U	167 U										
LEAD, FILTERED	0.07 U	0.37 U										
LITHIUM, FILTERED												
MAGNESIUM, FILTERED	2190 J	2090 J										
MANGANESE, FILTERED	45.4 J	47.9 J										
MERCURY, FILTERED	0.007 U	0.007 U										
NICKEL, FILTERED	3.6 J	3.6 J										
POTASSIUM, FILTERED	151 U	149 U										
SELENIUM, FILTERED	0.04 U	0.22 U										
SILVER, FILTERED	0.03 U	0.26 U										
SODIUM, FILTERED	8900 J	8970 J										
STRONTIUM, FILTERED												
THALLIUM, FILTERED	0.04 U	0.29 U										
TIN, FILTERED	0.1 U	0.49 U										
TITANIUM, FILTERED	1.1 U	1.9 U										
VANADIUM, FILTERED	0.14 U	0.34 U										
ZINC, FILTERED	3.3 J	3.5 J										
Field Parameters (mg/L)												
ALKALINITY								0				
CARBON DIOXIDE								48				
DISSOLVED OXYGEN			3.48					1.5		0.2		
DISSOLVED OXYGEN - METER				1.69		1.21		1.14			1.4	
HYDROGEN SULFIDE (H2S)								0				
IRON(+2)								0				
MANGANESE(+2)								0.4				
NITRITE-N								0.023				
OXIDATION REDUCTION POTENTIAL (MV)			121	205.6		148		251		88.1	364	
PH (S.U.)			6.11	5.36		5.38		5.32		6.27	3.01	
SPECIFIC CONDUCTANCE (MS/CM)			0.085	0.829		0.725		0.64		0.773	0.582	
SULFIDE								0.01				
TEMPERATURE (C)			20.69	13.33		14.36		12.82		18.15	15.6	
TURBIDITY (NTU)			16	3		0.1		4.07		3.8	10	
Miscellaneous Parameters (mg/L)												
AMMONIA-N				3.3	3.2			3.4	3.5		0.98	
NITRITE/NITRATE-N				92	94			54 J	74 J		0.02 U	
TOTAL ORGANIC CARBON												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2,3-TRICHLOROPROPANE												
1,2-DIBROMO-3-CHLOROPROPANE												
1,2-DIBROMOETHANE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
1,4-DIOXANE												
2-BUTANONE												
2-HEXANONE												
3-CHLOROPROPENE												
4-METHYL-2-PENTANONE												
ACETONE												
ACETONITRILE												
ACROLEIN												
ACRYLONITRILE												
BENZENE												
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CHLOROPRENE												
CIS-1,2-DICHLOROETHENE												
CIS-1,3-DICHLOROPROPENE												
DIBROMOMETHANE												
DICHLORODIFLUOROMETHANE												
ETHYL METHACRYLATE												
ETHYLBENZENE												
ISOBUTANOL												
METHACRYLONITRILE												
METHYL IODIDE												
METHYL METHACRYLATE												
METHYLENE CHLORIDE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
PROPIONITRILE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE												
TOTAL XYLENES												
TRANS-1,2-DICHLOROETHENE												
TRANS-1,3-DICHLOROPROPENE												
TRANS-1,4-DICHLORO-2-BUTENE												
TRICHLOROETHENE												
TRICHLOROFLUOROMETHANE												
VINYL ACETATE												
VINYL CHLORIDE												
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
1,3-DINITROBENZENE	0.266 U	0.27 U	0.83 J	0.258 U	0.46 J	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.532 U			0.515 U				0.521 U				0.515 U
2,4,6-TRINITROTOLUENE	0.266 U	0.27 U	31	9.5	11	1.8		1.6	2.2	0.37 U	0.18 U	0.258 U
2,4-DIAMINO-6-NITROTOLUENE	0.266 U			1.4 J				0.89 J				0.258 U
2,4-DINITROTOLUENE	0.266 U	0.27 U	0.43 U	1.2	1.6	0.6 U		0.48 J	0.61 J	0.37 U	0.18 U	0.258 U
2,6-DIAMINO-4-NITROTOLUENE	0.266 U			1.8 J				0.26 U				0.258 U
2,6-DINITROTOLUENE	0.266 U	0.27 U	0.43 U	1.2 J	2.1 J	0.6 U		0.26 U	1 J	0.37 U	0.18 U	0.258 U
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.27 U	6 J	4.4 J	6.6 J	3.7 J		3.1 J	4.4 J	0.37 U	0.18 U	0.258 U
2-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
3,5-DINITROANILINE	0.266 U			0.258 U				0.26 U				0.258 U
3-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.58 J	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
4-AMINO-2,6-DINITROTOLUENE	0.266 U	0.27 U	19	9.8	14	5.8 J		4.8	6.7	0.37 U	0.18 U	0.258 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA
PAGE 29 OF 90

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
4-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
DNX	0.266 U			0.258 U				0.5 J				0.258 U
HMX	0.45 J	0.27 U	34	44	45	50		41	54	9.5	8.4	12
MNX	0.266 U			1.2				0.68				0.258 U
NITROBENZENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
PICRAMIC ACID												
PICRIC ACID												
RDX	0.266 U	0.27 U	560	520	490	150		140	160	12	10	20
TETRYL	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
TNX	0.266 U			0.258 U				0.26 U				0.258 U
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM	768 J		719 J	696 J		2170 J		67 U		1080 J	1060 J	1000 J
ANTIMONY	0.02 U		0.03 U	0.02 U		0.03 U		0.02 U		0.03 U	0.04 U	0.02 U
ARSENIC	1 U		0.22 U	0.23 U		1.3 J		0.13 U		0.39 U	0.41 U	0.16 U
BARIUM	18.8 J		27.4 J	27.6 J		36.5 J		21.1 J		43.8 J	43.3 J	52.9 J
BERYLLIUM	3.1 J		1.6 U	1.4 U		0.27 U		0.24 U		2.1 J	2.1 J	2.1 U
CADMIUM	1.2 U		0.12 U	0.13 U		0.1 U		0.04 U		0.09 U	0.12 U	0.04 U
CALCIUM	30600 J		5760 J	6320 J		2800 J		1720 J		3740 J	3700 J	3030 J
CHROMIUM	0.61 U		0.35 U	0.25 U		4.1 J		0.17 U		0.29 U	0.33 U	0.29 U
COBALT	210 J		26.3 J	24 J		8.1 J		6.5 J		30.1 J	30.2 J	25.3 J
COPPER	1.3 U		3 J	1.6 U		2.2 J		0.7 U		5 J	4.9 J	3.6 J
IRON	22900 J		4250 J	4340 J		2020 J		129 U		860 J	846 J	162 J
LEAD	3.5 J		1.5 U	1.4 U		1.9 U		0.08 U		1 U	0.99 U	0.63 U
LITHIUM			66.8 J			15.3 J				29.3 J	28.7 J	
MAGNESIUM	25500 J		4770 J	4660 J		2560 J		2370 J		3660 J	3680 J	3420 J
MANGANESE	1720 J		250 J	251 U		216 J		312 U		600 J	584 J	451 J
MERCURY	0.007 U		0.032 J	0.007 U		0.02 U		0.035 J		0.2 U	0.2 U	0.007 U
NICKEL	357 J		66.5 J	61 J		16.4 J		15.3 J		25.3 J	24.8 J	20.4 J
POTASSIUM	3220 J		668 J	687 J		724 J		358 J		649 J	641 J	459 J
SELENIUM	0.04 U		0.05 U	0.04 U		0.25 U		0.14 U		0.1 U	0.12 U	0.06 U
SILVER	0.03 U		0.04 U	0.03 U		0.11 U		0.03 U		0.04 U	0.13 U	0.05 U
SODIUM	31500 J		24000 J	26000 J		21900 J		20600 J		6030 J	6330 J	6800 J
STRONTIUM			31 J			14.6 J				18.5 J	18.3 J	
THALLIUM	0.23 U		0.1 U	0.14 U		0.04 U		0.04 U		0.05 U	0.1 U	0.1 U
TIN	0.1 U		0.03 U	0.1 U		0.11 U		0.1 U		0.09 U	0.07 U	0.1 U
TITANIUM	1.8 U		6.7 J	1 U		34.6 J		1 U		3.7 J	3.7 J	0.73 U
VANADIUM	0.17 U		0.29 U	0.06 U		4.2 J		0.07 U		0.07 U	0.1 U	0.06 U
ZINC	245 J		82.7 J	85.3 J		14.6 J		10.8 J		35.1 J	34.4 J	25.3
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED							257 J					
ANTIMONY, FILTERED							0.03 U					

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
ARSENIC, FILTERED							0.37 U					
BARIUM, FILTERED							26.2 J					
BERYLLIUM, FILTERED							0.17 U					
CADMIUM, FILTERED							0.13 U					
CALCIUM, FILTERED							2980 J					
CHROMIUM, FILTERED							0.63 U					
COBALT, FILTERED							9 J					
COPPER, FILTERED							3.4 J					
IRON, FILTERED							203 J					
LEAD, FILTERED							0.31 U					
LITHIUM, FILTERED							14.6 J					
MAGNESIUM, FILTERED							2500 J					
MANGANESE, FILTERED							224 J					
MERCURY, FILTERED							0.02 U					
NICKEL, FILTERED							18.3 J					
POTASSIUM, FILTERED							366 J					
SELENIUM, FILTERED							0.26 U					
SILVER, FILTERED							0.16 U					
SODIUM, FILTERED							21800 J					
STRONTIUM, FILTERED							13.6 J					
THALLIUM, FILTERED							0.04 U					
TIN, FILTERED							0.06 U					
TITANIUM, FILTERED							8.1 J					
VANADIUM, FILTERED							0.46 U					
ZINC, FILTERED							13.5 J					
Field Parameters (mg/L)												
ALKALINITY	10 U			10 U				10 U				10 U
CARBON DIOXIDE	154			165				135				120
DISSOLVED OXYGEN	3.5	7.8		1.5	4.95			2	3.86			11
DISSOLVED OXYGEN - METER	4.83		0.85	3.49		2.35		2.02		3.37		3.26
HYDROGEN SULFIDE (H2S)	0			0				0				0
IRON(+2)	3.3 >			3.3 >				0.1				0.03
MANGANESE(+2)	1.8			0.3				0.4				0.5
NITRITE-N	0.003			0.009				0				0
OXIDATION REDUCTION POTENTIAL (MV)	230.3	402.8	265	355	127	242		305.9	444.5	268.2		385.1
PH (S.U.)	4.74	4.23	3.64	3.93	3.85	4.83		4.87	4.66	4.2		3.56
SPECIFIC CONDUCTANCE (MS/CM)	0.52	0.629	0.251	0.238	0.262	0.135		0.131	0.132	0.106		0.113
SULFIDE	0.05			0.01				0.01				0
TEMPERATURE (C)	19.73	21.36	15.73	16.35	21.2	14.46		16.37	16.7	13.82		12.33
TURBIDITY (NTU)	5.79	9	10	4.52	2.5	60		29.1	9.8	5.8		0.38
Miscellaneous Parameters (mg/L)												
AMMONIA-N	0.84 J		0.1	0.1 J		0.06		0.005 UJ		0.03	0.03	0.01
NITRITE/NITRATE-N	0.025 U		0.02 U	0.19 J		1.3		0.3 J		1.1	1.1	1 J
TOTAL ORGANIC CARBON	1											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2,3-TRICHLOROPROPANE												
1,2-DIBROMO-3-CHLOROPROPANE												
1,2-DIBROMOETHANE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
1,4-DIOXANE												
2-BUTANONE												
2-HEXANONE												
3-CHLOROPROPENE												
4-METHYL-2-PENTANONE												
ACETONE												
ACETONITRILE												
ACROLEIN												
ACRYLONITRILE												
BENZENE												
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CHLOROPRENE												
CIS-1,2-DICHLOROETHENE												
CIS-1,3-DICHLOROPROPENE												
DIBROMOMETHANE												
DICHLORODIFLUOROMETHANE												
ETHYL METHACRYLATE												
ETHYLBENZENE												
ISOBUTANOL												
METHACRYLONITRILE												
METHYL IODIDE												
METHYL METHACRYLATE												
METHYLENE CHLORIDE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
PROPIONITRILE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE												
TOTAL XYLENES												
TRANS-1,2-DICHLOROETHENE												
TRANS-1,3-DICHLOROPROPENE												
TRANS-1,4-DICHLORO-2-BUTENE												
TRICHLOROETHENE												
TRICHLOROFLUOROMETHANE												
VINYL ACETATE												
VINYL CHLORIDE												
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
1,3-DINITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U			0.515 U					0.575 U	
2,4,6-TRINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE			0.25 U			0.258 U					0.287 U	
2,4-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U			0.258 U					0.287 U	
2,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
3,5-DINITROANILINE			0.25 U			0.258 U					0.287 U	
3-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
4-AMINO-2,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.12 J	0.144 U	0.27 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
4-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
DNX			0.25 U			0.258 U					5.8 J	
HMX	12	0.345 U	0.89 J	0.34 J	0.485 U	0.258 U			0.25 U	22 J	120	32
MNX			0.25 U			0.258 U					3.6 J	
NITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
PICRAMIC ACID												
PICRIC ACID												
RDX	17	1.6	4.7	2	0.46 U	0.258 U			0.25 U	10	16	18
TETRYL	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
TNX			0.25 U			0.258 U					0.31 J	
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM		57.1 U	47.5 U		1440 J	4310 J				123 J	116 U	
ANTIMONY		0.03 U	0.02 U		0.03 U	0.09 U				0.33 U	0.02 U	
ARSENIC		5.8 J	3.1 J		7 J	9.2 J				0.66 U	0.35 U	
BARIUM		31.1 J	19.1 J		43.3 J	39 J				72.9 J	69.3 J	
BERYLLIUM		0.06 U	0.05 U		4.2 J	5.2 J				0.13 U	0.03 U	
CADMIUM		0.35 U	0.04 U		1 U	0.63 U				0.14 U	0.04 U	
CALCIUM		29700 J	34100 J		14600 J	10700 J				27200 J	46000 J	
CHROMIUM		0.18 U	0.53 U		0.82 U	4.5 J				0.29 U	0.33 U	
COBALT		14.2 J	9.5 J		106 J	82.7 J				5.4 J	0.95 U	
COPPER		0.28 U	0.3 U		3 J	0.87 U				0.59 U	1.2 U	
IRON		10500 J	9740 J		9260 J	17500 J				2570 J	159 U	
LEAD		0.2 U	0.04 U		23.8 J	35.9 J				0.14 U	0.09 U	
LITHIUM		33.9 J			133 J					2.3 J		
MAGNESIUM		26100 J	29500 J		14300 J	13200 J				11600 J	14400 J	
MANGANESE		1910 J	1880 J		1300 J	821 J				712 J	330 U	
MERCURY		0.02 U	0.007 U		0.2 U	0.007 U				0.2 U	0.007 U	
NICKEL		24.7 J	20 J		222 J	182 J				7.1 J	5.3 J	
POTASSIUM		2080 J	2010 J		2230 J	2550 J				576 J	500 J	
SELENIUM		0.41 U	0.04 U		1.1 U	0.1 U				0.26 U	0.1 U	
SILVER		0.04 U	0.03 U		0.04 U	0.07 U				0.74 U	0.03 U	
SODIUM		48300 J	57400 J		16000 J	16300 J				15000 J	25400 J	
STRONTIUM		71.7 J			65.5 J					129 J		
THALLIUM		0.04 U	0.04 U		0.4 U	0.65 U				0.14 U	0.04 U	
TIN		0.3 U	0.1 U		0.09 U	0.17 U				0.12 U	0.1 U	
TITANIUM		1.9 U	0.7 U		4.6 J	26 J				3.2 J	3.3 J	
VANADIUM		0.08 U	0.08 U		0.32 U	4.3 J				0.27 U	0.22 U	
ZINC		17.8 J	16.9 J		266 J	240				3.9 J	2.8 U	
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED								1990 J				
ANTIMONY, FILTERED								0.27 U				

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
ARSENIC, FILTERED								8.6 J				
BARIUM, FILTERED								30.5 J				
BERYLLIUM, FILTERED								5.2 J				
CADMIUM, FILTERED								0.78 U				
CALCIUM, FILTERED								10700 J				
CHROMIUM, FILTERED								0.98 U				
COBALT, FILTERED								82.8 J				
COPPER, FILTERED								1.4 U				
IRON, FILTERED								16000 J				
LEAD, FILTERED								35.7 J				
LITHIUM, FILTERED												
MAGNESIUM, FILTERED								13000 J				
MANGANESE, FILTERED								812 J				
MERCURY, FILTERED								0.007 U				
NICKEL, FILTERED								180 J				
POTASSIUM, FILTERED								2040 J				
SELENIUM, FILTERED								0.19 U				
SILVER, FILTERED								0.25 U				
SODIUM, FILTERED								16400 J				
STRONTIUM, FILTERED												
THALLIUM, FILTERED								0.84 U				
TIN, FILTERED								0.26 U				
TITANIUM, FILTERED								0.42 U				
VANADIUM, FILTERED								0.63 U				
ZINC, FILTERED								222 J				
Field Parameters (mg/L)												
ALKALINITY						10 U						
CARBON DIOXIDE						137						
DISSOLVED OXYGEN	0.73			6.74		0.07			0.53			3.85
DISSOLVED OXYGEN - METER		1.2	0.52		0.53	7.79				0.81	3.87	
HYDROGEN SULFIDE (H2S)						0						
IRON(+2)						3.3 >						
MANGANESE(+2)						0.9						
NITRITE-N						0.001						
OXIDATION REDUCTION POTENTIAL (MV)	132	23.2	100.5	71	286.8	322			6.85	-30.4	237.8	386.4
PH (S.U.)	4.31	5.5	5.48	6.86	3.74	3.98			3.26	6.16	6.13	6.05
SPECIFIC CONDUCTANCE (MS/CM)	0.131	0.885	0.623	0.714	0.391	0.34			0.352	0.356	0.402	0.29
SULFIDE						0.14						
TEMPERATURE (C)	20.61	14.34	10.77	17.41	15.89	12.28			15.66	14.27	18.83	18.21
TURBIDITY (NTU)	0.7	1.6	0	3	7.3	45.4			10	2.7	8.49	1.2
Miscellaneous Parameters (mg/L)												
AMMONIA-N		0.08	0.06 J		1	1.3				0.4	0.03 J	
NITRITE/NITRATE-N		0.13	0.05 J		0.02 U	0.05 U				0.02 U	0.84 J	
TOTAL ORGANIC CARBON						1.1	1.2					

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
1,3-DINITROBENZENE	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.5 U	0.5 U				0.602 U				0.52 U
2,4,6-TRINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U	0.25 U				0.301 U				0.26 U
2,4-DINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U	0.25 U				0.301 U				0.26 U
2,6-DINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.43 U	0.28 J	0.37 J	0.37 J	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
3,5-DINITROANILINE		0.25 U	0.25 U				0.301 U				0.26 U
3-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
4-AMINO-2,6-DINITROTOLUENE	0.6 J	0.71	0.79	0.84	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
4-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
DNX		2.2 J	2.2 J				0.301 U				0.26 U
HMX	92 J	140	130	120	8.6		14		22	6.4	6.2
MNX		11	11				2.9				0.26 U
NITROBENZENE	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
PICRAMIC ACID											
PICRIC ACID											
RDX	430	580	540	490	150		240		390	5.9	5.4
TETRYL	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
TNX		1.2	1.2				0.301 U				0.26 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	418 J	419 J	339 J		19000 J		2080 J			195 J	193 J
ANTIMONY	0.03 U	0.56 U	0.09 U		0.12 U		0.02 U			0.31 U	0.02 U
ARSENIC	0.5 U	0.74 U	0.47 U		4.2 J		0.52 U			0.43 U	0.81 U
BARIUM	19.3 J	19.6 J	18.6 J		118 J		20.7 J			401 J	314 J
BERYLLIUM	0.04 U	0.5 U	0.05 U		3 J		1.5 U			0.77 U	0.56 U
CADMIUM	0.05 U	0.43 U	0.04 U		0.33 U		0.04 U			0.72 U	0.43 U
CALCIUM	12100 J	11400 J	11200 J		19300 J		16000 J			32500 J	25700 J
CHROMIUM	0.63 U	0.82 U	0.53 U		25.6 J		2.6 J			0.59 U	1 U
COBALT	1.5 J	1.5 U	1.3 U		52.8 J		27.1 J			44.1 J	14.8 J
COPPER	0.26 U	0.73 U	0.57 U		14 J		1.4 U			1.1 U	1.3 U
IRON	357 J	440 U	361 U		15800 J		2440 J			117 U	325 U
LEAD	0.35 U	0.82 U	0.32 U		9.5 J		2 U			0.89 U	0.46 U
LITHIUM	5.7 J				181 J					40.8 J	
MAGNESIUM	9470 J	8900 J	8930 J		25600 J		16500 J			37800 J	27300 J
MANGANESE	56.3 U	48.3 U	43.1 U		2170 J		1360 J			1450 J	730 J
MERCURY	0.2 U	0.02 U	0.02 U		0.2 U		0.007 U			0.2 U	0.02 U
NICKEL	2.9 J	3.3 J	2.9 J		140 J		76.8 J			79.4 J	61.5 J
POTASSIUM	481 J	605 J	560 J		6390 J		2970 J			1290 J	1010 J
SELENIUM	0.1 U	0.51 U	0.16 U		0.42 U		0.24 U			0.29 U	0.04 U
SILVER	0.04 U	0.49 U	0.03 U		0.61 U		0.08 U			0.39 U	0.03 U
SODIUM	8450 J	8550 J	8550 J		35200 J		37500 J			160000 J	123000 J
STRONTIUM	27.4 J				39.8 J					173 J	
THALLIUM	0.04 U	0.5 U	0.05 U		0.27 U		0.07 U			0.36 U	0.05 U
TIN	0.04 U	0.46 U	0.1 U		0.46 U		0.2 U			0.42 U	0.43 U
TITANIUM	7.2 J	10.9 J	8.7 J		166 J		35.4 J			5.1 J	3.7 J
VANADIUM	0.72 U	0.9 U	0.6 U		26.6 J		2.4 J			0.31 U	0.2 U
ZINC	3 J	2.7 J	2.3 U		175 J		75.7 J			57 J	48.3 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED						382 J		434 J			
ANTIMONY, FILTERED						0.08 U		0.26 U			

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
ARSENIC, FILTERED						1.4 J		0.33 U			
BARIUM, FILTERED						20.9 J		14.3 J			
BERYLLIUM, FILTERED						2 J		1.5 U			
CADMIUM, FILTERED						0.2 U		0.17 U			
CALCIUM, FILTERED						20300 J		17900 J			
CHROMIUM, FILTERED						0.2 U		0.51 U			
COBALT, FILTERED						49.5 J		31.7 J			
COPPER, FILTERED						6.4 J		3.1 J			
IRON, FILTERED						1980 J		1940 J			
LEAD, FILTERED						0.91 U		1 U			
LITHIUM, FILTERED						154 J					
MAGNESIUM, FILTERED						22700 J		19600 J			
MANGANESE, FILTERED						2090 J		1660 J			
MERCURY, FILTERED						0.2 U		0.007 U			
NICKEL, FILTERED						123 J		86.2 J			
POTASSIUM, FILTERED						2590 J		2860 J			
SELENIUM, FILTERED						0.29 U		0.18 U			
SILVER, FILTERED						0.04 U		0.15 U			
SODIUM, FILTERED						34400 J		38800 J			
STRONTIUM, FILTERED						32.8 J					
THALLIUM, FILTERED						0.08 U		0.18 U			
TIN, FILTERED						0.03 U		0.16 U			
TITANIUM, FILTERED						2.8 U		1.1 U			
VANADIUM, FILTERED						0.05 U		0.22 U			
ZINC, FILTERED						138 J		84.2 J			
Field Parameters (mg/L)											
ALKALINITY		10 U	10 U				10 U				
CARBON DIOXIDE		170	180				45				
DISSOLVED OXYGEN		0.9	0.9	2.01			5.5		5.67		
DISSOLVED OXYGEN - METER	0.53	0.84			2.17		4.61			3.51	34.37
HYDROGEN SULFIDE (H2S)		0	0				0				
IRON(+2)		0.06	0.07				0.33				
MANGANESE(+2)		0	0				1.4				
NITRITE-N		0.006	0.006				0				
OXIDATION REDUCTION POTENTIAL (MV)	112	338		129.4	324.1		422.2		361.6	224.1	209.6
PH (S.U.)	5.35	5.38		5.28	3.88		4.26		4.44	5.12	4.87
SPECIFIC CONDUCTANCE (MS/CM)	0.17	0.153		0.159	0.514		0.351		0.293	1.241	1.21
SULFIDE		0.02	0				0.07				
TEMPERATURE (C)	15.7	15.97		18.57	16.75		9.78		16.27	13.81	14.98
TURBIDITY (NTU)	10	3.74		4.1	450		40.2		6.6	5	5.5
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01	0.005 U	0.005 U		0.02		0.02 J			0.01 U	0.01 U
NITRITE/NITRATE-N	0.86	0.65	0.66		0.09		0.12 J			0.02 U	0.16
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE		0.3 U										
1,1,1-TRICHLOROETHANE		0.3 U										
1,1,2,2-TETRACHLOROETHANE		0.3 U										
1,1,2-TRICHLOROETHANE		0.3 U										
1,1-DICHLOROETHANE		0.3 U										
1,1-DICHLOROETHENE		0.3 U										
1,2,3-TRICHLOROPROPANE		0.3 U										
1,2-DIBROMO-3-CHLOROPROPANE		0.3 U										
1,2-DIBROMOETHANE		0.3 U										
1,2-DICHLOROETHANE		0.3 U										
1,2-DICHLOROPROPANE		0.3 U										
1,4-DIOXANE		50 UJ										
2-BUTANONE		0.5 UJ										
2-HEXANONE		0.5 UJ										
3-CHLOROPROPENE		0.5 U										
4-METHYL-2-PENTANONE		0.5 U										
ACETONE		0.5 UJ										
ACETONITRILE		20 U										
ACROLEIN		0.5 UR										
ACRYLONITRILE		0.5 U										
BENZENE		0.3 U										
BROMODICHLOROMETHANE		0.3 U										
BROMOFORM		0.3 U										
BROMOMETHANE		0.3 U										
CARBON DISULFIDE		0.3 U										
CARBON TETRACHLORIDE		0.3 UJ										
CHLOROBENZENE		0.3 U										
CHLORODIBROMOMETHANE		0.3 U										
CHLOROETHANE		0.5 U										
CHLOROFORM		0.3 U										
CHLOROMETHANE		0.3 U										
CHLOROPRENE		0.5 U										
CIS-1,2-DICHLOROETHENE		0.3 U										
CIS-1,3-DICHLOROPROPENE		0.3 U										
DIBROMOMETHANE		0.3 U										
DICHLORODIFLUOROMETHANE		0.3 U										
ETHYL METHACRYLATE		0.5 U										
ETHYLBENZENE		0.3 U										
ISOBUTANOL		20 U										
METHACRYLONITRILE		0.3 U										
METHYL IODIDE		0.5 U										
METHYL METHACRYLATE		0.5 U										
METHYLENE CHLORIDE		0.3 U										

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
PROPIONITRILE		20 U										
STYRENE		0.3 U										
TETRACHLOROETHENE		0.3 U										
TOLUENE		0.3 U										
TOTAL XYLENES		0.3 U										
TRANS-1,2-DICHLOROETHENE		0.3 U										
TRANS-1,3-DICHLOROPROPENE		0.3 U										
TRANS-1,4-DICHLORO-2-BUTENE		0.5 U										
TRICHLOROETHENE		1 J										
TRICHLOROFLUOROMETHANE		0.3 U										
VINYL ACETATE		0.5 U										
VINYL CHLORIDE		0.3 U										
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE		1 U		1 U								
1,2,4-TRICHLOROBENZENE		1 U		1 U								
1,2-DICHLOROBENZENE		1 U		1 U								
1,3-DICHLOROBENZENE		1 U		1 U								
1,4-DICHLOROBENZENE		1 U		1 U								
1,4-NAPHTHOQUINONE		1 UJ		1 U								
1,4-PHENYLENEDIAMINE		1 UJ		1 UJ								
1-NAPHTHYLAMINE		1 U		1 U								
2,2'-OXYBIS(1-CHLOROPROPANE)		1 U		1 U								
2,3,4,6-TETRACHLOROPHENOL		1 UR		1 U								
2,4,5-TRICHLOROPHENOL		1 UR		1 U								
2,4,6-TRICHLOROPHENOL		1 UR		1 U								
2,4-DICHLOROPHENOL		1 UR		1 U								
2,4-DIMETHYLPHENOL		1 UR		1 U								
2,4-DINITROPHENOL		1 UR		1 UJ								
2,6-DICHLOROPHENOL		1 UR		1 U								
2-ACETYLAMINOFLUORENE		1 U		1 U								
2-CHLORONAPHTHALENE		1 UJ		1 U								
2-CHLOROPHENOL		1 UR		1 U								
2-METHYLNAPHTHALENE		0.05 U										
2-METHYLPHENOL		1 UR		1 U								
2-NAPHTHYLAMINE		1 U		1 U								
2-NITROANILINE		1 U		1 U								
2-NITROPHENOL		1 UR		1 U								
2-PICOLINE		1 U		1 U								
3&4-METHYLPHENOL		1 UR		1 U								
3,3'-DICHLOROBENZIDINE		1 U		1 U								
3,3'-DIMETHYLBENZIDINE		1 U		1 U								
3-METHYLCHOLANTHRENE		1 U		1 U								
3-NITROANILINE		1 U		1 U								
4,6-DINITRO-2-METHYLPHENOL		1 UR		1 U								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
4-AMINOBIPHENYL		1 U		1 U								
4-BROMOPHENYL PHENYL ETHER		1 U		1 U								
4-CHLORO-3-METHYLPHENOL		1 UR		1 U								
4-CHLOROANILINE		1 U		1 U								
4-CHLOROPHENYL PHENYL ETHER		1 U		1 U								
4-NITROANILINE		1 U		1 U								
4-NITROPHENOL		1 UR		1 U								
4-NITROQUINOLINE-1-OXIDE		1 UR		1 UR								
5-NITRO-O-TOLUIDINE		1 U		1 U								
7,12-DIMETHYLBENZ(A)ANTHRACENE		1 U		1 U								
A,A-DIMETHYLPHENETHYLAMINE		1 U		1 U								
ACENAPHTHENE		0.05 U										
ACENAPHTHYLENE		0.05 U										
ACETOPHENONE		1 U		1 U								
ANILINE		1 U		1 UJ								
ANTHRACENE		0.05 U										
ARAMITE		1 UR		1 UR								
BENZO(A)ANTHRACENE		0.05 U										
BENZO(A)PYRENE		0.05 U										
BENZO(B)FLUORANTHENE		0.05 U										
BENZO(G,H,I)PERYLENE		0.05 U										
BENZO(K)FLUORANTHENE		0.05 U										
BENZYL ALCOHOL		1 U		1 U								
BIS(2-CHLOROETHOXY)METHANE		1 U		1 U								
BIS(2-CHLOROETHYL)ETHER		1 U		1 U								
BIS(2-ETHYLHEXYL)PHTHALATE		1 U		1 U								
BUTYL BENZYL PHTHALATE		1 U		1 U								
CHLOROBENZILATE		1 U		1 U								
CHRYSENE		0.05 U										
DI-N-BUTYL PHTHALATE		1 U		1 U								
DI-N-OCTYL PHTHALATE		1 U		1 U								
DIALLATE		1 U		1 U								
DIBENZO(A,H)ANTHRACENE		0.05 U										
DIBENZOFURAN		1 U		1 U								
DIETHYL PHTHALATE		1 U		1 U								
DIMETHYL PHTHALATE		1 U		1 U								
DIPHENYLAMINE		1 U		1 U								
ETHYL METHANE SULFONATE		1 U		1 U								
FLUORANTHENE		0.05 U										
FLUORENE		0.05 U										
HEXACHLOROBENZENE		1 U		1 U								
HEXACHLOROBUTADIENE		1 U		1 U								
HEXACHLOROCYCLOPENTADIENE		1 UR		1 UR								
HEXACHLOROETHANE		1 U		1 U								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
HEXACHLOROPROPENE		1 U		1 U								
INDENO(1,2,3-CD)PYRENE		0.05 U										
ISODRIN		1 U		1 U								
ISOPHORONE		1 U		1 U								
ISOSAFROLE		1 U		1 U								
KEPONE		1 UJ		1 UR								
METHAPYRILENE		1 U		1 U								
METHYL METHANE SULFONATE		1 U		1 U								
N-NITROSO-DI-N-BUTYLAMINE		1 U		1 U								
N-NITROSO-DI-N-PROPYLAMINE		1 U		1 U								
N-NITROSODIETHYLAMINE		1 U		1 U								
N-NITROSODIMETHYLAMINE		1 U		1 UJ								
N-NITROSOMETHYLETHYLAMINE		1 U		1 U								
N-NITROSOMORPHOLINE		1 U		1 U								
N-NITROSOPIPERIDINE		1 U		1 U								
N-NITROSOPYRROLIDINE		1 U		1 U								
NAPHTHALENE		0.05 U										
O,O,O-TRIETHYL PHOSPHOROTHIOATE		1 U		1 U								
O-TOLUIDINE		1 U		1 U								
P-(DIMETHYLAMINO)AZOBENZENE		1 U		1 U								
PENTACHLOROBENZENE		1 U		1 U								
PENTACHLOROETHANE		1 U		1 U								
PENTACHLORONITROBENZENE		1 U		1 U								
PHENACETIN		1 U		1 U								
PHENANTHRENE		0.05 U										
PHENOL		1 UR		1 U								
PRONAMIDE		1 U		1 U								
PYRENE		0.05 U										
PYRIDINE		1 U		1 U								
SAFROLE		1 U		1 U								
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.3 J	0.4 J	0.395 U	0.266 U
1,3-DINITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.8 J	0.8	0.395 U	0.266 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE					0.532 U				0.481 U			0.532 U
2,4,6-TRINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	26 J	33 J	69 J	26	0.395 U	0.266 U
2,4-DIAMINO-6-NITROTOLUENE					0.266 U				0.77 J			0.266 U
2,4-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.4 J	0.65 J	0.395 U	0.266 U
2,6-DIAMINO-4-NITROTOLUENE					0.266 U				0.24 U			0.266 U
2,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	5.8 J	2.8	0.395 U	0.266 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	3.8 J	0.395 U	0.266 U
2-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	0.24 U	0.395 U	0.266 U
3,5-DINITROANILINE					0.266 U				0.24 U			0.266 U
3-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	0.24 U	0.395 U	0.266 U
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	2.9 J	0.395 U	0.266 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
4-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.5 J	0.345 U	0.24 UJ	0.24 U	0.395 U	0.266 U
DNX					0.266 U				50 J			0.266 U
HMX	7.3	0.37 U			0.266 U	0.26 U	390	350	640	460	19	23
MNX					0.266 U				9.3 J			0.266 U
NITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	0.24 U	0.395 U	0.266 U
PICRAMIC ACID		0.39 U										
PICRIC ACID		0.39 U										
RDX	5.9	0.35 U			0.266 U	0.26 U	2700	3100	7700	4000	20	26
TETRYL	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	0.24 U	0.395 U	0.266 U
TNX					0.266 U				1.4 J			0.266 U
Herbicides (ug/L)												
HEXACHLOROPHENE		0.025 U										
PENTACHLOROPHENOL		0.013 U										
Total Metals (ug/L)												
ALUMINUM		12900 J			7940 J	8860 J	354	349	332 U		709 J	1360 J
ANTIMONY		0.12 U			0.02 U	0.04 U	0.04 U	0.03 U	0.1 U		0.03 U	0.03 U
ARSENIC		1.8 J			1.1 U	0.69 U	0.18 U	0.16 U	0.32 U		0.3 U	0.4 U
BARIUM		16.7 J			13.3 J	12.6 J	41.7 J	40.5 J	42 J		25 J	31.6 J
BERYLLIUM		5.8 J			5.2 J	5.2 J	0.97 U	1 U	1.7 U		3.7 J	3.6 J
CADMIUM		1 U			0.76 U	0.63 U	0.14 U	0.11 U	0.08 U		0.4 U	0.49 U
CALCIUM		72200 J			65100 J	49200 J	12000 J	11600 J	10600 J		13100 J	12200 J
CHROMIUM		3.3 J			1.1 U	1.6 U	0.9 J	0.43 U	0.46 U		0.44 U	1.7 J
COBALT		234 J			169 J	200 J	16.4 J	16.7 J	15.9 J		80.5 J	69 J
COPPER		10.5 J			3.1 J	4.5 U	0.83 J	0.92 J	1.1 U		4.8 J	6.4 J
IRON		143000 J			120000 J	124000 J	127 J	109 U	193 U		434 J	846 J
LEAD		12.5 J			8.5 J	7.7 J	1.1 J	1.1 J	0.93 U		2.4 J	3 J
LITHIUM		340 J					45.8 J	49.2 J			208 J	
MAGNESIUM		70300 J			61400 J	52200 J	8150 J	8100 J	7300 J		11300 J	10000 J
MANGANESE		11600 J			9770 J	8390 J	612 J	628 J	590 J		381 J	327 J
MERCURY		0.02 U			0.007 U	0.03 U	0.02 U	0.02 U	0.02 U		0.2 U	0.14 J
NICKEL		477 J			397 J	427 J	35.7 J	35.4 J	32.8 J		153 J	138 J
POTASSIUM		6660 J			5750 J	4950 J	845 J	848 J	1130 J		705 J	964 J
SELENIUM		0.13 U			0.06 U	0.07 U	0.05 U	0.08 U	0.13 U		0.05 U	0.1 U
SILVER		0.04 U			0.03 U	0.04 U	0.04 U	0.04 U	0.15 U		0.04 U	0.05 U
SODIUM		53500 J			56600 J	51200 J	16000 J	16000 J	16800 J		15400 J	15500 J
STRONTIUM		72 J					45.6 J	44.1 J			64.9 J	
THALLIUM		1.3 U			1.2 U	1 U	0.06 U	0.07 U	0.13 U		0.09 U	0.1 U
TIN		0.09 U			0.11 U	0.05 U	0.1 U	0.05 U	0.1 U		0.04 U	0.12 U
TITANIUM		5.5 J			0.72 U		4.4 J	4.3 J	0.47 U		5.1 J	9.1 J
VANADIUM		0.63 J			0.45 U	0.27 U	0.2 U	0.16 U	0.22 U		0.18 U	1.4 U
ZINC		661 J			566 J	616 J	21.9 J	23 J	30 J		278 J	273
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED			11800 J									
ANTIMONY, FILTERED			0.03 U									

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01	02
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201	13GWT2202
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003	12/4/2003
ARSENIC, FILTERED			1.7 J									
BARIUM, FILTERED			15.6 J									
BERYLLIUM, FILTERED			5.6 J									
CADMIUM, FILTERED			1 U									
CALCIUM, FILTERED			70900 J									
CHROMIUM, FILTERED			2.7 J									
COBALT, FILTERED			230 J									
COPPER, FILTERED			10.6 J									
IRON, FILTERED			142000 J									
LEAD, FILTERED			11.5 J									
LITHIUM, FILTERED			322 J									
MAGNESIUM, FILTERED			67900 J									
MANGANESE, FILTERED			11500 J									
MERCURY, FILTERED			0.02 U									
NICKEL, FILTERED			470 J									
POTASSIUM, FILTERED			6520 J									
SELENIUM, FILTERED			0.19 U									
SILVER, FILTERED			0.04 U									
SODIUM, FILTERED			52100 J									
STRONTIUM, FILTERED			68.9 J									
THALLIUM, FILTERED			1.2 U									
TIN, FILTERED			0.03 U									
TITANIUM, FILTERED			4.2 J									
VANADIUM, FILTERED			0.45 U									
ZINC, FILTERED			695									
Field Parameters (mg/L)												
ALKALINITY					10 U				10 U			10 U
CARBON DIOXIDE					400				125			50
DISSOLVED OXYGEN	27.18				0.02	15.56			1	2.94		1
DISSOLVED OXYGEN - METER		0.11		0.54	0.76		1.45		2.09		0.64	1.65
HYDROGEN SULFIDE (H2S)					0				0			0
IRON(+2)					3.3 >				0.1			0.37
MANGANESE(+2)					8.3				0.6			0.1
NITRITE-N					0				0.031			0.005
OXIDATION REDUCTION POTENTIAL (MV)	484.2	265		224	376.2	337.2	193.6		247.2	107.3	264	351.6
PH (S.U.)	4.57	3.48		3.65	3.43	3.47	5.46		5.59	7.32	3.95	4.09
SPECIFIC CONDUCTANCE (MS/CM)	1.397	1.504		1.445	1.3	1.288	0.212		0.195	0.298	0.245	0.243
SULFIDE					0.03				0.04			0.06
TEMPERATURE (C)	18.49	15.78		16.7	15.9	20.04	13.01		15.17	20.07	14.15	11.4
TURBIDITY (NTU)	0.4	19		1.4	6.91	3.8	8.2		2.61	4	0	1.03
Miscellaneous Parameters (mg/L)												
AMMONIA-N		1.6			1.6 J		0.05	0.04	0.02		0.01 U	0.01 U
NITRITE/NITRATE-N		0.07			0.025 U		0.64	0.65	1.2		0.02 U	0.17 J
TOTAL ORGANIC CARBON												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2,3-TRICHLOROPROPANE												
1,2-DIBROMO-3-CHLOROPROPANE												
1,2-DIBROMOETHANE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
1,4-DIOXANE												
2-BUTANONE												
2-HEXANONE												
3-CHLOROPROPENE												
4-METHYL-2-PENTANONE												
ACETONE												
ACETONITRILE												
ACROLEIN												
ACRYLONITRILE												
BENZENE												
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CHLOROPRENE												
CIS-1,2-DICHLOROETHENE												
CIS-1,3-DICHLOROPROPENE												
DIBROMOMETHANE												
DICHLORODIFLUOROMETHANE												
ETHYL METHACRYLATE												
ETHYLBENZENE												
ISOBUTANOL												
METHACRYLONITRILE												
METHYL IODIDE												
METHYL METHACRYLATE												
METHYLENE CHLORIDE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
PROPIONITRILE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE												
TOTAL XYLENES												
TRANS-1,2-DICHLOROETHENE												
TRANS-1,3-DICHLOROPROPENE												
TRANS-1,4-DICHLORO-2-BUTENE												
TRICHLOROETHENE												
TRICHLOROFLUOROMETHANE												
VINYL ACETATE												
VINYL CHLORIDE												
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
1,3-DINITROBENZENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U		0.27 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.51 U			0.47 U				0.5 U		
2,4,6-TRINITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
2,4-DIAMINO-6-NITROTOLUENE			0.26 U			0.24 U				0.25 U		
2,4-DINITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
2,6-DIAMINO-4-NITROTOLUENE			0.26 U			0.24 U				0.25 U		
2,6-DINITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
2-NITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	1	0.145 U		0.25 UJ		0.27 U
3,5-DINITROANILINE			0.26 U			0.24 U				0.25 U		
3-NITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U		0.27 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
4-NITROTOLUENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ		0.27 U
DNX			0.26 U			0.24 U				0.25 U		
HMX	23	13	14	16	2.1	2.2	2.2	0.34		0.85		2.3
MNX			0.26 U			0.35 J				0.25 U		
NITROBENZENE	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U		0.27 U
PICRAMIC ACID												
PICRIC ACID												
RDX	26	17	21	17	7.3	9	8.7	0.4		1.2 J		1.6
TETRYL	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U		0.27 U
TNX			0.26 U			0.24 U				0.25 U		
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM		192 J	38.2 U		47.3 U	14.2 U		39000 J		73500 J		836 J
ANTIMONY		0.04 U	0.02 U		0.03 U	0.02 U		0.35 U		0.44 U		0.08 U
ARSENIC		0.41 U	0.09 U		0.07 U	0.14 U		15.4 J		14.3 J		0.55 U
BARIUM		38.4 J	35 J		22.7 J	18.6 J		303 J		355 J		39.9 J
BERYLLIUM		0.06 U	0.04 U		0.03 U	0.04 U		2.3 J		3.4 J		0.99 U
CADMIUM		0.13 U	0.1 U		0.05 UJ	0.06 U		2.7 J		2.7 J		0.42 U
CALCIUM		10300 J	12500 J		34300 J	37900 J		117000 J		53900 J		22900 J
CHROMIUM		0.55 U	0.35 U		0.37 U	0.27 U		64.9 J		89.9 J		2.2 U
COBALT		5.1 J	2.4 J		3.7 J	10.1 J		33 J		48 J		56.5 J
COPPER		0.35 U	0.2 U		4 J	0.19 U		89.5 J		82.8 J		18.2 J
IRON		414 J	118 U		65.7 U	3190 J		36000 J		41000 J		961 J
LEAD		0.36 U	0.14 U		0.18 U	0.09 U		54.3 J		51.3 J		2.9 J
LITHIUM		12.2 J			18.2 J			74.4 J				
MAGNESIUM		10800 J	10900 J		34500 J	33600 J		19900 J		22700 J		12800 J
MANGANESE		404 J	256 J		525 J	2010 J		2080 J		839 J		125 J
MERCURY		0.2 U	0.02 U		0.02 U	0.02 U		0.052 J		0.098 J		0.03 U
NICKEL		5.5 J	4.9 J		6.3 J	9.4 J		82.1 J		120 J		123 J
POTASSIUM		796 J	875 J		1010 J	1120 J		11000 J		18100 J		1800 J
SELENIUM		0.24 U	0.19 U		0.29 U	0.2 U		1.8 J		4.1 J		1.4 U
SILVER		0.08 U	0.03 U		0.04 U	0.03 U		1.2 U		1.3 U		0.03 U
SODIUM		37200 J	34000 J		44200 J	41000 J		27900 J		31400 J		39700 J
STRONTIUM		49.9 J			81 J			262 J				
THALLIUM		0.07 U	0.04 U		0.04 U	0.04 U		0.6 U		0.75 U		0.05 U
TIN		0.13 U	0.1 U		0.13 U	0.1 U		0.55 U		1.5 U		0.45 U
TITANIUM		6.9 J	0.55 U		2.1 U	0.13 U		285 J		516 J		
VANADIUM		0.51 U	0.08 U		0.06 U	0.06 U		75.3 J		93.5 J		1.4 J
ZINC		4 J	4.1 U		8.2 J	3.7 U		260 J		340 J		138 J
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED									344 J		79.8 U	
ANTIMONY, FILTERED									0.29 U		0.22 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	03	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502	13GWT2502-F	13GWT2503
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003	11/19/2003	7/24/2004
ARSENIC, FILTERED									0.36 U		0.17 U	
BARIUM, FILTERED									62.6 J		35.9 J	
BERYLLIUM, FILTERED									0.09 U		0.1 U	
CADMIUM, FILTERED									0.47 U		0.74 U	
CALCIUM, FILTERED									64700 J		28600 J	
CHROMIUM, FILTERED									0.81 U		0.34 U	
COBALT, FILTERED									2.5 J		30.5 J	
COPPER, FILTERED									2.8 J		1.8 U	
IRON, FILTERED									198 J		93.6 U	
LEAD, FILTERED									0.44 U		0.14 U	
LITHIUM, FILTERED									57.3 J			
MAGNESIUM, FILTERED									14100 J		9360 J	
MANGANESE, FILTERED									460 J		177 J	
MERCURY, FILTERED									0.2 U		0.007 U	
NICKEL, FILTERED									26.3 J		73.9 J	
POTASSIUM, FILTERED									5560 J		2700 J	
SELENIUM, FILTERED									2 J		2.5 J	
SILVER, FILTERED									0.04 U		0.03 U	
SODIUM, FILTERED									27100 J		29600 J	
STRONTIUM, FILTERED									135 J			
THALLIUM, FILTERED									0.08 U		0.04 U	
TIN, FILTERED									0.11 U		0.1 U	
TITANIUM, FILTERED									7.3 J		3.6 J	
VANADIUM, FILTERED									0.8 U		0.27 U	
ZINC, FILTERED									22.8 J		95.5 J	
Field Parameters (mg/L)												
ALKALINITY			25			90						
CARBON DIOXIDE			23			28						
DISSOLVED OXYGEN	2.51		7	3.37		0.5	1.07					1.87
DISSOLVED OXYGEN - METER		4.09	2.37		2.89	29.68		4.21		0.96		
HYDROGEN SULFIDE (H2S)			0			0						
IRON(+2)			0.09			3.21						
MANGANESE(+2)			0.1			1.8						
NITRITE-N			0.004			0						
OXIDATION REDUCTION POTENTIAL (MV)	448.2	131	397.5	141	284	59.9	395	219.1		333		717
PH (S.U.)	3.81	5.19	5.5	5.48	5.9	6.14	5.41	6.45		5.29		4.58
SPECIFIC CONDUCTANCE (MS/CM)	0.294	0.314	0.309	0.315	0.671	0.672	0.669	0.511		0.341		0.382
SULFIDE			0.01			0						
TEMPERATURE (C)	19.61	16.46	13.67	17.26	16.76	14.27	20.16	12		16.7		21.8
TURBIDITY (NTU)	1.5	0.7	2.09	2.1	5.2	1.66	5.82	999 >		39		40
Miscellaneous Parameters (mg/L)												
AMMONIA-N		0.01 U	0.01 U		0.02	0.01 U		0.09		0.05 J		
NITRITE/NITRATE-N		0.5	0.51		0.39	0.27		0.02 U		0.17 J		
TOTAL ORGANIC CARBON												

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U
1,3-DINITROBENZENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.538 U		0.505 U		0.515 U			0.51 U	
2,4,6-TRINITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
2,4-DIAMINO-6-NITROTOLUENE			0.269 U		0.253 U		0.258 U			0.25 U	
2,4-DINITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
2,6-DIAMINO-4-NITROTOLUENE			0.269 U		0.253 U		0.258 U			0.25 U	
2,6-DINITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
2-AMINO-4,6-DINITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U
2-NITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
3,5-DINITROANILINE			0.269 U		0.253 U		0.258 U			0.25 U	
3-NITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
4-AMINO-2,6-DINITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
4-NITROTOLUENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 UJ	0.26 U
DNX			0.269 U		0.253 U		0.258 U			0.25 U	
HMX		2.4	2.4	1.8	15	38	0.258 U		0.25 U	0.97 J	1.7 J
MNX			0.269 U		0.253 U		0.258 U			0.25 U	
NITROBENZENE		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U
PICRAMIC ACID											
PICRIC ACID											
RDX		0.4 J	0.53 J	0.38 J	32	74	0.258 U		0.25 U	3.8	10
TETRYL		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	0.039 U	0.26 U
TNX			0.269 U		0.253 U		0.258 U			0.25 U	
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		241	340 J		1980 J		6270 J			781 J	
ANTIMONY		0.04 U	0.02 U		0.02 U		2.9 J			0.02 U	
ARSENIC		0.25 U	0.21 U		3.1 J		15.2 J			0.3 U	
BARIUM		21.2 J	13.9 J		78.1 J		65.3 J			23.2 J	
BERYLLIUM		0.03 U	0.03 U		2.3 J		0.27 U			1 U	
CADMIUM		0.05 U	0.04 U		0.3 U		0.04 U			0.21 U	
CALCIUM		22700 J	27100 J		11100 J		10600 J			26800 J	
CHROMIUM		0.76 J	0.51 U		3.2 J		11.7 J			4 J	
COBALT		5 J	1.7 U		41.1 J		2 J			69.8 J	
COPPER		0.45 U	0.31 U		19.6 J		1.4 U			0.68 U	
IRON		238 J	334 U		17300 J		2460 J			60900 J	
LEAD		0.15 U	0.14 U		3.3 J		2.5 U			0.39 U	
LITHIUM		35.7 J									
MAGNESIUM		13700 J	14900 J		7520 J		2950 J			18000 J	
MANGANESE		391 J	271 U		594 J		66.7 J			1320 J	
MERCURY		0.02 U	0.007 U		0.007 U		0.007 U			0.02 U	
NICKEL		8 J	5.9 J		67.4 J		7.1 J			173 J	
POTASSIUM		474 J	412 J		4170 J		3670 J			3810 J	
SELENIUM		0.09 U	0.04 U		0.04 U		4.1 J			0.04 U	
SILVER		0.04 U	0.03 U		0.03 U		0.03 U			0.03 U	
SODIUM		29200 J	41200 J		14900 J		124000 J			44400 J	
STRONTIUM		56.9 J									
THALLIUM		0.04 U	0.04 U		0.25 U		0.06 U			0.15 U	
TIN		0.22 U	0.1 U		0.12 U		0.63 U			0.1 U	
TITANIUM		6.8 J	6.5 J		12.4 J		99 J			21.6 J	
VANADIUM		0.46 U	0.55 U		1.9 J		12.5 J			1 U	
ZINC		4.7 J	2.8 U		94.9		6.7 J			162 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	154 J							102 U			
ANTIMONY, FILTERED	0.07 U							3 J			

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER
LOCATION	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT29	13MWT29
SAMPLING ROUND	03	01	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2901	13GWT2902
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	11/7/2003	7/27/2004
ARSENIC, FILTERED	0.11 U							13.6 J			
BARIUM, FILTERED	36.3 J							36.9 J			
BERYLLIUM, FILTERED	0.79 U							0.03 U			
CADMIUM, FILTERED	0.35 U							0.04 U			
CALCIUM, FILTERED	20700 J							8960 J			
CHROMIUM, FILTERED	1.1 U							0.81 U			
COBALT, FILTERED	54.2 J							0.55 U			
COPPER, FILTERED	13.1 J							1 U			
IRON, FILTERED	130 J							25.5 U			
LEAD, FILTERED	1.3 U							0.2 U			
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	11100 J							1800 J			
MANGANESE, FILTERED	105 J							3.7 U			
MERCURY, FILTERED	0.03 U							0.007 U			
NICKEL, FILTERED	118 J							3.1 J			
POTASSIUM, FILTERED	1550 J							1880 J			
SELENIUM, FILTERED	1.4 U							3.9 J			
SILVER, FILTERED	0.02 U							0.04 U			
SODIUM, FILTERED	33300 J							122000 J			
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.02 U							0.04 U			
TIN, FILTERED	0.06 U							0.19 U			
TITANIUM, FILTERED								1.4 U			
VANADIUM, FILTERED	0.06 U							2 J			
ZINC, FILTERED	126 J							3.5 J			
Field Parameters (mg/L)											
ALKALINITY			60		10 U		150			10 U	
CARBON DIOXIDE			50		45		10 U			150	
DISSOLVED OXYGEN			1.7	0.89	5	4.96	0.5		0.26	0.02	8.4
DISSOLVED OXYGEN - METER		4.2	1.7		1.67		0.57			0.44	
HYDROGEN SULFIDE (H2S)			0		0		0			0	
IRON(+2)			0		0.21		0.01			3.3 >	
MANGANESE(+2)			0.3		0		0			1.3	
NITRITE-N			0.01		0.001		0.007			0	
OXIDATION REDUCTION POTENTIAL (MV)		189	354	752	223.2	423.5	-34.1		73.5	-473	2.8
PH (S.U.)		6.05	5.95	5.27	4.4	3.36	9.15		8.08	5.56	5.62
SPECIFIC CONDUCTANCE (MS/CM)		0.352	0.333	0.43	0.288	0.294	0.495		1.217	0.589	0.662
SULFIDE			0.05		0		0			0.04	
TEMPERATURE (C)		12.01	15.68	19.78	14.29	20.1	13.59		17.98	15.52	19.73
TURBIDITY (NTU)		7.1	9.81	22	110	3.3	260		65	9.36	4
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.02	0.005 UJ		0.39		0.46 J			0.36	
NITRITE/NITRATE-N		0.03	0.06 J		0.1 J		0.66 J			0.025 U	
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
1,3-DINITROBENZENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.485 U		0.581 U		0.532 U		0.5 U				0.5 U
2,4,6-TRINITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.243 U		0.291 U		0.266 U		0.25 U				0.25 U
2,4-DINITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.243 U		0.291 U		0.266 U		0.25 U				0.25 U
2,6-DINITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
2-NITROTOLUENE	0.243 U	0.26 U	0.291 U	0.37 J	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
3,5-DINITROANILINE	0.243 U		0.291 U		0.266 U		0.25 U				0.25 U
3-NITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.29 J

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
4-NITROTOLUENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
DNX	0.243 U		0.291 U		0.266 U		0.25 U				1
HMX	0.243 U	0.26 U	4.5	8.1	0.92	0.86	5.3		11		29
MNX	0.243 U		0.291 U		0.266 U		0.25 U				4.5
NITROBENZENE	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX	1.1 J	4	9.3	22	2.7 J	2.3	4.3		4.2		460
TETRYL	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U		0.25 U
TNX	0.243 U		0.291 U		0.266 U		0.25 U				0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	2680 J		79.1 U		168 U		17100 J		2350 J		277 J
ANTIMONY	0.11 U		0.04 U		0.04 U		0.66 U		0.22 U		0.02 U
ARSENIC	1.1 U		0.16 U		0.18 U		4.9 J		2.1 J		0.13 U
BARIUM	21.7 J		41.7 J		38.2 J		103 J		50.6 J		17.7 J
BERYLLIUM	5.9 J		0.06 U		0.03 U		1.4 U		0.37 U		0.23 U
CADMIUM	0.47 U		0.29 U		0.06 U		0.57 U		0.15 U		0.04 U
CALCIUM	25700 J		34700 J		31600 J		6020 J		4300 J		14700 J
CHROMIUM	0.86 U		0.36 U		0.34 U		23.8 J		6.1 J		0.55 U
COBALT	104 J		18.9 J		2.2 J		13.4 J		7 J		10.3 J
COPPER	4.5 J		0.6 U		0.45 U		9.6 J		6.9 U		1.7 J
IRON	36600 J		61.5 U		276 U		16100 J		6090 J		316 J
LEAD	3.8 J		0.07 U		0.24 U		9.4 J		5.1 J		0.77 U
LITHIUM											
MAGNESIUM	18800 J		41400 J		20000 J		5930 J		3600 J		12300 J
MANGANESE	3230 J		3170 J		84.8 J		837 J		274 J		645 J
MERCURY	0.007 U		0.007 U		0.007 U		0.007 J		0.03 U		0.007 U
NICKEL	167 J		93.8 J		7.8 J		29.9 J		21.8 J		42.5 J
POTASSIUM	4150 J		4430 J		885 J		5580 J		1340 J		2980 J
SELENIUM	0.12 U		0.14 U		0.51 U		0.53 U		0.25 U		0.26 U
SILVER	0.11 U		0.03 U		0.03 U		0.48 U		0.08 U		0.03 U
SODIUM	38500 J		84800 J		31000 J		11800 J		11700 J		34500 J
STRONTIUM											
THALLIUM	0.24 U		0.04 U		0.04 U		0.7 U		0.14 U		0.05 U
TIN	0.16 U		0.1 U		1 U		1.1 U		0.67 U		0.13 U
TITANIUM	0.61 U		0.72 U		1.9 U		150 J				2.8 J
VANADIUM	0.28 U		0.09 U		0.24 U		25.8 J		6.2 J		0.3 U
ZINC	280		21.3 J		6.8 U		45.4 J		49.6 J		28.8 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED								52.6 U		66.5 U	
ANTIMONY, FILTERED								0.41 U		0.65 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33	13MWT33	13MWT34
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	03	02
SAMPLE NUMBER	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302	13GWT3302-F	13GWT3401
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004	7/26/2004	12/4/2003
ARSENIC, FILTERED								0.87 U		0.33 U	
BARIUM, FILTERED								33.9 J		32.5 J	
BERYLLIUM, FILTERED								0.3 U		0.39 U	
CADMIUM, FILTERED								0.24 U		0.35 U	
CALCIUM, FILTERED								9670 J		3290 J	
CHROMIUM, FILTERED								0.73 U		1.4 U	
COBALT, FILTERED								14.7 J		6.7 J	
COPPER, FILTERED								1.1 U		4 U	
IRON, FILTERED								4810 J		201 J	
LEAD, FILTERED								0.34 U		0.56 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED								7230 J		3300 J	
MANGANESE, FILTERED								1110 J		287 J	
MERCURY, FILTERED								0.007 U		0.03 U	
NICKEL, FILTERED								21.6 J		21.7 J	
POTASSIUM, FILTERED								1460 J		562 J	
SELENIUM, FILTERED								0.16 U		0.21 U	
SILVER, FILTERED								0.24 U		0.48 U	
SODIUM, FILTERED								13000 J		12200 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED								0.3 U		0.33 U	
TIN, FILTERED								0.22 U		0.48 U	
TITANIUM, FILTERED								1 U			
VANADIUM, FILTERED								0.54 U		0.3 U	
ZINC, FILTERED								22.4 J		19 J	
Field Parameters (mg/L)											
ALKALINITY											10 U
CARBON DIOXIDE											32
DISSOLVED OXYGEN		7.03		23.4		10.9			5.56		1
DISSOLVED OXYGEN - METER	0.88		5.66		8.98		3.75				2.35
HYDROGEN SULFIDE (H2S)											0
IRON(+2)											0.18
MANGANESE(+2)											0.8
NITRITE-N											0.005
OXIDATION REDUCTION POTENTIAL (MV)	396.6	142	246.7	518.6	223.6	71	91.7		559.8		276
PH (S.U.)	3.34	5.2	5.67	5.39	6.26	6.99	5.88		4.96		4.97
SPECIFIC CONDUCTANCE (MS/CM)	0.568	0.795	0.793	1.444	0.386	0.519	0.234		0.091		0.312
SULFIDE											0
TEMPERATURE (C)	9.18	15.4	10.09	15.98	14.73	18.79	8.83		16.12		10.94
TURBIDITY (NTU)	7	0.6	4.69	6.1	3.45	2.8	80		94		6.07
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.42		0.005 UJ		0.005 UJ		0.02				0.04
NITRITE/NITRATE-N	0.05 U		0.13 J		0.25 J		1.2 J				0.3 J
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U	0.24 U	0.253 UJ
1,3-DINITROBENZENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U	0.24 U	0.253 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.472 U			0.538 U	0.538 U		0.52 U			0.505 U
2,4,6-TRINITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
2,4-DIAMINO-6-NITROTOLUENE		0.236 U			0.269 U	0.269 U		0.26 U			0.253 U
2,4-DINITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
2,6-DIAMINO-4-NITROTOLUENE		0.236 U			0.269 U	0.269 U		0.26 U			0.253 U
2,6-DINITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
2-AMINO-4,6-DINITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U	0.24 U	0.253 UJ
2-NITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
3,5-DINITROANILINE		0.236 U			0.269 U	0.269 U		0.26 U			0.253 U
3-NITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
4-AMINO-2,6-DINITROTOLUENE	0.26 J	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.5	0.47 J	0.253 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
4-NITROTOLUENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U	0.24 U	0.253 UJ
DNX		0.236 U			0.269 U	0.269 U		1.5 J			0.253 U
HMX	28	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	25	140	150	0.253 U
MNX		0.236 U			0.269 U	0.269 U		5.2			0.253 U
NITROBENZENE	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U	0.24 U	0.253 U
PICRAMIC ACID											
PICRIC ACID											
RDX	400	0.236 U		0.25 U	0.27 J	0.275 U	6.1	650	2100	2300	0.253 U
TETRYL	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U	0.24 U	0.253 U
TNX		0.236 U			0.269 UJ	0.269 U		0.73			0.253 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		20900 J			147 U	655 J		140 U			4720 J
ANTIMONY		6.7 J			0.09 U	1.3 U		0.02 U			3.8 J
ARSENIC		15 J			0.22 U	0.5 U		0.27 U			24.5 J
BARIUM		94.7 J			30.5 J	33 J		38.8 J			32.2 J
BERYLLIUM		1 U			0.09 U	1.3 U		0.05 U			0.3 U
CADMIUM		0.07 U			0.54 U	1.8 U		0.13 U			0.04 U
CALCIUM		18000 J			48800 J	49400 J		21600 J			5790 J
CHROMIUM		35 J			0.89 U	1.5 U		0.72 U			12.5 J
COBALT		5.6 J			3.7 J	4.3 J		14.8 U			1.6 U
COPPER		6.1 J			0.88 U	1.3 U		0.83 U			1.6 J
IRON		10300 J			83.6 U	130 U		1760 J			5410 J
LEAD		7.2 J			0.42 U	1.7 U		0.94 U			5.8 J
LITHIUM											
MAGNESIUM		6520 J			45800 J	47400 J		14500 J			1040 J
MANGANESE		118 J			437 J	458 J		834 J			67.4 J
MERCURY		0.007 U			0.007 U	0.007 U		0.02 U			0.02 U
NICKEL		22 J			56.4 J	63.3 J		12.9 J			5.7 J
POTASSIUM		10100 J			2330 J	2510 J		1810 J			5180 J
SELENIUM		1.7 U			0.28 U	0.54 U		0.1 U			2.2 U
SILVER		0.03 U			0.04 U	1.2 U		0.03 U			0.03 U
SODIUM		166000 J			49700 J	51200 J		29600 J			71400 J
STRONTIUM											
THALLIUM		0.19 U			0.07 U	1.3 U		0.04 U			0.04 U
TIN		0.51 U			0.12 U	2 U		0.1 U			0.25 U
TITANIUM		104 J			4.2 J	18.6 J		8 J			26.6 J
VANADIUM		31.6 J			0.23 U	1.2 U		0.4 U			25.6 J
ZINC		30.6 J			31.2 J	36.2 J		16.8 J			11.6 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED			130 U								
ANTIMONY, FILTERED			7.3 J								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER
LOCATION	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37	13MWT37	13MWT38
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	03	02
SAMPLE NUMBER	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702	13GWT3702-D	13GWT3801
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004	7/30/2004	11/10/2003
ARSENIC, FILTERED			13.1 J								
BARIUM, FILTERED			24 J								
BERYLLIUM, FILTERED			0.03 U								
CADMIUM, FILTERED			0.04 U								
CALCIUM, FILTERED			17000 J								
CHROMIUM, FILTERED			2.3 J								
COBALT, FILTERED			3 J								
COPPER, FILTERED			0.42 U								
IRON, FILTERED			32.2 U								
LEAD, FILTERED			0.07 U								
LITHIUM, FILTERED											
MAGNESIUM, FILTERED			3130 J								
MANGANESE, FILTERED			9 J								
MERCURY, FILTERED			0.007 U								
NICKEL, FILTERED			0.75 U								
POTASSIUM, FILTERED			5390 J								
SELENIUM, FILTERED			2.4 U								
SILVER, FILTERED			0.03 U								
SODIUM, FILTERED			161000 J								
STRONTIUM, FILTERED											
THALLIUM, FILTERED			0.04 U								
TIN, FILTERED			0.1 U								
TITANIUM, FILTERED			1.2 U								
VANADIUM, FILTERED			2.8 J								
ZINC, FILTERED			4 J								
Field Parameters (mg/L)											
ALKALINITY		200			10 U	10 U					108
CARBON DIOXIDE		10 U			40	40					10 U
DISSOLVED OXYGEN	13.42	5.5		0.98	5.5	5.5	16.14		2.9		3.5
DISSOLVED OXYGEN - METER		5.28			4.91			4.82			4.7
HYDROGEN SULFIDE (H2S)		0			0	0					0
IRON(+2)		0.02			0.03	0.05					0
MANGANESE(+2)		0			0.3	0.2					0.1
NITRITE-N		0			0.003	0					0
OXIDATION REDUCTION POTENTIAL (MV)	149.6	105.2			252.1		350.1	-144.9	133.5		10.3
PH (S.U.)	5.06	9.08		7.58	5.68		5.51	5.75	6.26		11.39
SPECIFIC CONDUCTANCE (MS/CM)	0.347	0.781		0.718	0.721		0.68	0.307	0.174		0.332
SULFIDE		0.01			0.01	0.01					0
TEMPERATURE (C)	18.58	13.6		15.91	12.24		15.66	13.32	17.35		13.18
TURBIDITY (NTU)	21	1000 >		1000 >	6.06		9.9	3.2	5		999 >
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.56			0.01 U	0.01 U		0.005 U			0.44
NITRITE/NITRATE-N		0.05 U			0.08	0.06		0.28			0.11
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ		0.24 U	0.04 U
1,3-DINITROBENZENE		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ		0.24 U	0.04 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.52 U			0.51 UJ		0.538 U			0.52 UJ
2,4,6-TRINITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.24 U	0.04 UJ
2,4-DIAMINO-6-NITROTOLUENE			0.26 U			0.26 U		0.269 U			0.26 U
2,4-DINITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.24 U	0.04 UJ
2,6-DIAMINO-4-NITROTOLUENE			0.26 U			0.26 U		0.269 U			0.26 U
2,6-DINITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.24 U	0.04 UJ
2-AMINO-4,6-DINITROTOLUENE		0.24 U	0.42 J		0.28 J	0.04 U	0.25 U	0.269 UJ		0.24 U	0.04 U
2-NITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.45 J	0.04 UJ
3,5-DINITROANILINE			0.26 U			0.26 U		0.269 U			0.26 U
3-NITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.24 U	0.04 UJ
4-AMINO-2,6-DINITROTOLUENE		0.24 U	0.56 J		0.5 J	0.52 J	1.1	0.269 UJ		0.24 U	0.04 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
4-NITROTOLUENE		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ		0.24 U	0.04 UJ
DNX			43 J			0.9 J		0.269 U			0.26 U
HMX		0.24 U	48 J		74	14	22	0.269 UJ		0.24 U	64
MNX			7.7			3.3		0.269 U			0.32 J
NITROBENZENE		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ		0.24 U	0.04 U
PICRAMIC ACID											
PICRIC ACID											
RDX		0.24 U	180		190	140	230	0.269 UJ		0.24 U	41
TETRYL		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ		0.24 U	0.04 U
TNX			2.4			0.26 U		0.269 U			0.26 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM			2010 J			221 J		29800 J			24300 J
ANTIMONY			0.02 U			0.09 U		5.6 J			0.26 U
ARSENIC			1.1 U			0.35 U		20.6 J			5.8 J
BARIUM			104 J			49.2 J		114 J			130 J
BERYLLIUM			0.12 U			0.09 U		1.2 U			0.98 U
CADMIUM			0.23 U			0.42 U		0.43 U			0.19 U
CALCIUM			52200 J			14900 J		18500 J			11800 J
CHROMIUM			4.2 J			0.58 U		38.7 J			39.6 J
COBALT			5.5 J			31.4 J		11.2 J			17.8 J
COPPER			2.1 J			1.3 J		10.9 J			10 J
IRON			1450 J			272 J		23700 J			20000 J
LEAD			1.1 U			0.78 U		12 J			8.7 J
LITHIUM											
MAGNESIUM			14300 J			11800 J		6520 J			6730 J
MANGANESE			1290 J			855 J		300 U			2330 J
MERCURY			0.02 U			0.02 U		0.007 U			0.02 U
NICKEL			25.6 J			26.4 J		34 J			28.4 J
POTASSIUM			5110 J			1840 J		7170 J			8410 J
SELENIUM			0.11 U			0.39 U		5.1 J			0.28 U
SILVER			0.03 U			0.22 U		0.05 U			0.14 U
SODIUM			15800 J			33000 J		86700 J			7420 J
STRONTIUM											
THALLIUM			0.04 U			0.09 U		0.18 U			0.23 U
TIN			0.1 U			0.12 U		1.3 U			0.83 U
TITANIUM			55.3 J			6.1 J		101 J			237 J
VANADIUM			4.1 J			0.42 U		33.9 J			34.4 J
ZINC			14.3 J			14.4 J		77.6 J			32.8 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	285 J			53.1 U					95.6 U		
ANTIMONY, FILTERED	4 J			0.08 U					5.6 J		

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER
LOCATION	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41	13MWT41	13MWT42
SAMPLING ROUND	02	03	02	02	03	02	03	02	02	03	02
SAMPLE NUMBER	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F	13GWT4102	13GWT4201
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003	8/1/2004	11/6/2003
ARSENIC, FILTERED	21.3 J			0.31 U					9.4 J		
BARIUM, FILTERED	9.6 J			93.6 J					16.7 J		
BERYLLIUM, FILTERED	0.03 U			0.03 U					0.05 U		
CADMIUM, FILTERED	0.04 U			0.33 U					0.1 U		
CALCIUM, FILTERED	3980 J			48000 J					17300 J		
CHROMIUM, FILTERED	0.8 U			0.17 U					0.34 U		
COBALT, FILTERED	1.5 U			5.2 J					3.9 J		
COPPER, FILTERED	0.57 U			1.3 U					1.1 U		
IRON, FILTERED	85.6 U			447 J					47.3 U		
LEAD, FILTERED	0.12 U			0.06 U					0.33 U		
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	140 U			13700 J					2810 J		
MANGANESE, FILTERED	4.2 U			1190 J					30.9 U		
MERCURY, FILTERED	0.02 U			0.02 U					0.007 U		
NICKEL, FILTERED	0.48 U			23.8 J					2.6 J		
POTASSIUM, FILTERED	4260 J			4540 J					2960 J		
SELENIUM, FILTERED	2 U			0.16 U					4.2 J		
SILVER, FILTERED	0.03 U			0.03 U					0.03 U		
SODIUM, FILTERED	65200 J			15500 J					82100 J		
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.04 U			0.06 U					0.06 U		
TIN, FILTERED	0.1 U			0.1 U					0.28 U		
TITANIUM, FILTERED	1.6 U			1.2 U					0.9 U		
VANADIUM, FILTERED	7 J			0.07 U					0.68 U		
ZINC, FILTERED	1.7 U			11.3 J					17 J		
Field Parameters (mg/L)											
ALKALINITY											
CARBON DIOXIDE											
DISSOLVED OXYGEN		1.7			6.07		0.39			0.53	
DISSOLVED OXYGEN - METER			5.35			6.28		3.72			1.46
HYDROGEN SULFIDE (H2S)											
IRON(+2)											
MANGANESE(+2)											
NITRITE-N											
OXIDATION REDUCTION POTENTIAL (MV)		72.9	135.1		321	100.3	538	170		149	105
PH (S.U.)		8.44	6.4		5.85	5.53	5.04	8.36		6.85	6.39
SPECIFIC CONDUCTANCE (MS/CM)		0.665	0.391		0.352	0.273	0.329	0.394		1.001	0.19
SULFIDE											
TEMPERATURE (C)		21.72	13.29		16.31	13.28	15.02	14.01		14.73	14.03
TURBIDITY (NTU)		18	17.9		2.2	6.2	1.28	1000 >		110	1000 >
Miscellaneous Parameters (mg/L)											
AMMONIA-N			0.36			0.11 J		0.18 J			0.16 J
NITRITE/NITRATE-N			0.77			0.28		0.025 U			0.025 U
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											
METHYLENE CHLORIDE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
1,3-DINITROBENZENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.481 U		0.51 U		0.515 U			0.556 U	
2,4,6-TRINITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE			0.24 U		0.255 U		0.258 U			0.278 U	
2,4-DINITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE			0.24 U		0.255 U		0.258 U			0.278 U	
2,6-DINITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
2-NITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
3,5-DINITROANILINE			0.24 U		0.255 U		0.258 U			0.278 U	
3-NITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.34 J		0.24 U	0.278 U	0.26 U
4-AMINO-2,6-DINITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
4-NITROTOLUENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
DNX			0.24 U		0.255 U		0.258 U			0.278 U	
HMX		330 J	0.97 J	1.2	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
MNX			0.24 U		0.255 U		0.258 U			0.278 U	
NITROBENZENE		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
PICRAMIC ACID											
PICRIC ACID											
RDX		140 J	0.72 J	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
TETRYL		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U	0.278 U	0.26 U
TNX			0.24 U		0.255 U		0.258 U			0.278 U	
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM			2500 J		135 J		4300 J			472 J	
ANTIMONY			0.04 U		0.65 U		0.81 U			0.05 U	
ARSENIC			1.9 J		1.4 U		2.1 J			0.5 U	
BARIUM			28.9 J		29.6 J		64.3 J			23.1 J	
BERYLLIUM			3 J		0.03 U		0.13 U			0.2 U	
CADMIUM			1.1 U		0.04 U		0.04 U			0.04 U	
CALCIUM			21400 J		20200 J		14000 J			67700 J	
CHROMIUM			0.72 U		0.43 U		5.6 J			0.67 U	
COBALT			65 J		0.36 U		0.91 U			2.9 J	
COPPER			4.3 J		0.25 U		4.8 J			0.42 U	
IRON			4600 J		168 J		1630 J			2350 J	
LEAD			1.1 U		1 U		1.5 U			0.37 U	
LITHIUM											
MAGNESIUM			9940 J		6020 J		3510 J			34100 J	
MANGANESE			825 J		58.1 J		120 J			495 J	
MERCURY			0.007 U		0.007 U		0.007 U			0.007 U	
NICKEL			129 J		1.4 U		3.1 J			6 J	
POTASSIUM			2890 J		3630 J		3440 J			3260 J	
SELENIUM			0.18 U		0.46 U		1.2 U			0.13 U	
SILVER			0.03 U		0.03 U		0.13 U			0.03 U	
SODIUM			16400 J		145000 J		87500 J			120000 J	
STRONTIUM											
THALLIUM			0.18 U		0.04 U		0.05 U			0.04 U	
TIN			0.15 U		0.17 U		0.44 U			0.1 U	
TITANIUM			0.71 U		1.6 U		58.6 J			5.4 J	
VANADIUM			0.41 U		0.33 U		6.7 J			0.58 U	
ZINC			250		0.5 J		8.5 J			6.1 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	73.6 U							103 U			
ANTIMONY, FILTERED	0.32 U							1 U			

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45	13MWT46	13MWT46
SAMPLING ROUND	02	03	02	03	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502	13GWT4601	13GWT4602
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004	12/9/2003	7/30/2004
ARSENIC, FILTERED	1.6 J							1.4 U			
BARIUM, FILTERED	30.4 J							43.8 J			
BERYLLIUM, FILTERED	0.1 U							0.03 U			
CADMIUM, FILTERED	0.14 U							0.04 U			
CALCIUM, FILTERED	12000 J							13500 J			
CHROMIUM, FILTERED	0.36 U							0.61 U			
COBALT, FILTERED	13.2 J							3.1 J			
COPPER, FILTERED	0.69 U							1.3 U			
IRON, FILTERED	112 U							31.5 U			
LEAD, FILTERED	0.17 U							0.15 U			
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	4200 J							3160 J			
MANGANESE, FILTERED	2000 J							104 J			
MERCURY, FILTERED	0.02 U							0.007 U			
NICKEL, FILTERED	12.8 J							1.4 U			
POTASSIUM, FILTERED	2520 J							2360 J			
SELENIUM, FILTERED	0.76 U							1.6 U			
SILVER, FILTERED	0.09 U							0.03 U			
SODIUM, FILTERED	7100 J							91500 J			
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.1 U							0.04 U			
TIN, FILTERED	0.12 U							0.1 U			
TITANIUM, FILTERED	2 U							1.6 U			
VANADIUM, FILTERED	0.23 U							0.68 U			
ZINC, FILTERED	3.3 J							2.8 J			
Field Parameters (mg/L)											
ALKALINITY											
CARBON DIOXIDE											
DISSOLVED OXYGEN		2.12		3.43		0.56			7.97		0.05
DISSOLVED OXYGEN - METER			4.37		0.79		0.55			0.99	
HYDROGEN SULFIDE (H2S)											
IRON(+2)											
MANGANESE(+2)											
NITRITE-N											
OXIDATION REDUCTION POTENTIAL (MV)		132.1	298.5	364.8	-70	76.3	55.5		116.5	-32.5	131
PH (S.U.)		5.66	4.47	4.19	7.77	7.74	8.19		6.78	6.6	6.25
SPECIFIC CONDUCTANCE (MS/CM)		0.101	0.303	0.263	0.595	0.853	0.357		0.703	1.021	0.786
SULFIDE											
TEMPERATURE (C)		16.71	12.83	14.5	11.37	23.1	13.36		25.29	12.45	14.1
TURBIDITY (NTU)		1000 >	1.9	8.9	4.6	110	75		19	8.72	2.81
Miscellaneous Parameters (mg/L)											
AMMONIA-N			0.11		0.42		0.26			0.12	
NITRITE/NITRATE-N			0.05 U		0.51 J		0.05 U			0.05 U	
TOTAL ORGANIC CARBON											

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
Volatile Organics (ug/L)								
1,1,1,2-TETRACHLOROETHANE								
1,1,1-TRICHLOROETHANE								
1,1,2,2-TETRACHLOROETHANE								
1,1,2-TRICHLOROETHANE								
1,1-DICHLOROETHANE								
1,1-DICHLOROETHENE								
1,2,3-TRICHLOROPROPANE								
1,2-DIBROMO-3-CHLOROPROPANE								
1,2-DIBROMOETHANE								
1,2-DICHLOROETHANE								
1,2-DICHLOROPROPANE								
1,4-DIOXANE								
2-BUTANONE								
2-HEXANONE								
3-CHLOROPROPENE								
4-METHYL-2-PENTANONE								
ACETONE								
ACETONITRILE								
ACROLEIN								
ACRYLONITRILE								
BENZENE								
BROMODICHLOROMETHANE								
BROMOFORM								
BROMOMETHANE								
CARBON DISULFIDE								
CARBON TETRACHLORIDE								
CHLOROBENZENE								
CHLORODIBROMOMETHANE								
CHLOROETHANE								
CHLOROFORM								
CHLOROMETHANE								
CHLOROPRENE								
CIS-1,2-DICHLOROETHENE								
CIS-1,3-DICHLOROPROPENE								
DIBROMOMETHANE								
DICHLORODIFLUOROMETHANE								
ETHYL METHACRYLATE								
ETHYLBENZENE								
ISOBUTANOL								
METHACRYLONITRILE								
METHYL IODIDE								
METHYL METHACRYLATE								
METHYLENE CHLORIDE								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
PROPIONITRILE								
STYRENE								
TETRACHLOROETHENE								
TOLUENE								
TOTAL XYLENES								
TRANS-1,2-DICHLOROETHENE								
TRANS-1,3-DICHLOROPROPENE								
TRANS-1,4-DICHLORO-2-BUTENE								
TRICHLOROETHENE								
TRICHLOROFLUOROMETHANE								
VINYL ACETATE								
VINYL CHLORIDE								
Semivolatile Organics (ug/L)								
1,2,4,5-TETRACHLOROBENZENE								
1,2,4-TRICHLOROBENZENE								
1,2-DICHLOROBENZENE								
1,3-DICHLOROBENZENE								
1,4-DICHLOROBENZENE								
1,4-NAPHTHOQUINONE								
1,4-PHENYLENEDIAMINE								
1-NAPHTHYLAMINE								
2,2'-OXYBIS(1-CHLOROPROPANE)								
2,3,4,6-TETRACHLOROPHENOL								
2,4,5-TRICHLOROPHENOL								
2,4,6-TRICHLOROPHENOL								
2,4-DICHLOROPHENOL								
2,4-DIMETHYLPHENOL								
2,4-DINITROPHENOL								
2,6-DICHLOROPHENOL								
2-ACETYLAMINOFLUORENE								
2-CHLORONAPHTHALENE								
2-CHLOROPHENOL								
2-METHYLNAPHTHALENE								
2-METHYLPHENOL								
2-NAPHTHYLAMINE								
2-NITROANILINE								
2-NITROPHENOL								
2-PICOLINE								
3&4-METHYLPHENOL								
3,3'-DICHLOROBENZIDINE								
3,3'-DIMETHYLBENZIDINE								
3-METHYLCHOLANTHRENE								
3-NITROANILINE								
4,6-DINITRO-2-METHYLPHENOL								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
4-AMINOBIPHENYL								
4-BROMOPHENYL PHENYL ETHER								
4-CHLORO-3-METHYLPHENOL								
4-CHLOROANILINE								
4-CHLOROPHENYL PHENYL ETHER								
4-NITROANILINE								
4-NITROPHENOL								
4-NITROQUINOLINE-1-OXIDE								
5-NITRO-O-TOLUIDINE								
7,12-DIMETHYLBENZ(A)ANTHRACENE								
A,A-DIMETHYLPHENETHYLAMINE								
ACENAPHTHENE								
ACENAPHTHYLENE								
ACETOPHENONE								
ANILINE								
ANTHRACENE								
ARAMITE								
BENZO(A)ANTHRACENE								
BENZO(A)PYRENE								
BENZO(B)FLUORANTHENE								
BENZO(G,H,I)PERYLENE								
BENZO(K)FLUORANTHENE								
BENZYL ALCOHOL								
BIS(2-CHLOROETHOXY)METHANE								
BIS(2-CHLOROETHYL)ETHER								
BIS(2-ETHYLHEXYL)PHTHALATE								
BUTYL BENZYL PHTHALATE								
CHLOROBENZILATE								
CHRYSENE								
DI-N-BUTYL PHTHALATE								
DI-N-OCTYL PHTHALATE								
DIALLATE								
DIBENZO(A,H)ANTHRACENE								
DIBENZOFURAN								
DIETHYL PHTHALATE								
DIMETHYL PHTHALATE								
DIPHENYLAMINE								
ETHYL METHANE SULFONATE								
FLUORANTHENE								
FLUORENE								
HEXACHLOROBENZENE								
HEXACHLOROBUTADIENE								
HEXACHLOROCYCLOPENTADIENE								
HEXACHLOROETHANE								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
HEXACHLOROPROPENE								
INDENO(1,2,3-CD)PYRENE								
ISODRIN								
ISOPHORONE								
ISOSAFROLE								
KEPONE								
METHAPYRILENE								
METHYL METHANE SULFONATE								
N-NITROSO-DI-N-BUTYLAMINE								
N-NITROSO-DI-N-PROPYLAMINE								
N-NITROSODIETHYLAMINE								
N-NITROSODIMETHYLAMINE								
N-NITROSOMETHYLETHYLAMINE								
N-NITROSOMORPHOLINE								
N-NITROSOPIPERIDINE								
N-NITROSOPYRROLIDINE								
NAPHTHALENE								
O,O,O-TRIETHYL PHOSPHOROTHIOATE								
O-TOLUIDINE								
P-(DIMETHYLAMINO)AZOBENZENE								
PENTACHLOROBENZENE								
PENTACHLOROETHANE								
PENTACHLORONITROBENZENE								
PHENACETIN								
PHENANTHRENE								
PHENOL								
PRONAMIDE								
PYRENE								
PYRIDINE								
SAFROLE								
Energetics (ug/L)								
1,3,5-TRINITROBENZENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
1,3-DINITROBENZENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.521 U							
2,4,6-TRINITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
2,4-DIAMINO-6-NITROTOLUENE	0.26 U							
2,4-DINITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
2,6-DIAMINO-4-NITROTOLUENE	0.26 U							
2,6-DINITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.39 J	
2-NITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
3,5-DINITROANILINE	0.26 U							
3-NITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.62	0.27 U	0.27 U	

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
4-NITROTOLUENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
DNX	0.26 U							
HMX	0.26 U	0.24 U	0.86	0.85	27	0.27 U	120	
MNX	0.26 U							
NITROBENZENE	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
PICRAMIC ACID								
PICRIC ACID								
RDX	0.26 U	0.24 U	0.54 J	0.53 J	32	0.27 U	250	
TETRYL	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U	
TNX	0.26 U							
Herbicides (ug/L)								
HEXACHLOROPHENE								
PENTACHLOROPHENOL								
Total Metals (ug/L)								
ALUMINUM	16500 J	17400 J	8.35 U	16.2 U	39.4 U	93.9 J	1990 J	
ANTIMONY	0.02 U	0.03 U	0.085 U	0.52 U	0.085 U	1.5 U	0.13 U	
ARSENIC	3.2 J	4.1 J	0.21 U	0.37 U	0.43 U	1.2 J	2 J	
BARIUM	14.1 J	14.9 J	100 J	97.8 J	119 J	148 J	67 J	
BERYLLIUM	12.8 J	12.4 J	0.02 U	0.32 U	0.02 U	0.02 U	0.18 U	
CADMIUM	1.5 U	1.4 U	0.33 U	0.65 U	0.039 U	0.04 U	0.1 U	
CALCIUM	41500 J	41200 J	148000 J	138000 J	69400 J	62400 J	22700 J	
CHROMIUM	1 U	1.6 U	0.81 U	0.86 U	0.84 U	0.98 U	4.6 J	
COBALT	194 J	249 J	0.97 U	1.1 J	1.1 J	2.2 J	29 J	
COPPER	29.9 J	35.2 J	0.46 U	0.74 U	0.62 U	1.4 J	3.4 U	
IRON	24300 J	41600 J	26.9 U	29.6 U	158 J	92.9 J	5620 J	
LEAD	13.3 J	14.8 J	0.069 U	0.35 U	0.08 U	0.14 U	2.8 J	
LITHIUM								
MAGNESIUM	37500 J	40500 J	13300 J	13100 J	11800 J	45700 J	9000 J	
MANGANESE	3960 J	3750 J	156	156	357	146	3370 J	
MERCURY	0.29	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	
NICKEL	400 J	463 J	3.2 J	3.5 J	2.2 J	9.7 J	22.4 J	
POTASSIUM	2570 J	2860 J	4220 J	4220 J	11900 J	5210 J	20100 J	
SELENIUM	0.11 U	0.11 U	0.094 U	0.31 U	0.094 U	6 J	0.18 U	
SILVER	0.05 U	0.02 U	0.028 U	0.44 U	0.028 U	0.028 U	0.02 U	
SODIUM	63900 J	69900 J	32200 J	30100 J	9640 J	146000 J	7740 J	
STRONTIUM								
THALLIUM	0.7 U	0.84 U	0.043 U	0.38 U	0.043 U	0.043 U	0.07 U	
TIN	0.12 U	0.04 U	0.048 U	0.33 U	0.048 U	0.36 U	0.09 U	
TITANIUM	1 U							
VANADIUM	0.12 U	0.16 U	1.14 U	1.14 U	1.14 U	1.14 U	4.9 J	
ZINC	1070 J	1220 J	3.5 U	3.1 U	1.8 U	3.5 U	12.4 U	
Dissolved Metals (ug/L)								
ALUMINUM, FILTERED								6.4 U
ANTIMONY, FILTERED								0.33 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY
LOCATION	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51
SAMPLING ROUND	02	03	03	03	03	03	03	03
SAMPLE NUMBER	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004
ARSENIC, FILTERED								0.55 U
BARIUM, FILTERED								51.6 J
BERYLLIUM, FILTERED								0.08 U
CADMIUM, FILTERED								0.13 U
CALCIUM, FILTERED								24700 J
CHROMIUM, FILTERED								0.83 U
COBALT, FILTERED								30.4 J
COPPER, FILTERED								1.2 U
IRON, FILTERED								17.2 U
LEAD, FILTERED								0.11 U
LITHIUM, FILTERED								
MAGNESIUM, FILTERED								8400 J
MANGANESE, FILTERED								3890 J
MERCURY, FILTERED								0.03 U
NICKEL, FILTERED								18.8 J
POTASSIUM, FILTERED								20800 J
SELENIUM, FILTERED								0.18 U
SILVER, FILTERED								0.1 U
SODIUM, FILTERED								7410 J
STRONTIUM, FILTERED								
THALLIUM, FILTERED								0.1 U
TIN, FILTERED								0.12 U
TITANIUM, FILTERED								
VANADIUM, FILTERED								0.06 U
ZINC, FILTERED								3.5 U
Field Parameters (mg/L)								
ALKALINITY								
CARBON DIOXIDE								
DISSOLVED OXYGEN		0.51	0.15		0.3	2.42	8.32	
DISSOLVED OXYGEN - METER	1.5							
HYDROGEN SULFIDE (H2S)								
IRON(+2)								
MANGANESE(+2)								
NITRITE-N								
OXIDATION REDUCTION POTENTIAL (MV)	409.9	181.2	113.7		104.4	244.1	299	
PH (S.U.)	3.46	3.4	6.93		6.37	7.18	5.94	
SPECIFIC CONDUCTANCE (MS/CM)	1634	1.056	0.719		0.45	0.881	0.278	
SULFIDE								
TEMPERATURE (C)	12.42	18.41	19.88		20.31	16.11	20.57	
TURBIDITY (NTU)	5.4	7	1.95		1.54	8.34	33	
Miscellaneous Parameters (mg/L)								
AMMONIA-N	0.44							
NITRITE/NITRATE-N	0.05 U							
TOTAL ORGANIC CARBON								

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
SUMP WATER AND SEDIMENT SAMPLES - EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SU/SL007	13SU/SL009	13SU/SL009	13SU/SL001	13SU/SL002	13SU/SL003	13SU/SL004
SAMPLE NUMBER	13SU00701	13SU00901	13SU00901-D	13SL001010006	13SL002010006	13SL003010006	13SL004010006
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006
Energetics (mg/kg)							
1,3,5-TRINITROBENZENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	8.3	1.6 J	1.1 J	0.53	0.7	560	21
2,4-DINITROTOLUENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.45 J	0.25 U
2,6-DINITROTOLUENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	1.1 J	0.98 J	0.9 J	0.25 U	0.25 U	4.9 J	0.42 J
2-NITROTOLUENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	3.6	2.2	2	0.25 U	0.35 J	31 J	0.88 J
4-NITROTOLUENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	79	25	23	0.72 J	1.3 J	230 J	23
NITROBENZENE	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	630	69	68	2.4	2.3	1200	5.8
TETRYL	0.269 U	0.252 U	0.25 U	0.25 U	0.25 U	30	0.25 U

TABLE G-5

SUMMARY OF ANALYTIC RESULTS
SUMP WATER AND SEDIMENT SAMPLES - EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
LOCATION	13SU/SL005	13SU/SL006	13SU/SL007	13SU/SL008	13SU/SL009	13SU/SL009
SAMPLE NUMBER	13SL005010006	13SL006010006	13SL007010006	13SL008010006	13SL009010006	13SL009010006-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
SAMPLE DATE	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006	2/19/2006
Energetics (mg/kg)						
1,3,5-TRINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	66	4.5	0.81	38 J	3.7 J	9.4 J
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.74	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.93 J	0.35 J	0.25 U	1.3	1.6 J	3.3 J
2-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.43 J	0.25 U	5.1 J	1.4 J	1.8 J
4-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	3.7	1.8	3.9	3400	0.84 J	2 J
NITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	10	3.1	0.41 J	8600	1.1 J	1.3
TETRYL	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
1,3-DINITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.526 U			0.556 U				0.51 U		
2,4,6-TRINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,4-DIAMINO-6-NITROTOLUENE		0.263 U			0.278 U				0.255 U		
2,4-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2,6-DIAMINO-4-NITROTOLUENE		0.263 U			0.278 U				0.255 U		
2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004	7/24/2004
2-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
3,5-DINITROANILINE		0.263 U			0.278 U				0.255 U			
3-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
4-AMINO-2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
4-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
DNX		0.263 U			0.278 U				0.255 U			
HMX	1	1	1.3	0.495 U	0.278 U	0.26 U	0.29 J		0.51 J		0.38 J	
MNX		0.263 U			0.278 U				0.255 U			
NITROBENZENE	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
PICRAMIC ACID												
PICRIC ACID												
RDX	0.44 U	0.35 J	0.3 J	0.465 U	0.278 U	0.26 U	0.25 U		0.3 J		0.33 J	
TETRYL	0.47 U	0.263 U	0.25 U	0.495 U	0.278 U	0.26 U	0.265 U		0.255 U		0.26 U	
TNX		0.263 U			0.278 U				0.255 U			
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM	598 J	699 J		659 J	244 J		3990 J		627 J			
ANTIMONY	0.24 U	0.02 U		0.06 U	0.06 U		0.13 U		0.02 U			
ARSENIC	0.23 U	0.17 U		0.65 J	0.87 U		1 J		0.31 U			
BARIUM	55.4 J	46.8 J		27.5 J	18.1 J		74.5 J		62.1 J			
BERYLLIUM	1.2 U	1.2 U		0.63 U	0.3 U		1.2 U		1.8 U			
CADMIUM	0.18 U	0.06 U		0.38 U	0.34 U		0.82 U		0.37 U			
CALCIUM	9720 J	7190 J		94100 J	113000 J		34800 J		26100 J			
CHROMIUM	0.2 U	0.73 U		1.1 J	0.71 U		7.1 J		1.4 U			
COBALT	36 J	29.9 J		119 J	71 J		48.8 J		25 J			
COPPER	2.9 J	1.4 U		2.7 J	2 J		5.6 J		3.2 J			
IRON	135 J	61.7 U		10500 J	15200 J		1910 J		344 U			
LEAD	1.4 U	1.2 U		0.53 U	0.36 U		2 U		0.67 U			
LITHIUM	21.1 J			208 J			74 J					
MAGNESIUM	6790 J	5850 J		60200 J	69800 J		17000 J		15800 J			
MANGANESE	689 J	566 U		4580 J	5100 J		302 J		211 J			
MERCURY	0.16 J	0.39		0.02 U	0.007 U		0.02 U		0.02 U			
NICKEL	26.6 J	21.1 J		289 J	170 J		99.7 J		76.3 J			
POTASSIUM	494 J	403 J		6910 J	7090 J		2860 J		1040 J			
SELENIUM	0.17 U	0.05 U		0.91 U	0.27 U		0.32 U		0.04 U			
SILVER	0.18 U	0.03 U		0.12 U	0.03 U		0.43 U		0.03 U			
SODIUM	24300 J	26100 J		102000 J	129000 J		37400 J		40700 J			
STRONTIUM	53.3 J			396 J			97.8 J					
THALLIUM	0.11 U	0.08 U		0.13 U	0.15 U		0.23 U		0.04 U			
TIN	0.1 U	0.1 U		0.33 U	0.14 U		0.34 U		0.1 U			
TITANIUM	4 J	0.21 U		5.8 J	2.2 U		32 J		8.5 J			

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03	
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303	
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW	
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004	
VANADIUM	0.08 U	0.06 U		0.68 J	0.39 U		5.8 J		0.76 U			
ZINC	29.7 J	29.9 J		140 J	96.7 J		161 J		97.7 J			
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED								226 J		790 J		
ANTIMONY, FILTERED								0.36 U		0.08 U		
ARSENIC, FILTERED								0.5 U		0.5 U		
BARIUM, FILTERED								71.1 J		55.8 J		
BERYLLIUM, FILTERED								1.1 U		2.5 J		
CADMIUM, FILTERED								0.97 U		0.76 U		
CALCIUM, FILTERED								30900 J		27100 J		
CHROMIUM, FILTERED								0.48 U		0.24 U		
COBALT, FILTERED								55.7 J		43.4 J		
COPPER, FILTERED								4.5 J		6.2 J		
IRON, FILTERED								344 J		219 U		
LEAD, FILTERED								0.25 U		0.82 U		
LITHIUM, FILTERED								78.5 J				
MAGNESIUM, FILTERED								16800 J		16000 J		
MANGANESE, FILTERED								300 J		278 J		
MERCURY, FILTERED								0.02 U		0.02 U		
NICKEL, FILTERED								107 J		107 J		
POTASSIUM, FILTERED								1890 J		1440 J		
SELENIUM, FILTERED								0.33 U		0.07 U		
SILVER, FILTERED								0.25 U		0.03 U		
SODIUM, FILTERED								35000 J		40600 J		
STRONTIUM, FILTERED								97.1 J				
THALLIUM, FILTERED								0.25 U		0.07 U		
TIN, FILTERED								0.19 U		0.1 U		
TITANIUM, FILTERED								2.6 J		3.8 U		
VANADIUM, FILTERED								0.31 U		0.1 U		
ZINC, FILTERED								178		158 J		
Field Parameters (mg/L)												
ALKALINITY					10 U				10 U			
CARBON DIOXIDE					40				50			
DISSOLVED OXYGEN			4.2		4	2.19			6		3.66	
DISSOLVED OXYGEN - METER	1.28	1.4		1.98	5.75		4.5		4.45			
HYDROGEN SULFIDE (H2S)					0				0			
IRON(+2)					2.05				0.03			
MANGANESE(+2)					5.4				0.1			
NITRITE-N					0.003				0.006			
OXIDATION REDUCTION POTENTIAL (MV)	220	385.4	461.2	191	157.9	616.2	152.7		345		107.4	
PH (S.U.)	4.68	4.17	3.57	4.61	5.25	3.39	5.56		5.32		5.52	
SPECIFIC CONDUCTANCE (MS/CM)	0.229	0.233	0.255	1.244	1.23	1.501	0.445		0.487		0.528	
SULFIDE					0				0.06			

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT01	13MWT01	13MWT01	13MWT02	13MWT02	13MWT02	13MWT03	13MWT03	13MWT03	13MWT03	13MWT03
SAMPLING ROUND	01	02	03	01	02	03	01	01	02	02	03
SAMPLE NUMBER	13GWT0101	13GWT0102	13GWT0103	13GWT0201	13GWT0202	13GWT0203	13GWT0301	13GWT0301-F	13GWT0302	13GWT0302-F	13GWT0303
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/26/2003	11/23/2003	8/1/2004	4/26/2003	12/7/2003	7/24/2004	4/26/2003	4/26/2003	11/11/2003	11/11/2003	7/24/2004
TEMPERATURE (C)	12.59	17.04	18.75	15.28	10.43	19.59	13.14		18		19.98
TURBIDITY (NTU)	3.8	4.39	9.5	6.8	6.62	2.3	38		328 >		9.2
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U	0.005 UJ		0.13	0.24 J		0.12		0.07		
NITRITE/NITRATE-N	0.07	0.15 J		0.02 U	0.05 UJ		0.07		0.09		
TOTAL ORGANIC CARBON									0.5 U		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
1,3-DINITROBENZENE	0.26 U	0.281 U	0.27 U	0.3 J		0.263 U		0.26 U		0.19 U	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.562 U				0.526 U					
2,4,6-TRINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,4-DIAMINO-6-NITROTOLUENE		0.281 U				0.263 U					
2,4-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2,6-DIAMINO-4-NITROTOLUENE		0.281 U				0.263 U					
2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
2-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
3,5-DINITROANILINE		0.281 U				0.263 U					
3-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
4-NITROTOLUENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 UJ		0.26 U		0.19 U	
DNX		0.281 U				0.31 J					
HMX	3.3	4.1	4.7	13		10		12		0.97	
MNX		0.281 U				0.263 U					
NITROBENZENE	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
PICRAMIC ACID											
PICRIC ACID											
RDX	4.1	3.4	3.1	0.77 J		1.4		0.85		2	
TETRYL	0.26 U	0.281 U	0.27 U	0.155 U		0.263 U		0.26 U		0.19 U	
TNX		0.281 U				0.263 U					
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	8050 J	1530 J		21700 J		139000 J		510 J		12300 J	
ANTIMONY	0.19 U	0.02 U		0.09 U		0.32 U		0.57 U		0.19 U	
ARSENIC	1.8 J	0.5 U		4.7 J		24.1 J		0.8 U		4 J	
BARIUM	154 J	91.8 J		126 J		727 J		31.9 J		178 J	
BERYLLIUM	3.5 J	1.2 U		1.2 U		5.9 J		1.4 U		0.58 U	
CADMIUM	1.9 U	0.52 U		0.39 U		0.69 U		0.6 U		0.56 U	
CALCIUM	34800 J	19000 J		40200 J		35300 J		30900 J		36700 J	
CHROMIUM	1.5 J	0.49 U		36.4 J		145 J		2 U		18.7 J	
COBALT	111 J	38.8 J		34.2 J		48.6 J		43.2 J		3.6 J	
COPPER	3.8 J	2.1 J		10.1 J		48.3 J		4.1 U		7.3 J	
IRON	5400 J	1530 J		9860 J		68900 J		485 J		12000 J	
LEAD	3.2 J	0.94 U		8.1 J		46.5 J		1.5 U		7.1 J	
LITHIUM	126 J			40 J						15.7 J	
MAGNESIUM	16700 J	8720 J		35700 J		35400 J		24200 J		17700 J	
MANGANESE	1330 J	441 U		172 J		209 J		135 J		505 J	
MERCURY	0.02 U	0.007 U		0.02 U		0.097 J		0.03 U		0.02 U	
NICKEL	314 J	107 J		96.2 J		153 J		99.4 J		11.7 J	
POTASSIUM	7760 J	3920 J		8390 J		27500 J		1750 J		10300 J	
SELENIUM	0.61 U	0.23 U		0.42 U		1.3 U		0.3 U		0.69 U	
SILVER	0.24 U	0.03 U		0.05 U		0.2 U		0.55 U		0.49 U	
SODIUM	22800 J	19000 J		57900 J		49600 J		50800 J		58000 J	
STRONTIUM	101 J			189 J						203 J	
THALLIUM	0.6 U	0.16 U		0.2 U		1.2 U		0.35 U		0.11 U	
TIN	0.22 U	0.1 U		0.67 U		1.6 U		0.41 U		1.3 U	
TITANIUM	7.8 J	4.7 J		180 J		659 J				85 J	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
VANADIUM	0.79 J	0.32 U		34.3 J		135 J		1.1 J		15.8 J	
ZINC	358 J	97.3 J		114 J		334 J		183 J		30.3 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED					254 J		164 U		124 J		826 J
ANTIMONY, FILTERED					0.1 U		0.28 U		0.23 U		0.17 U
ARSENIC, FILTERED					0.8 J		0.32 U		0.44 U		0.51 U
BARIUM, FILTERED					22.8 J		26.2 J		27.9 J		41.6 J
BERYLLIUM, FILTERED					0.46 U		0.5 U		0.93 U		0.05 U
CADMIUM, FILTERED					0.26 U		0.47 U		0.26 U		0.17 U
CALCIUM, FILTERED					39800 J		33900 J		26100 J		34900 J
CHROMIUM, FILTERED					2.6 J		0.39 U		1.2 U		1.3 J
COBALT, FILTERED					35 J		39.3 J		38.2 J		1.3 J
COPPER, FILTERED					3.4 J		2.5 J		5.2 U		0.63 U
IRON, FILTERED					93.8 J		184 U		55.3 U		772 J
LEAD, FILTERED					0.21 U		0.37 U		0.53 U		0.3 U
LITHIUM, FILTERED					27.4 J						9.7 J
MAGNESIUM, FILTERED					32200 J		26000 J		20000 J		16700 J
MANGANESE, FILTERED					133 J		141 J		111 J		543 J
MERCURY, FILTERED					0.02 U		0.02 U		0.03 U		0.2 U
NICKEL, FILTERED					90.5 J		93.8 J		87.6 J		3.2 J
POTASSIUM, FILTERED					4540 J		2050 J		1540 J		7110 J
SELENIUM, FILTERED					0.28 U		0.17 U		0.1 U		0.29 U
SILVER, FILTERED					0.53 U		0.03 U		0.06 U		0.04 U
SODIUM, FILTERED					55000 J		50500 J		40500 J		49700 J
STRONTIUM, FILTERED					188 J						159 J
THALLIUM, FILTERED					0.06 U		0.04 U		0.04 U		0.05 U
TIN, FILTERED					0.11 U		0.1 U		0.07 U		0.34 U
TITANIUM, FILTERED					4.5 J		3.3 U				9.3 J
VANADIUM, FILTERED					0.46 U		0.11 U		0.15 U		1.1 J
ZINC, FILTERED					111 J		190 J		168 J		3.6 J
Field Parameters (mg/L)											
ALKALINITY						10 U					
CARBON DIOXIDE						33					
DISSOLVED OXYGEN			1.62			4		0.87			
DISSOLVED OXYGEN - METER	4.3	4.14		0.6		3.96				3.15	
HYDROGEN SULFIDE (H2S)						0					
IRON(+2)						0.11					
MANGANESE(+2)						1.3					
NITRITE-N						0.012					
OXIDATION REDUCTION POTENTIAL (MV)	216.1	243.6	455.2	76		432		97		88	
PH (S.U.)	4.77	5.24	5.03	5.83		5.4		6.6		6.63	
SPECIFIC CONDUCTANCE (MS/CM)	0.316	0.228	0.201	0.632		0.558		0.468		0.495	
SULFIDE						0.09					

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT04	13MWT04	13MWT04	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT05	13MWT06	13MWT06
SAMPLING ROUND	01	02	03	01	01	02	02	03	03	01	01
SAMPLE NUMBER	13GWT0401	13GWT0402	13GWT0403	13GWT0501	13GWT0501-F	13GWT0502	13GWT0502-F	13GWT0503	13GWT0503-F	13GWT0601	13GWT0601-F
SUBMATRIX	GW	GW	GW	GW	GF	GW	GF	GW	GF	GW	GF
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	4/27/2003	11/23/2003	7/24/2004	4/27/2003	4/27/2003	11/6/2003	11/6/2003	7/24/2004	7/24/2004	4/27/2003	4/27/2003
TEMPERATURE (C)	13.73	16.45	18.86	15.18		15.42		20.05		12.46	
TURBIDITY (NTU)	6	6.85	7.9	8.8		18.6		75		650	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.39	0.08 J		0.05		0.65				0.02	
NITRITE/NITRATE-N	0.24	0.27 J		0.03		0.09				0.03	
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.543 U				0.51 U	0.51 U				0.5 U	0.5 U
2,4,6-TRINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
2,4-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
2-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
3,5-DINITROANILINE	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
3-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
4-NITROTOLUENE	0.272 U		0.26 UJ	0.6 U	0.255 UJ	0.255 UJ	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
DNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
HMX	1.2		1.9 J	0.6 U	0.51	0.6	0.26 U	0.25 U	0.345 U	0.3 J	0.36 J
MNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
NITROBENZENE	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX	1.7		1.9 J	7.2	7.9	8.5	9.3	9.2	0.325 U	0.61 J	0.76 J
TETRYL	0.272 U		0.26 UJ	0.6 U	0.255 U	0.255 U	0.26 U	0.25 U	0.345 U	0.25 U	0.25 U
TNX	0.272 U				0.255 U	0.255 U				0.25 U	0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	1960 J			4320 J	4630 J	4660 J			907 J	5280 J	7660 J
ANTIMONY	0.13 U			0.03 U	0.02 U	0.02 U			0.03 U	0.09 U	0.06 U
ARSENIC	0.61 U			1.6 J	1.6 J	1.7 J			0.2 U	0.79 U	1.4 U
BARIUM	47.3 J			10.4 J	11.3 J	10.3 J			24.5 J	40 J	51.7 J
BERYLLIUM	0.11 U			8.4 J	9.3 J	9.4 J			0.14 U	0.26 U	0.36 U
CADMIUM	0.15 U			0.64 U	0.46 U	0.55 U			0.05 UJ	0.07 U	0.04 U
CALCIUM	27600 J			69400 J	76700 J	78800 J			2580 U	2030 J	2110 J
CHROMIUM	3.7 J			0.71 U	0.71 U	0.85 U			0.99 J	5.7 J	8.9 J
COBALT	0.48 U			140 J	121 J	123 J			2.2 J	2.4 J	3.2 J
COPPER	1.3 U			5 J	5.1 J	5.1 J			1 J	2.9 J	4.2 J
IRON	1520 J			128 J	683 J	737 J			600 J	3520 J	6090 J
LEAD	1.1 U			8.4 J	9.2 J	9.5 J			0.34 U	1.7 U	2.7 J
LITHIUM				154 J					6.6 J		
MAGNESIUM	13000 J			54300 J	56300 J	58100 J			2230 J	2540 J	2750 J
MANGANESE	33.6 J			1800 J	1810 J	1840 J			57.6 U	38.3 J	57.3 J
MERCURY	0.007 U			0.16 J	0.19 J	0.23			0.02 U	0.007 U	0.007 U
NICKEL	2.9 J			299 J	315 J	314 J			4.2 J	6.1 J	7.6 J
POTASSIUM	4010 J			4380 J	4660 J	4790 J			240 J	718 J	1080 J
SELENIUM	0.16 U			0.13 U	0.12 U	0.18 U			0.08 U	0.08 U	0.07 U
SILVER	0.16 U			0.04 U	0.03 U	0.03 U			0.14 U	0.09 U	0.03 U
SODIUM	44500 J			82300 J	92000 J	95300 J			8360 J	8580 J	8530 J
STRONTIUM				163 J					14.5 J		
THALLIUM	0.08 U			0.21 U	0.19 U	0.23 U			0.04 U	0.12 U	0.11 U
TIN	0.32 U			0.13 U	0.1 U	0.1 U			0.04 U	0.25 U	0.24 U
TITANIUM	22.2 J			4.4 J	2 U	3.9 U			16.8 J	87.5 J	127 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
VANADIUM	2.7 J			0.14 U	0.2 U	0.28 U			1.4 J	8.3 J	12.5 J
ZINC	4.8 J			382 J	408 J	437 J			7.4 J	10.9 J	13.9 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED		18.3 U									
ANTIMONY, FILTERED		0.34 U									
ARSENIC, FILTERED		0.36 U									
BARIUM, FILTERED		31.5 J									
BERYLLIUM, FILTERED		0.03 U									
CADMIUM, FILTERED		0.06 U									
CALCIUM, FILTERED		26900 J									
CHROMIUM, FILTERED		0.53 U									
COBALT, FILTERED		0.11 U									
COPPER, FILTERED		0.87 U									
IRON, FILTERED		27.1 U									
LEAD, FILTERED		0.04 U									
LITHIUM, FILTERED											
MAGNESIUM, FILTERED		12600 J									
MANGANESE, FILTERED		20.9 J									
MERCURY, FILTERED		0.007 U									
NICKEL, FILTERED		1.6 U									
POTASSIUM, FILTERED		3760 J									
SELENIUM, FILTERED		0.15 U									
SILVER, FILTERED		0.03 U									
SODIUM, FILTERED		45800 J									
STRONTIUM, FILTERED											
THALLIUM, FILTERED		0.04 U									
TIN, FILTERED		0.24 U									
TITANIUM, FILTERED		0.47 U									
VANADIUM, FILTERED		0.41 U									
ZINC, FILTERED		2.1 J									
Field Parameters (mg/L)											
ALKALINITY										10 U	
CARBON DIOXIDE										45	
DISSOLVED OXYGEN			6.73				2.28			5	
DISSOLVED OXYGEN - METER	7.35			0.34	1.32				2.45	6.44	
HYDROGEN SULFIDE (H2S)										0	
IRON(+2)										0.21	
MANGANESE(+2)										0	
NITRITE-N										0.001	
OXIDATION REDUCTION POTENTIAL (MV)	180.4		441.2	278	383.6		159		206	266.7	
PH (S.U.)	6.45		6.08	3.98	3.9		4.12		5.06	5	
SPECIFIC CONDUCTANCE (MS/CM)	0.363		0.399	1.03	1.054		1.078		0.74	0.076	
SULFIDE										0	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT06	13MWT06	13MWT06	13MWT07	13MWT07	13MWT07	13MWT07	13MWT07	13MWT08	13MWT08	13MWT08
SAMPLING ROUND	02	02	03	01	02	02	03	03	01	02	02
SAMPLE NUMBER	13GWT0602	13GWT0602-F	13GWT0603	13GWT0701	13GWT0702	13GWT0702-D	13GWT0703	13GWT0703-D	13GWT0801	13GWT0802	13GWT0802-D
SUBMATRIX	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL	ORIG	DUP
SAMPLE DATE	12/7/2003	12/10/2003	7/25/2004	4/27/2003	11/10/2003	11/10/2003	7/25/2004	7/25/2004	4/26/2003	11/23/2003	11/23/2003
TEMPERATURE (C)	12.5		18.85	15.6	18.45		19.8		14.65	15.18	
TURBIDITY (NTU)	22		26	6.8	3.01		1.5		10	36	
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.14			0.03	0.005 U	0.005 U			0.01 U	0.005 UJ	0.005 UJ
NITRITE/NITRATE-N	0.7			0.07	0.025 U	0.025 U			0.02 U	0.025 U	0.05 J
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE				0.3 U	0.3 U						
1,1,1-TRICHLOROETHANE				0.3 U	0.3 U						
1,1,2,2-TETRACHLOROETHANE				0.3 U	0.3 U						
1,1,2-TRICHLOROETHANE				0.3 U	0.3 U						
1,1-DICHLOROETHANE				0.3 U	0.3 U						
1,1-DICHLOROETHENE				0.3 U	0.3 U						
1,2,3-TRICHLOROPROPANE				0.3 U	0.3 U						
1,2-DIBROMO-3-CHLOROPROPANE				0.3 U	0.3 U						
1,2-DIBROMOETHANE				0.3 U	0.3 U						
1,2-DICHLOROETHANE				0.3 U	0.3 U						
1,2-DICHLOROPROPANE				0.3 U	0.3 U						
1,4-DIOXANE				50 U	50 U						
2-BUTANONE				0.5 U	0.5 U						
2-HEXANONE				0.5 UJ	0.5 UJ						
3-CHLOROPROPENE				0.5 U	0.5 U						
4-METHYL-2-PENTANONE				0.5 U	0.5 U						
ACETONE				0.5 UJ	0.5 UJ						
ACETONITRILE				20 U	20 U						
ACROLEIN				0.5 UR	0.5 UR						
ACRYLONITRILE				0.5 U	0.5 U						
BENZENE				0.3 U	0.3 U						
BROMODICHLOROMETHANE				0.3 U	0.3 U						
BROMOFORM				0.3 U	0.3 U						
BROMOMETHANE				0.3 UJ	0.3 UJ						
CARBON DISULFIDE				0.3 U	0.3 U						
CARBON TETRACHLORIDE				0.3 U	0.3 U						
CHLOROBENZENE				0.3 U	0.3 U						
CHLORODIBROMOMETHANE				0.3 U	0.3 U						
CHLOROETHANE				0.5 U	0.5 U						
CHLOROFORM				0.3 U	0.3 U						
CHLOROMETHANE				0.3 U	0.3 U						
CHLOROPRENE				0.5 U	0.5 U						
CIS-1,2-DICHLOROETHENE				0.3 U	0.3 U						
CIS-1,3-DICHLOROPROPENE				0.3 U	0.3 U						
DIBROMOMETHANE				0.3 U	0.3 U						
DICHLORODIFLUOROMETHANE				0.3 U	0.3 U						
ETHYL METHACRYLATE				0.5 U	0.5 U						
ETHYLBENZENE				0.3 U	0.3 U						
ISOBUTANOL				20 U	20 U						
METHACRYLONITRILE				0.3 U	0.3 U						
METHYL IODIDE				0.5 U	0.5 U						
METHYL METHACRYLATE				0.5 U	0.5 U						

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
METHYLENE CHLORIDE				0.3 U	0.3 U						
PROPIONITRILE				20 U	20 U						
STYRENE				0.3 U	0.3 U						
TETRACHLOROETHENE				0.3 U	0.3 U						
TOLUENE				0.3 U	0.3 U						
TOTAL XYLENES				0.3 U	0.3 U						
TRANS-1,2-DICHLOROETHENE				0.3 U	0.3 U						
TRANS-1,3-DICHLOROPROPENE				0.3 U	0.3 U						
TRANS-1,4-DICHLORO-2-BUTENE				0.5 U	0.5 U						
TRICHLOROETHENE				0.3 U	0.3 U						
TRICHLOROFLUOROMETHANE				0.3 U	0.3 U						
VINYL ACETATE				0.5 U	0.5 U						
VINYL CHLORIDE				0.3 U	0.3 U						
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE				1 U	1 U	1 U	1 U				
1,2,4-TRICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,2-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,3-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,4-DICHLOROBENZENE				1 U	1 U	1 U	1 U				
1,4-NAPHTHOQUINONE				1 UJ	1 UJ	1 U	1 U				
1,4-PHENYLENEDIAMINE				1 UJ	1 UJ	1 UJ	1 UJ				
1-NAPHTHYLAMINE				1 U	1 U	1 U	1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)				1 U	1 U	1 U	1 U				
2,3,4,6-TETRACHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4,5-TRICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4,6-TRICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4-DICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2,4-DIMETHYLPHENOL				1 UR	1 U	1 U	1 U				
2,4-DINITROPHENOL				1 UR	1 UR	1 UJ	1 UJ				
2,6-DICHLOROPHENOL				1 UR	1 U	1 U	1 U				
2-ACETYLAMINOFLUORENE				1 U	1 U	1 U	1 U				
2-CHLORONAPHTHALENE				1 UJ	1 UJ	1 U	1 U				
2-CHLOROPHENOL				1 UR	1 U	1 U	1 U				
2-METHYLNAPHTHALENE				0.05 U	0.05 U						
2-METHYLPHENOL				1 UR	1 U	1 U	1 U				
2-NAPHTHYLAMINE				1 U	1 U	1 U	1 U				
2-NITROANILINE				1 U	1 U	1 U	1 U				
2-NITROPHENOL				1 UR	1 U	1 U	1 U				
2-PICOLINE				1 U	1 U	1 U	1 U				
3&4-METHYLPHENOL				1 UR	1 U	1 U	1 U				
3,3'-DICHLOROBENZIDINE				1 U	1 U	1 U	1 U				
3,3'-DIMETHYLBENZIDINE				1 U	1 U	1 U	1 U				
3-METHYLCHOLANTHRENE				1 U	1 U	1 U	1 U				

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01	
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001	
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW	
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL	
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003	
3-NITROANILINE				1 U	1 U	1 U	1 U					
4,6-DINITRO-2-METHYLPHENOL				1 UR	1 UJ	1 U	1 U					
4-AMINOBIPHENYL				1 U	1 U	1 U	1 U					
4-BROMOPHENYL PHENYL ETHER				1 U	1 U	1 U	1 U					
4-CHLORO-3-METHYLPHENOL				1 UR	1 U	1 U	1 U					
4-CHLOROANILINE				1 U	1 U	1 U	1 U					
4-CHLOROPHENYL PHENYL ETHER				1 U	1 U	1 U	1 U					
4-NITROANILINE				1 U	1 U	1 U	1 U					
4-NITROPHENOL				1 UR	1 UR	1 U	1 U					
4-NITROQUINOLINE-1-OXIDE				1 UR	1 UR	1 UR	1 UR					
5-NITRO-O-TOLUIDINE				1 U	1 U	1 U	1 U					
7,12-DIMETHYLBENZ(A)ANTHRACENE				1 U	1 U	1 U	1 U					
A,A-DIMETHYLPHENETHYLAMINE				1 U	1 U	1 U	1 U					
ACENAPHTHENE				0.05 U	0.05 U							
ACENAPHTHYLENE				0.05 U	0.05 U							
ACETOPHENONE				1 U	1 U	1 U	1 U					
ANILINE				1 U	1 U	1 UJ	1 UJ					
ANTHRACENE				0.05 U	0.05 U							
ARAMITE				1 UR	1 UR	1 UR	1 UR					
BENZO(A)ANTHRACENE				0.05 U	0.05 U							
BENZO(A)PYRENE				0.05 U	0.05 U							
BENZO(B)FLUORANTHENE				0.05 U	0.05 U							
BENZO(G,H,I)PERYLENE				0.05 U	0.05 U							
BENZO(K)FLUORANTHENE				0.05 U	0.05 U							
BENZYL ALCOHOL				1 U	1 U	1 U	1 U					
BIS(2-CHLOROETHOXY)METHANE				1 U	1 U	1 U	1 U					
BIS(2-CHLOROETHYL)ETHER				1 U	1 U	1 U	1 U					
BIS(2-ETHYLHEXYL)PHTHALATE				1 U	1 U	1 U	1 U					
BUTYL BENZYL PHTHALATE				1 U	1 U	1 U	1 U					
CHLOROBENZILATE				1 U	1 U	1 U	1 U					
CHRYSENE				0.05 U	0.05 U							
DI-N-BUTYL PHTHALATE				1 U	1 U	1 U	1 U					
DI-N-OCTYL PHTHALATE				1 U	1 U	1 U	1 U					
DIALLATE				1 U	1 U	1 U	1 U					
DIBENZO(A,H)ANTHRACENE				0.05 U	0.05 U							
DIBENZOFURAN				1 U	1 U	1 U	1 U					
DIETHYL PHTHALATE				1 U	1 U	1 U	1 U					
DIMETHYL PHTHALATE				1 U	1 U	1 U	1 U					
DIPHENYLAMINE				1 U	1 U	1 U	1 U					
ETHYL METHANE SULFONATE				1 U	1 U	1 U	1 U					
FLUORANTHENE				0.05 U	0.05 U							
FLUORENE				0.05 U	0.05 U							
HEXACHLOROBENZENE				1 U	1 U	1 U	1 U					

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
HEXACHLOROBUTADIENE				1 U	1 U	1 U	1 U				
HEXACHLOROCYCLOPENTADIENE				1 UR	1 UR	1 UR	1 UR				
HEXACHLOROETHANE				1 U	1 U	1 U	1 U				
HEXACHLOROPROPENE				1 U	1 U	1 U	1 U				
INDENO(1,2,3-CD)PYRENE				0.05 U	0.05 U						
ISODRIN				1 U	1 U	1 U	1 U				
ISOPHORONE				1 U	1 U	1 U	1 U				
ISOSAFROLE				1 U	1 U	1 U	1 U				
KEPONE				1 UJ	1 UJ	1 UR	1 UR				
METHAPYRILENE				1 U	1 U	1 U	1 U				
METHYL METHANE SULFONATE				1 U	1 U	1 U	1 U				
N-NITROSO-DI-N-BUTYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSO-DI-N-PROPYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSODIETHYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSODIMETHYLAMINE				1 U	1 U	1 UJ	1 UJ				
N-NITROSOMETHYLETHYLAMINE				1 U	1 U	1 U	1 U				
N-NITROSOMORPHOLINE				1 U	1 U	1 U	1 U				
N-NITROSOPIPERIDINE				1 U	1 U	1 U	1 U				
N-NITROSOPYRROLIDINE				1 U	1 U	1 U	1 U				
NAPHTHALENE				0.05 U	0.05 U						
O,O,O-TRIETHYL PHOSPHOROTHIOATE				1 U	1 U	1 U	1 U				
O-TOLUIDINE				1 U	1 U	1 U	1 U				
P-(DIMETHYLAMINO)AZOBENZENE				1 U	1 U	1 U	1 U				
PENTACHLOROBENZENE				1 U	1 U	1 U	1 U				
PENTACHLOROETHANE				1 U	1 U	1 U	1 U				
PENTACHLORONITROBENZENE				1 U	1 U	1 U	1 U				
PHENACETIN				1 U	1 U	1 U	1 U				
PHENANTHRENE				0.05 U	0.05 U						
PHENOL				1 UR	1 U	1 U	1 U				
PRONAMIDE				1 U	1 U	1 U	1 U				
PYRENE				0.05 U	0.05 U						
PYRIDINE				1 U	1 U	1 U	1 U				
SAFROLE				1 U	1 U	1 U	1 U				
Energetics (ug/L)											
1,3,5-TRINITROBENZENE			0.25 U	0.215 U	0.385 U			1.3	1.4 J	1.1	0.265 U
1,3-DINITROBENZENE			0.25 U	1.4 J	1.5 J			2.4	2.2	2.1	0.265 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE								0.505 U	0.633 U		
2,4,6-TRINITROTOLUENE			0.25 U	19	20 J			25	20	24	0.265 U
2,4-DIAMINO-6-NITROTOLUENE								3.9	3.8 J		
2,4-DINITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	1.4 J	0.265 U
2,6-DIAMINO-4-NITROTOLUENE								0.253 U	0.316 U		
2,6-DINITROTOLUENE			0.25 U	0.215 U	0.385 U			9.9	8.2	8.8 J	0.265 U
2-AMINO-4,6-DINITROTOLUENE			0.25 U	8.6 J	8.6 J			13	18	15 J	0.265 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
2-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
3,5-DINITROANILINE								0.253 U	0.316 U		
3-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
4-AMINO-2,6-DINITROTOLUENE			0.25 U	18	18			18	15 J	19	0.265 U
4-NITROTOLUENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
DNX								4 J	2.6 J		
HMX			0.3 J	84	66			130	92	140	0.265 U
MNX								7.1 J	5.5 J		
NITROBENZENE			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
PICRAMIC ACID											
PICRIC ACID											
RDX			0.25 U	1100	1100			1700	1300	1500	0.25 U
TETRYL			0.25 U	0.215 U	0.385 U			0.253 U	0.316 U	0.24 U	0.265 U
TNX								1.5 J	0.58 J		
Herbicides (ug/L)											
HEXACHLOROPHENE				0.025 U	0.025 U						
PENTACHLOROPHENOL				0.013 U	0.013 U						
Total Metals (ug/L)											
ALUMINUM				297 J	278 J			62.3 U	56.4 U		1430 J
ANTIMONY				0.03 U	0.03 U			0.02 U	0.04 U		0.03 U
ARSENIC				0.09 U	0.07 U			0.07 U	0.1 U		1.1 J
BARIUM				155 J	159 J			137 J	138 J		18.3 J
BERYLLIUM				0.41 U	0.42 U			0.14 U	0.16 U		4.3 J
CADMIUM				0.05 UJ	0.05 U			0.04 U	0.04 U		0.94 U
CALCIUM				48600 J	50100 J			48500 J	47500 J		26700 J
CHROMIUM				0.02 U	0.02 U			0.28 U	0.21 U		1 J
COBALT				17.2 J	17.6 J			14.3 J	14.6 J		246 J
COPPER				1.2 J	1.4 J			0.65 U	0.56 U		4.3 J
IRON				25 U	24.7 U			38.2 U	28.6 U		3560 J
LEAD				0.44 U	0.46 U			0.29 U	0.22 U		7.7 J
LITHIUM				31.1 J	31.8 J						158 J
MAGNESIUM				38700 J	39900 J			36500 J	35200 J		22200 J
MANGANESE				608 J	624 J			510 J	515 J		1580 J
MERCURY				0.034 J	0.026 J			0.091 J	0.1 J		0.02 U
NICKEL				23.7 J	25.3 J			18.5 J	19.2 J		371 J
POTASSIUM				983 J	1010 J			848 J	905 J		2570 J
SELENIUM				0.05 U	0.07 U			0.1 U	0.06 U		0.07 U
SILVER				0.04 U	0.06 U			0.03 U	0.03 U		0.04 U
SODIUM				35000 J	36700 J			33900 J	34800 J		25500 J
STRONTIUM				229 J	236 J						86.9 J
THALLIUM				0.34 U	0.35 U			0.36 U	0.35 U		0.25 U
TIN				0.03 U	0.04 U			0.12 U	0.14 U		0.13 U
TITANIUM				2.5 J	2.4 J			0.65 U	1 U		5.9 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
VANADIUM				0.05 U	0.05 U			0.07 U	0.06 U		0.58 U
ZINC				22 J	22.9 J			14.5 J	15.4 J		208 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	92.7 U	91.2 U									
ANTIMONY, FILTERED	0.02 U	0.44 U									
ARSENIC, FILTERED	0.12 U	0.36 U									
BARIUM, FILTERED	21.1 J	19.6 J									
BERYLLIUM, FILTERED	0.12 U	0.37 U									
CADMIUM, FILTERED	0.04 U	0.22 U									
CALCIUM, FILTERED	2250 J	2000 J									
CHROMIUM, FILTERED	0.13 U	0.39 U									
COBALT, FILTERED	1.9 J	3.1 J									
COPPER, FILTERED	0.35 U	0.64 U									
IRON, FILTERED	122 U	167 U									
LEAD, FILTERED	0.07 U	0.37 U									
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	2190 J	2090 J									
MANGANESE, FILTERED	45.4 J	47.9 J									
MERCURY, FILTERED	0.007 U	0.007 U									
NICKEL, FILTERED	3.6 J	3.6 J									
POTASSIUM, FILTERED	151 U	149 U									
SELENIUM, FILTERED	0.04 U	0.22 U									
SILVER, FILTERED	0.03 U	0.26 U									
SODIUM, FILTERED	8900 J	8970 J									
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.04 U	0.29 U									
TIN, FILTERED	0.1 U	0.49 U									
TITANIUM, FILTERED	1.1 U	1.9 U									
VANADIUM, FILTERED	0.14 U	0.34 U									
ZINC, FILTERED	3.3 J	3.5 J									
Field Parameters (mg/L)											
ALKALINITY								0			
CARBON DIOXIDE								48			
DISSOLVED OXYGEN			3.48					1.5		0.2	
DISSOLVED OXYGEN - METER				1.69		1.21		1.14			1.4
HYDROGEN SULFIDE (H2S)								0			
IRON(+2)								0			
MANGANESE(+2)								0.4			
NITRITE-N								0.023			
OXIDATION REDUCTION POTENTIAL (MV)			121	205.6		148		251		88.1	364
PH (S.U.)			6.11	5.36		5.38		5.32		6.27	3.01
SPECIFIC CONDUCTANCE (MS/CM)			0.085	0.829		0.725		0.64		0.773	0.582
SULFIDE								0.01			

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT08	13MWT08	13MWT08	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT09	13MWT10
SAMPLING ROUND	02	02	03	01	01	01	01	02	02	03	01
SAMPLE NUMBER	13GWT0802-F	13GWT0802-F-D	13GWT0803	13GWT0901	13GWT0901-D	13GWT0902	13GWT0902-D	13GWT0903	13GWT0903-D	13GWT0904	13GWT1001
SUBMATRIX	GF	GF	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
SAMPLE DATE	11/23/2003	11/23/2003	7/23/2004	4/28/2003	4/28/2003	5/9/2003	5/9/2003	12/4/2003	12/4/2003	7/31/2004	4/27/2003
TEMPERATURE (C)			20.69	13.33		14.36		12.82		18.15	15.6
TURBIDITY (NTU)			16	3		0.1		4.07		3.8	10
Miscellaneous Parameters (mg/L)											
AMMONIA-N				3.3	3.2			3.4	3.5		0.98
NITRITE/NITRATE-N				92	94			54 J	74 J		0.02 U
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2,3-TRICHLOROPROPANE												
1,2-DIBROMO-3-CHLOROPROPANE												
1,2-DIBROMOETHANE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
1,4-DIOXANE												
2-BUTANONE												
2-HEXANONE												
3-CHLOROPROPENE												
4-METHYL-2-PENTANONE												
ACETONE												
ACETONITRILE												
ACROLEIN												
ACRYLONITRILE												
BENZENE												
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CHLOROPRENE												
CIS-1,2-DICHLOROETHENE												
CIS-1,3-DICHLOROPROPENE												
DIBROMOMETHANE												
DICHLORODIFLUOROMETHANE												
ETHYL METHACRYLATE												
ETHYLBENZENE												
ISOBUTANOL												
METHACRYLONITRILE												
METHYL IODIDE												
METHYL METHACRYLATE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
METHYLENE CHLORIDE												
PROPIONITRILE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE												
TOTAL XYLENES												
TRANS-1,2-DICHLOROETHENE												
TRANS-1,3-DICHLOROPROPENE												
TRANS-1,4-DICHLORO-2-BUTENE												
TRICHLOROETHENE												
TRICHLOROFLUOROMETHANE												
VINYL ACETATE												
VINYL CHLORIDE												
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
1,3-DINITROBENZENE	0.266 U	0.27 U	0.83 J	0.258 U	0.46 J	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.532 U			0.515 U				0.521 U				0.515 U
2,4,6-TRINITROTOLUENE	0.266 U	0.27 U	31	9.5	11	1.8		1.6	2.2	0.37 U	0.18 U	0.258 U
2,4-DIAMINO-6-NITROTOLUENE	0.266 U			1.4 J				0.89 J				0.258 U
2,4-DINITROTOLUENE	0.266 U	0.27 U	0.43 U	1.2	1.6	0.6 U		0.48 J	0.61 J	0.37 U	0.18 U	0.258 U
2,6-DIAMINO-4-NITROTOLUENE	0.266 U			1.8 J				0.26 U				0.258 U
2,6-DINITROTOLUENE	0.266 U	0.27 U	0.43 U	1.2 J	2.1 J	0.6 U		0.26 U	1 J	0.37 U	0.18 U	0.258 U
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.27 U	6 J	4.4 J	6.6 J	3.7 J		3.1 J	4.4 J	0.37 U	0.18 U	0.258 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
2-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
3,5-DINITROANILINE	0.266 U			0.258 U				0.26 U				0.258 U
3-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.58 J	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
4-AMINO-2,6-DINITROTOLUENE	0.266 U	0.27 U	19	9.8	14	5.8 J		4.8	6.7	0.37 U	0.18 U	0.258 U
4-NITROTOLUENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
DNX	0.266 U			0.258 U				0.5 J				0.258 U
HMX	0.45 J	0.27 U	34	44	45	50		41	54	9.5	8.4	12
MNX	0.266 U			1.2				0.68				0.258 U
NITROBENZENE	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
PICRAMIC ACID												
PICRIC ACID												
RDX	0.266 U	0.27 U	560	520	490	150		140	160	12	10	20
TETRYL	0.266 U	0.27 U	0.43 U	0.258 U	0.27 U	0.6 U		0.26 U	0.27 U	0.37 U	0.18 U	0.258 U
TNX	0.266 U			0.258 U				0.26 U				0.258 U
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM	768 J		719 J	696 J		2170 J		67 U		1080 J	1060 J	1000 J
ANTIMONY	0.02 U		0.03 U	0.02 U		0.03 U		0.02 U		0.03 U	0.04 U	0.02 U
ARSENIC	1 U		0.22 U	0.23 U		1.3 J		0.13 U		0.39 U	0.41 U	0.16 U
BARIUM	18.8 J		27.4 J	27.6 J		36.5 J		21.1 J		43.8 J	43.3 J	52.9 J
BERYLLIUM	3.1 J		1.6 U	1.4 U		0.27 U		0.24 U		2.1 J	2.1 J	2.1 U
CADMIUM	1.2 U		0.12 U	0.13 U		0.1 U		0.04 U		0.09 U	0.12 U	0.04 U
CALCIUM	30600 J		5760 J	6320 J		2800 J		1720 J		3740 J	3700 J	3030 J
CHROMIUM	0.61 U		0.35 U	0.25 U		4.1 J		0.17 U		0.29 U	0.33 U	0.29 U
COBALT	210 J		26.3 J	24 J		8.1 J		6.5 J		30.1 J	30.2 J	25.3 J
COPPER	1.3 U		3 J	1.6 U		2.2 J		0.7 U		5 J	4.9 J	3.6 J
IRON	22900 J		4250 J	4340 J		2020 J		129 U		860 J	846 J	162 J
LEAD	3.5 J		1.5 U	1.4 U		1.9 U		0.08 U		1 U	0.99 U	0.63 U
LITHIUM			66.8 J			15.3 J				29.3 J	28.7 J	
MAGNESIUM	25500 J		4770 J	4660 J		2560 J		2370 J		3660 J	3680 J	3420 J
MANGANESE	1720 J		250 J	251 U		216 J		312 U		600 J	584 J	451 J
MERCURY	0.007 U		0.032 J	0.007 U		0.02 U		0.035 J		0.2 U	0.2 U	0.007 U
NICKEL	357 J		66.5 J	61 J		16.4 J		15.3 J		25.3 J	24.8 J	20.4 J
POTASSIUM	3220 J		668 J	687 J		724 J		358 J		649 J	641 J	459 J
SELENIUM	0.04 U		0.05 U	0.04 U		0.25 U		0.14 U		0.1 U	0.12 U	0.06 U
SILVER	0.03 U		0.04 U	0.03 U		0.11 U		0.03 U		0.04 U	0.13 U	0.05 U
SODIUM	31500 J		24000 J	26000 J		21900 J		20600 J		6030 J	6330 J	6800 J
STRONTIUM			31 J			14.6 J				18.5 J	18.3 J	
THALLIUM	0.23 U		0.1 U	0.14 U		0.04 U		0.04 U		0.05 U	0.1 U	0.1 U
TIN	0.1 U		0.03 U	0.1 U		0.11 U		0.1 U		0.09 U	0.07 U	0.1 U
TITANIUM	1.8 U		6.7 J	1 U		34.6 J		1 U		3.7 J	3.7 J	0.73 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
VANADIUM	0.17 U		0.29 U	0.06 U		4.2 J		0.07 U		0.07 U	0.1 U	0.06 U
ZINC	245 J		82.7 J	85.3 J		14.6 J		10.8 J		35.1 J	34.4 J	25.3
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED							257 J					
ANTIMONY, FILTERED							0.03 U					
ARSENIC, FILTERED							0.37 U					
BARIUM, FILTERED							26.2 J					
BERYLLIUM, FILTERED							0.17 U					
CADMIUM, FILTERED							0.13 U					
CALCIUM, FILTERED							2980 J					
CHROMIUM, FILTERED							0.63 U					
COBALT, FILTERED							9 J					
COPPER, FILTERED							3.4 J					
IRON, FILTERED							203 J					
LEAD, FILTERED							0.31 U					
LITHIUM, FILTERED							14.6 J					
MAGNESIUM, FILTERED							2500 J					
MANGANESE, FILTERED							224 J					
MERCURY, FILTERED							0.02 U					
NICKEL, FILTERED							18.3 J					
POTASSIUM, FILTERED							366 J					
SELENIUM, FILTERED							0.26 U					
SILVER, FILTERED							0.16 U					
SODIUM, FILTERED							21800 J					
STRONTIUM, FILTERED							13.6 J					
THALLIUM, FILTERED							0.04 U					
TIN, FILTERED		-					0.06 U					
TITANIUM, FILTERED							8.1 J					
VANADIUM, FILTERED							0.46 U					
ZINC, FILTERED							13.5 J					
Field Parameters (mg/L)												
ALKALINITY	10 U			10 U				10 U				10 U
CARBON DIOXIDE	154			165				135				120
DISSOLVED OXYGEN	3.5	7.8		1.5	4.95			2	3.86			11
DISSOLVED OXYGEN - METER	4.83		0.85	3.49		2.35		2.02		3.37		3.26
HYDROGEN SULFIDE (H2S)	0			0				0				0
IRON(+2)	3.3 >			3.3 >				0.1				0.03
MANGANESE(+2)	1.8			0.3				0.4				0.5
NITRITE-N	0.003			0.009				0				0
OXIDATION REDUCTION POTENTIAL (MV)	230.3	402.8	265	355	127	242		305.9	444.5	268.2		385.1
PH (S.U.)	4.74	4.23	3.64	3.93	3.85	4.83		4.87	4.66	4.2		3.56
SPECIFIC CONDUCTANCE (MS/CM)	0.52	0.629	0.251	0.238	0.262	0.135		0.131	0.132	0.106		0.113
SULFIDE	0.05			0.01				0.01				0

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT10	13MWT10	13MWT11	13MWT11	13MWT11	13MWT12	13MWT12	13MWT12	13MWT12	13MWT13	13MWT13	13MWT13
SAMPLING ROUND	02	03	01	02	03	01	01	02	03	01	01	02
SAMPLE NUMBER	13GWT1002	13GWT1003	13GWT1101	13GWT1102	13GWT1103	13GWT1201	13GWT1201-F	13GWT1202	13GWT1203	13GWT1301	13GWT1301-D	13GWT1302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
SAMPLE DATE	11/20/2003	7/29/2004	4/27/2003	11/20/2003	7/23/2004	4/27/2003	4/27/2003	11/18/2003	7/25/2004	5/7/2003	5/7/2003	11/25/2003
TEMPERATURE (C)	19.73	21.36	15.73	16.35	21.2	14.46		16.37	16.7	13.82		12.33
TURBIDITY (NTU)	5.79	9	10	4.52	2.5	60		29.1	9.8	5.8		0.38
Miscellaneous Parameters (mg/L)												
AMMONIA-N	0.84 J		0.1	0.1 J		0.06		0.005 UJ		0.03	0.03	0.01
NITRITE/NITRATE-N	0.025 U		0.02 U	0.19 J		1.3		0.3 J		1.1	1.1	1 J
TOTAL ORGANIC CARBON	1											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
Volatile Organics (ug/L)												
1,1,1,2-TETRACHLOROETHANE												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2,3-TRICHLOROPROPANE												
1,2-DIBROMO-3-CHLOROPROPANE												
1,2-DIBROMOETHANE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
1,4-DIOXANE												
2-BUTANONE												
2-HEXANONE												
3-CHLOROPROPENE												
4-METHYL-2-PENTANONE												
ACETONE												
ACETONITRILE												
ACROLEIN												
ACRYLONITRILE												
BENZENE												
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CHLOROPRENE												
CIS-1,2-DICHLOROETHENE												
CIS-1,3-DICHLOROPROPENE												
DIBROMOMETHANE												
DICHLORODIFLUOROMETHANE												
ETHYL METHACRYLATE												
ETHYLBENZENE												
ISOBUTANOL												
METHACRYLONITRILE												
METHYL IODIDE												
METHYL METHACRYLATE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
METHYLENE CHLORIDE												
PROPIONITRILE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE												
TOTAL XYLENES												
TRANS-1,2-DICHLOROETHENE												
TRANS-1,3-DICHLOROPROPENE												
TRANS-1,4-DICHLORO-2-BUTENE												
TRICHLOROETHENE												
TRICHLOROFLUOROMETHANE												
VINYL ACETATE												
VINYL CHLORIDE												
Semivolatile Organics (ug/L)												
1,2,4,5-TETRACHLOROBENZENE												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
1,4-NAPHTHOQUINONE												
1,4-PHENYLENEDIAMINE												
1-NAPHTHYLAMINE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,3,4,6-TETRACHLOROPHENOL												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,6-DICHLOROPHENOL												
2-ACETYLAMINOFLUORENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NAPHTHYLAMINE												
2-NITROANILINE												
2-NITROPHENOL												
2-PICOLINE												
3&4-METHYLPHENOL												
3,3'-DICHLOROBENZIDINE												
3,3'-DIMETHYLBENZIDINE												
3-METHYLCHOLANTHRENE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-AMINOBIPHENYL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-NITROANILINE												
4-NITROPHENOL												
4-NITROQUINOLINE-1-OXIDE												
5-NITRO-O-TOLUIDINE												
7,12-DIMETHYLBENZ(A)ANTHRACENE												
A,A-DIMETHYLPHENETHYLAMINE												
ACENAPHTHENE												
ACENAPHTHYLENE												
ACETOPHENONE												
ANILINE												
ANTHRACENE												
ARAMITE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BENZYL ALCOHOL												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CHLOROBENZILATE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIALLATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
DIPHENYLAMINE												
ETHYL METHANE SULFONATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
HEXACHLOROPROPENE												
INDENO(1,2,3-CD)PYRENE												
ISODRIN												
ISOPHORONE												
ISOSAFROLE												
KEPONE												
METHAPYRILENE												
METHYL METHANE SULFONATE												
N-NITROSO-DI-N-BUTYLAMINE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIETHYLAMINE												
N-NITROSODIMETHYLAMINE												
N-NITROSOMETHYLETHYLAMINE												
N-NITROSOMORPHOLINE												
N-NITROSOPIPERIDINE												
N-NITROSOPYRROLIDINE												
NAPHTHALENE												
O,O,O-TRIETHYL PHOSPHOROTHIOATE												
O-TOLUIDINE												
P-(DIMETHYLAMINO)AZOBENZENE												
PENTACHLOROBENZENE												
PENTACHLOROETHANE												
PENTACHLORONITROBENZENE												
PHENACETIN												
PHENANTHRENE												
PHENOL												
PRONAMIDE												
PYRENE												
PYRIDINE												
SAFROLE												
Energetics (ug/L)												
1,3,5-TRINITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
1,3-DINITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U			0.515 U					0.575 U	
2,4,6-TRINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE			0.25 U			0.258 U					0.287 U	
2,4-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U			0.258 U					0.287 U	
2,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
2-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
3,5-DINITROANILINE			0.25 U			0.258 U					0.287 U	
3-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
4-AMINO-2,6-DINITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.12 J	0.144 U	0.27 U
4-NITROTOLUENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
DNX			0.25 U			0.258 U					5.8 J	
HMX	12	0.345 U	0.89 J	0.34 J	0.485 U	0.258 U			0.25 U	22 J	120	32
MNX			0.25 U			0.258 U					3.6 J	
NITROBENZENE	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
PICRAMIC ACID												
PICRIC ACID												
RDX	17	1.6	4.7	2	0.46 U	0.258 U			0.25 U	10	16	18
TETRYL	0.24 U	0.345 U	0.25 U	0.25 U	0.485 U	0.258 U			0.25 U	0.11 U	0.144 U	0.27 U
TNX			0.25 U			0.258 U					0.31 J	
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM		57.1 U	47.5 U		1440 J	4310 J				123 J	116 U	
ANTIMONY		0.03 U	0.02 U		0.03 U	0.09 U				0.33 U	0.02 U	
ARSENIC		5.8 J	3.1 J		7 J	9.2 J				0.66 U	0.35 U	
BARIUM		31.1 J	19.1 J		43.3 J	39 J				72.9 J	69.3 J	
BERYLLIUM		0.06 U	0.05 U		4.2 J	5.2 J				0.13 U	0.03 U	
CADMIUM		0.35 U	0.04 U		1 U	0.63 U				0.14 U	0.04 U	
CALCIUM		29700 J	34100 J		14600 J	10700 J				27200 J	46000 J	
CHROMIUM		0.18 U	0.53 U		0.82 U	4.5 J				0.29 U	0.33 U	
COBALT		14.2 J	9.5 J		106 J	82.7 J				5.4 J	0.95 U	
COPPER		0.28 U	0.3 U		3 J	0.87 U				0.59 U	1.2 U	
IRON		10500 J	9740 J		9260 J	17500 J				2570 J	159 U	
LEAD		0.2 U	0.04 U		23.8 J	35.9 J				0.14 U	0.09 U	
LITHIUM		33.9 J			133 J					2.3 J		
MAGNESIUM		26100 J	29500 J		14300 J	13200 J				11600 J	14400 J	
MANGANESE		1910 J	1880 J		1300 J	821 J				712 J	330 U	
MERCURY		0.02 U	0.007 U		0.2 U	0.007 U				0.2 U	0.007 U	
NICKEL		24.7 J	20 J		222 J	182 J				7.1 J	5.3 J	
POTASSIUM		2080 J	2010 J		2230 J	2550 J				576 J	500 J	
SELENIUM		0.41 U	0.04 U		1.1 U	0.1 U				0.26 U	0.1 U	
SILVER		0.04 U	0.03 U		0.04 U	0.07 U				0.74 U	0.03 U	
SODIUM		48300 J	57400 J		16000 J	16300 J				15000 J	25400 J	
STRONTIUM		71.7 J			65.5 J					129 J		
THALLIUM		0.04 U	0.04 U		0.4 U	0.65 U				0.14 U	0.04 U	
TIN		0.3 U	0.1 U		0.09 U	0.17 U				0.12 U	0.1 U	
TITANIUM		1.9 U	0.7 U		4.6 J	26 J				3.2 J	3.3 J	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
VANADIUM		0.08 U	0.08 U		0.32 U	4.3 J				0.27 U	0.22 U	
ZINC		17.8 J	16.9 J		266 J	240				3.9 J	2.8 U	
Dissolved Metals (ug/L)												
ALUMINUM, FILTERED								1990 J				
ANTIMONY, FILTERED								0.27 U				
ARSENIC, FILTERED								8.6 J				
BARIUM, FILTERED								30.5 J				
BERYLLIUM, FILTERED								5.2 J				
CADMIUM, FILTERED								0.78 U				
CALCIUM, FILTERED								10700 J				
CHROMIUM, FILTERED								0.98 U				
COBALT, FILTERED								82.8 J				
COPPER, FILTERED								1.4 U				
IRON, FILTERED								16000 J				
LEAD, FILTERED								35.7 J				
LITHIUM, FILTERED												
MAGNESIUM, FILTERED								13000 J				
MANGANESE, FILTERED								812 J				
MERCURY, FILTERED								0.007 U				
NICKEL, FILTERED								180 J				
POTASSIUM, FILTERED								2040 J				
SELENIUM, FILTERED								0.19 U				
SILVER, FILTERED								0.25 U				
SODIUM, FILTERED								16400 J				
STRONTIUM, FILTERED												
THALLIUM, FILTERED								0.84 U				
TIN, FILTERED								0.26 U				
TITANIUM, FILTERED								0.42 U				
VANADIUM, FILTERED								0.63 U				
ZINC, FILTERED								222 J				
Field Parameters (mg/L)												
ALKALINITY						10 U						
CARBON DIOXIDE						137						
DISSOLVED OXYGEN	0.73			6.74		0.07			0.53			3.85
DISSOLVED OXYGEN - METER		1.2	0.52		0.53	7.79				0.81	3.87	
HYDROGEN SULFIDE (H2S)						0						
IRON(+2)						3.3 >						
MANGANESE(+2)						0.9						
NITRITE-N						0.001						
OXIDATION REDUCTION POTENTIAL (MV)	132	23.2	100.5	71	286.8	322			6.85	-30.4	237.8	386.4
PH (S.U.)	4.31	5.5	5.48	6.86	3.74	3.98			3.26	6.16	6.13	6.05
SPECIFIC CONDUCTANCE (MS/CM)	0.131	0.885	0.623	0.714	0.391	0.34			0.352	0.356	0.402	0.29
SULFIDE						0.14						

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT13	13MWT14	13MWT14	13MWT14	13MWT15	13MWT15	13MWT15	13MWT15	13MWT15	13MWT16	13MWT16	13MWT16
SAMPLING ROUND	03	01	02	03	01	02	02	02	03	01	02	03
SAMPLE NUMBER	13GWT1303	13GWT1401	13GWT1402	13GWT1403	13GWT1501	13GWT1502	13GWT1502-D	13GWT1502-F	13GWT1503	13GWT1601	13GWT1602	13GWT1603
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GF	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	4/29/2003	11/24/2003	7/27/2004	5/6/2003	11/25/2003	11/25/2003	11/25/2003	7/29/2004	5/6/2003	11/20/2003	7/25/2004
TEMPERATURE (C)	20.61	14.34	10.77	17.41	15.89	12.28			15.66	14.27	18.83	18.21
TURBIDITY (NTU)	0.7	1.6	0	3	7.3	45.4			10	2.7	8.49	1.2
Miscellaneous Parameters (mg/L)												
AMMONIA-N		0.08	0.06 J		1	1.3				0.4	0.03 J	
NITRITE/NITRATE-N		0.13	0.05 J		0.02 U	0.05 U				0.02 U	0.84 J	
TOTAL ORGANIC CARBON						1.1	1.2					

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
1,3-DINITROBENZENE	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.5 U	0.5 U				0.602 U				0.52 U
2,4,6-TRINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U	0.25 U				0.301 U				0.26 U
2,4-DINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U	0.25 U				0.301 U				0.26 U
2,6-DINITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.43 U	0.28 J	0.37 J	0.37 J	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
2-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
3,5-DINITROANILINE		0.25 U	0.25 U				0.301 U				0.26 U
3-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
4-AMINO-2,6-DINITROTOLUENE	0.6 J	0.71	0.79	0.84	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
4-NITROTOLUENE	0.43 U	0.25 UJ	0.25 UJ	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
DNX		2.2 J	2.2 J				0.301 U				0.26 U
HMX	92 J	140	130	120	8.6		14		22	6.4	6.2
MNX		11	11				2.9				0.26 U
NITROBENZENE	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
PICRAMIC ACID											
PICRIC ACID											
RDX	430	580	540	490	150		240		390	5.9	5.4
TETRYL	0.43 U	0.25 U	0.25 U	0.25 U	0.08 U		0.301 U		0.27 U	0.55 U	0.26 U
TNX		1.2	1.2				0.301 U				0.26 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	418 J	419 J	339 J		19000 J		2080 J			195 J	193 J
ANTIMONY	0.03 U	0.56 U	0.09 U		0.12 U		0.02 U			0.31 U	0.02 U
ARSENIC	0.5 U	0.74 U	0.47 U		4.2 J		0.52 U			0.43 U	0.81 U
BARIUM	19.3 J	19.6 J	18.6 J		118 J		20.7 J			401 J	314 J
BERYLLIUM	0.04 U	0.5 U	0.05 U		3 J		1.5 U			0.77 U	0.56 U
CADMIUM	0.05 U	0.43 U	0.04 U		0.33 U		0.04 U			0.72 U	0.43 U
CALCIUM	12100 J	11400 J	11200 J		19300 J		16000 J			32500 J	25700 J
CHROMIUM	0.63 U	0.82 U	0.53 U		25.6 J		2.6 J			0.59 U	1 U
COBALT	1.5 J	1.5 U	1.3 U		52.8 J		27.1 J			44.1 J	14.8 J
COPPER	0.26 U	0.73 U	0.57 U		14 J		1.4 U			1.1 U	1.3 U
IRON	357 J	440 U	361 U		15800 J		2440 J			117 U	325 U
LEAD	0.35 U	0.82 U	0.32 U		9.5 J		2 U			0.89 U	0.46 U
LITHIUM	5.7 J				181 J					40.8 J	
MAGNESIUM	9470 J	8900 J	8930 J		25600 J		16500 J			37800 J	27300 J
MANGANESE	56.3 U	48.3 U	43.1 U		2170 J		1360 J			1450 J	730 J
MERCURY	0.2 U	0.02 U	0.02 U		0.2 U		0.007 U			0.2 U	0.02 U
NICKEL	2.9 J	3.3 J	2.9 J		140 J		76.8 J			79.4 J	61.5 J
POTASSIUM	481 J	605 J	560 J		6390 J		2970 J			1290 J	1010 J
SELENIUM	0.1 U	0.51 U	0.16 U		0.42 U		0.24 U			0.29 U	0.04 U
SILVER	0.04 U	0.49 U	0.03 U		0.61 U		0.08 U			0.39 U	0.03 U
SODIUM	8450 J	8550 J	8550 J		35200 J		37500 J			160000 J	123000 J
STRONTIUM	27.4 J				39.8 J					173 J	
THALLIUM	0.04 U	0.5 U	0.05 U		0.27 U		0.07 U			0.36 U	0.05 U
TIN	0.04 U	0.46 U	0.1 U		0.46 U		0.2 U			0.42 U	0.43 U
TITANIUM	7.2 J	10.9 J	8.7 J		166 J		35.4 J			5.1 J	3.7 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
VANADIUM	0.72 U	0.9 U	0.6 U		26.6 J		2.4 J			0.31 U	0.2 U
ZINC	3 J	2.7 J	2.3 U		175 J		75.7 J			57 J	48.3 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED						382 J		434 J			
ANTIMONY, FILTERED						0.08 U		0.26 U			
ARSENIC, FILTERED						1.4 J		0.33 U			
BARIUM, FILTERED						20.9 J		14.3 J			
BERYLLIUM, FILTERED						2 J		1.5 U			
CADMIUM, FILTERED						0.2 U		0.17 U			
CALCIUM, FILTERED						20300 J		17900 J			
CHROMIUM, FILTERED						0.2 U		0.51 U			
COBALT, FILTERED						49.5 J		31.7 J			
COPPER, FILTERED						6.4 J		3.1 J			
IRON, FILTERED						1980 J		1940 J			
LEAD, FILTERED						0.91 U		1 U			
LITHIUM, FILTERED						154 J					
MAGNESIUM, FILTERED						22700 J		19600 J			
MANGANESE, FILTERED						2090 J		1660 J			
MERCURY, FILTERED						0.2 U		0.007 U			
NICKEL, FILTERED						123 J		86.2 J			
POTASSIUM, FILTERED						2590 J		2860 J			
SELENIUM, FILTERED						0.29 U		0.18 U			
SILVER, FILTERED						0.04 U		0.15 U			
SODIUM, FILTERED						34400 J		38800 J			
STRONTIUM, FILTERED						32.8 J					
THALLIUM, FILTERED						0.08 U		0.18 U			
TIN, FILTERED						0.03 U		0.16 U			
TITANIUM, FILTERED						2.8 U		1.1 U			
VANADIUM, FILTERED						0.05 U		0.22 U			
ZINC, FILTERED						138 J		84.2 J			
Field Parameters (mg/L)											
ALKALINITY		10 U	10 U				10 U				
CARBON DIOXIDE		170	180				45				
DISSOLVED OXYGEN		0.9	0.9	2.01			5.5		5.67		
DISSOLVED OXYGEN - METER	0.53	0.84			2.17		4.61			3.51	34.37
HYDROGEN SULFIDE (H2S)		0	0				0				
IRON(+2)		0.06	0.07				0.33				
MANGANESE(+2)		0	0				1.4				
NITRITE-N		0.006	0.006				0				
OXIDATION REDUCTION POTENTIAL (MV)	112	338		129.4	324.1		422.2		361.6	224.1	209.6
PH (S.U.)	5.35	5.38		5.28	3.88		4.26		4.44	5.12	4.87
SPECIFIC CONDUCTANCE (MS/CM)	0.17	0.153		0.159	0.514		0.351		0.293	1.241	1.21
SULFIDE		0.02	0				0.07				

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT17	13MWT17	13MWT17	13MWT17	13MWT18	13MWT18	13MWT18	13MWT18	13MWT18	13MWT19	13MWT19
SAMPLING ROUND	01	02	02	03	01	01	02	02	03	01	02
SAMPLE NUMBER	13GWT1701	13GWT1702	13GWT1702-D	13GWT1703	13GWT1801	13GWT1801-F	13GWT1802	13GWT1802-F	13GWT1803	13GWT1901	13GWT1902
SUBMATRIX	GW	GW	GW	GW	GW	GF	GW	GF	GW	GW	GW
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	5/7/2003	11/5/2003	11/5/2003	7/29/2004	5/6/2003	5/6/2003	12/7/2003	12/7/2003	7/29/2004	5/7/2003	10/28/2003
TEMPERATURE (C)	15.7	15.97		18.57	16.75		9.78		16.27	13.81	14.98
TURBIDITY (NTU)	10	3.74		4.1	450		40.2		6.6	5	5.5
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01	0.005 U	0.005 U		0.02		0.02 J			0.01 U	0.01 U
NITRITE/NITRATE-N	0.86	0.65	0.66		0.09		0.12 J			0.02 U	0.16
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE		0.3 U									
1,1,1-TRICHLOROETHANE		0.3 U									
1,1,2,2-TETRACHLOROETHANE		0.3 U									
1,1,2-TRICHLOROETHANE		0.3 U									
1,1-DICHLOROETHANE		0.3 U									
1,1-DICHLOROETHENE		0.3 U									
1,2,3-TRICHLOROPROPANE		0.3 U									
1,2-DIBROMO-3-CHLOROPROPANE		0.3 U									
1,2-DIBROMOETHANE		0.3 U									
1,2-DICHLOROETHANE		0.3 U									
1,2-DICHLOROPROPANE		0.3 U									
1,4-DIOXANE		50 UJ									
2-BUTANONE		0.5 UJ									
2-HEXANONE		0.5 UJ									
3-CHLOROPROPENE		0.5 U									
4-METHYL-2-PENTANONE		0.5 U									
ACETONE		0.5 UJ									
ACETONITRILE		20 U									
ACROLEIN		0.5 UR									
ACRYLONITRILE		0.5 U									
BENZENE		0.3 U									
BROMODICHLOROMETHANE		0.3 U									
BROMOFORM		0.3 U									
BROMOMETHANE		0.3 U									
CARBON DISULFIDE		0.3 U									
CARBON TETRACHLORIDE		0.3 UJ									
CHLOROBENZENE		0.3 U									
CHLORODIBROMOMETHANE		0.3 U									
CHLOROETHANE		0.5 U									
CHLOROFORM		0.3 U									
CHLOROMETHANE		0.3 U									
CHLOROPRENE		0.5 U									
CIS-1,2-DICHLOROETHENE		0.3 U									
CIS-1,3-DICHLOROPROPENE		0.3 U									
DIBROMOMETHANE		0.3 U									
DICHLORODIFLUOROMETHANE		0.3 U									
ETHYL METHACRYLATE		0.5 U									
ETHYLBENZENE		0.3 U									
ISOBUTANOL		20 U									
METHACRYLONITRILE		0.3 U									
METHYL IODIDE		0.5 U									
METHYL METHACRYLATE		0.5 U									

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
METHYLENE CHLORIDE		0.3 U									
PROPIONITRILE		20 U									
STYRENE		0.3 U									
TETRACHLOROETHENE		0.3 U									
TOLUENE		0.3 U									
TOTAL XYLENES		0.3 U									
TRANS-1,2-DICHLOROETHENE		0.3 U									
TRANS-1,3-DICHLOROPROPENE		0.3 U									
TRANS-1,4-DICHLORO-2-BUTENE		0.5 U									
TRICHLOROETHENE		1 J									
TRICHLOROFLUOROMETHANE		0.3 U									
VINYL ACETATE		0.5 U									
VINYL CHLORIDE		0.3 U									
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE		1 U		1 U							
1,2,4-TRICHLOROBENZENE		1 U		1 U							
1,2-DICHLOROBENZENE		1 U		1 U							
1,3-DICHLOROBENZENE		1 U		1 U							
1,4-DICHLOROBENZENE		1 U		1 U							
1,4-NAPHTHOQUINONE		1 UJ		1 U							
1,4-PHENYLENEDIAMINE		1 UJ		1 UJ							
1-NAPHTHYLAMINE		1 U		1 U							
2,2'-OXYBIS(1-CHLOROPROPANE)		1 U		1 U							
2,3,4,6-TETRACHLOROPHENOL		1 UR		1 U							
2,4,5-TRICHLOROPHENOL		1 UR		1 U							
2,4,6-TRICHLOROPHENOL		1 UR		1 U							
2,4-DICHLOROPHENOL		1 UR		1 U							
2,4-DIMETHYLPHENOL		1 UR		1 U							
2,4-DINITROPHENOL		1 UR		1 UJ							
2,6-DICHLOROPHENOL		1 UR		1 U							
2-ACETYLAMINOFLUORENE		1 U		1 U							
2-CHLORONAPHTHALENE		1 UJ		1 U							
2-CHLOROPHENOL		1 UR		1 U							
2-METHYLNAPHTHALENE		0.05 U									
2-METHYLPHENOL		1 UR		1 U							
2-NAPHTHYLAMINE		1 U		1 U							
2-NITROANILINE		1 U		1 U							
2-NITROPHENOL		1 UR		1 U							
2-PICOLINE		1 U		1 U							
3&4-METHYLPHENOL		1 UR		1 U							
3,3'-DICHLOROBENZIDINE		1 U		1 U							
3,3'-DIMETHYLBENZIDINE		1 U		1 U							
3-METHYLCHOLANTHRENE		1 U		1 U							

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
3-NITROANILINE		1 U		1 U							
4,6-DINITRO-2-METHYLPHENOL		1 UR		1 U							
4-AMINOBIPHENYL		1 U		1 U							
4-BROMOPHENYL PHENYL ETHER		1 U		1 U							
4-CHLORO-3-METHYLPHENOL		1 UR		1 U							
4-CHLOROANILINE		1 U		1 U							
4-CHLOROPHENYL PHENYL ETHER		1 U		1 U							
4-NITROANILINE		1 U		1 U							
4-NITROPHENOL		1 UR		1 U							
4-NITROQUINOLINE-1-OXIDE		1 UR		1 UR							
5-NITRO-O-TOLUIDINE		1 U		1 U							
7,12-DIMETHYLBENZ(A)ANTHRACENE		1 U		1 U							
A,A-DIMETHYLPHENETHYLAMINE		1 U		1 U							
ACENAPHTHENE		0.05 U									
ACENAPHTHYLENE		0.05 U									
ACETOPHENONE		1 U		1 U							
ANILINE		1 U		1 UJ							
ANTHRACENE		0.05 U									
ARAMITE		1 UR		1 UR							
BENZO(A)ANTHRACENE		0.05 U									
BENZO(A)PYRENE		0.05 U									
BENZO(B)FLUORANTHENE		0.05 U									
BENZO(G,H,I)PERYLENE		0.05 U									
BENZO(K)FLUORANTHENE		0.05 U									
BENZYL ALCOHOL		1 U		1 U							
BIS(2-CHLOROETHOXY)METHANE		1 U		1 U							
BIS(2-CHLOROETHYL)ETHER		1 U		1 U							
BIS(2-ETHYLHEXYL)PHTHALATE		1 U		1 U							
BUTYL BENZYL PHTHALATE		1 U		1 U							
CHLOROBENZILATE		1 U		1 U							
CHRYSENE		0.05 U									
DI-N-BUTYL PHTHALATE		1 U		1 U							
DI-N-OCTYL PHTHALATE		1 U		1 U							
DIALLATE		1 U		1 U							
DIBENZO(A,H)ANTHRACENE		0.05 U									
DIBENZOFURAN		1 U		1 U							
DIETHYL PHTHALATE		1 U		1 U							
DIMETHYL PHTHALATE		1 U		1 U							
DIPHENYLAMINE		1 U		1 U							
ETHYL METHANE SULFONATE		1 U		1 U							
FLUORANTHENE		0.05 U									
FLUORENE		0.05 U									
HEXACHLOROBENZENE		1 U		1 U							

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
HEXACHLOROBUTADIENE		1 U		1 U							
HEXACHLOROCYCLOPENTADIENE		1 UR		1 UR							
HEXACHLOROETHANE		1 U		1 U							
HEXACHLOROPROPENE		1 U		1 U							
INDENO(1,2,3-CD)PYRENE		0.05 U									
ISODRIN		1 U		1 U							
ISOPHORONE		1 U		1 U							
ISOSAFROLE		1 U		1 U							
KEPONE		1 UJ		1 UR							
METHAPYRILENE		1 U		1 U							
METHYL METHANE SULFONATE		1 U		1 U							
N-NITROSO-DI-N-BUTYLAMINE		1 U		1 U							
N-NITROSO-DI-N-PROPYLAMINE		1 U		1 U							
N-NITROSODIETHYLAMINE		1 U		1 U							
N-NITROSODIMETHYLAMINE		1 U		1 UJ							
N-NITROSOMETHYLETHYLAMINE		1 U		1 U							
N-NITROSOMORPHOLINE		1 U		1 U							
N-NITROSOPIPERIDINE		1 U		1 U							
N-NITROSOPYRROLIDINE		1 U		1 U							
NAPHTHALENE		0.05 U									
O,O,O-TRIETHYL PHOSPHOROTHIOATE		1 U		1 U							
O-TOLUIDINE		1 U		1 U							
P-(DIMETHYLAMINO)AZOBENZENE		1 U		1 U							
PENTACHLOROBENZENE		1 U		1 U							
PENTACHLOROETHANE		1 U		1 U							
PENTACHLORONITROBENZENE		1 U		1 U							
PHENACETIN		1 U		1 U							
PHENANTHRENE		0.05 U									
PHENOL		1 UR		1 U							
PRONAMIDE		1 U		1 U							
PYRENE		0.05 U									
PYRIDINE		1 U		1 U							
SAFROLE		1 U		1 U							
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.3 J	0.4 J	0.395 U
1,3-DINITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.8 J	0.8	0.395 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE					0.532 U				0.481 U		
2,4,6-TRINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	26 J	33 J	69 J	26	0.395 U
2,4-DIAMINO-6-NITROTOLUENE					0.266 U				0.77 J		
2,4-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	1.4 J	0.65 J	0.395 U
2,6-DIAMINO-4-NITROTOLUENE					0.266 U				0.24 U		
2,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	5.8 J	2.8	0.395 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	3.8 J	0.395 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
2-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	0.24 U	0.395 U
3,5-DINITROANILINE					0.266 U				0.24 U		
3-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 UJ	0.24 U	0.395 U
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	2.9 J	0.395 U
4-NITROTOLUENE	0.26 U	0.37 U			0.266 U	0.26 U	0.5 J	0.345 U	0.24 UJ	0.24 U	0.395 U
DNX					0.266 U				50 J		
HMX	7.3	0.37 U			0.266 U	0.26 U	390	350	640	460	19
MNX					0.266 U				9.3 J		
NITROBENZENE	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	0.24 U	0.395 U
PICRAMIC ACID		0.39 U									
PICRIC ACID		0.39 U									
RDX	5.9	0.35 U			0.266 U	0.26 U	2700	3100	7700	4000	20
TETRYL	0.26 U	0.37 U			0.266 U	0.26 U	0.28 U	0.345 U	0.24 U	0.24 U	0.395 U
TNX					0.266 U				1.4 J		
Herbicides (ug/L)											
HEXACHLOROPHENE		0.025 U									
PENTACHLOROPHENOL		0.013 U									
Total Metals (ug/L)											
ALUMINUM		12900 J			7940 J	8860 J	354	349	332 U		709 J
ANTIMONY		0.12 U			0.02 U	0.04 U	0.04 U	0.03 U	0.1 U		0.03 U
ARSENIC		1.8 J			1.1 U	0.69 U	0.18 U	0.16 U	0.32 U		0.3 U
BARIUM		16.7 J			13.3 J	12.6 J	41.7 J	40.5 J	42 J		25 J
BERYLLIUM		5.8 J			5.2 J	5.2 J	0.97 U	1 U	1.7 U		3.7 J
CADMIUM		1 U			0.76 U	0.63 U	0.14 U	0.11 U	0.08 U		0.4 U
CALCIUM		72200 J			65100 J	49200 J	12000 J	11600 J	10600 J		13100 J
CHROMIUM		3.3 J			1.1 U	1.6 U	0.9 J	0.43 U	0.46 U		0.44 U
COBALT		234 J			169 J	200 J	16.4 J	16.7 J	15.9 J		80.5 J
COPPER		10.5 J			3.1 J	4.5 U	0.83 J	0.92 J	1.1 U		4.8 J
IRON		143000 J			120000 J	124000 J	127 J	109 U	193 U		434 J
LEAD		12.5 J			8.5 J	7.7 J	1.1 J	1.1 J	0.93 U		2.4 J
LITHIUM		340 J					45.8 J	49.2 J			208 J
MAGNESIUM		70300 J			61400 J	52200 J	8150 J	8100 J	7300 J		11300 J
MANGANESE		11600 J			9770 J	8390 J	612 J	628 J	590 J		381 J
MERCURY		0.02 U			0.007 U	0.03 U	0.02 U	0.02 U	0.02 U		0.2 U
NICKEL		477 J			397 J	427 J	35.7 J	35.4 J	32.8 J		153 J
POTASSIUM		6660 J			5750 J	4950 J	845 J	848 J	1130 J		705 J
SELENIUM		0.13 U			0.06 U	0.07 U	0.05 U	0.08 U	0.13 U		0.05 U
SILVER		0.04 U			0.03 U	0.04 U	0.04 U	0.04 U	0.15 U		0.04 U
SODIUM		53500 J			56600 J	51200 J	16000 J	16000 J	16800 J		15400 J
STRONTIUM		72 J					45.6 J	44.1 J			64.9 J
THALLIUM		1.3 U			1.2 U	1 U	0.06 U	0.07 U	0.13 U		0.09 U
TIN		0.09 U			0.11 U	0.05 U	0.1 U	0.05 U	0.1 U		0.04 U
TITANIUM		5.5 J			0.72 U		4.4 J	4.3 J	0.47 U		5.1 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
VANADIUM		0.63 J			0.45 U	0.27 U	0.2 U	0.16 U	0.22 U		0.18 U
ZINC		661 J			566 J	616 J	21.9 J	23 J	30 J		278 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED			11800 J								
ANTIMONY, FILTERED			0.03 U								
ARSENIC, FILTERED			1.7 J								
BARIUM, FILTERED			15.6 J								
BERYLLIUM, FILTERED			5.6 J								
CADMIUM, FILTERED			1 U								
CALCIUM, FILTERED			70900 J								
CHROMIUM, FILTERED			2.7 J								
COBALT, FILTERED			230 J								
COPPER, FILTERED			10.6 J								
IRON, FILTERED			142000 J								
LEAD, FILTERED			11.5 J								
LITHIUM, FILTERED			322 J								
MAGNESIUM, FILTERED			67900 J								
MANGANESE, FILTERED			11500 J								
MERCURY, FILTERED			0.02 U								
NICKEL, FILTERED			470 J								
POTASSIUM, FILTERED			6520 J								
SELENIUM, FILTERED			0.19 U								
SILVER, FILTERED			0.04 U								
SODIUM, FILTERED			52100 J								
STRONTIUM, FILTERED			68.9 J								
THALLIUM, FILTERED			1.2 U								
TIN, FILTERED			0.03 U								
TITANIUM, FILTERED			4.2 J								
VANADIUM, FILTERED			0.45 U								
ZINC, FILTERED			695								
Field Parameters (mg/L)											
ALKALINITY					10 U				10 U		
CARBON DIOXIDE					400				125		
DISSOLVED OXYGEN	27.18				0.02	15.56			1	2.94	
DISSOLVED OXYGEN - METER		0.11		0.54	0.76		1.45		2.09		0.64
HYDROGEN SULFIDE (H2S)					0				0		
IRON(+2)					3.3 >				0.1		
MANGANESE(+2)					8.3				0.6		
NITRITE-N					0				0.031		
OXIDATION REDUCTION POTENTIAL (MV)	484.2	265		224	376.2	337.2	193.6		247.2	107.3	264
PH (S.U.)	4.57	3.48		3.65	3.43	3.47	5.46		5.59	7.32	3.95
SPECIFIC CONDUCTANCE (MS/CM)	1.397	1.504		1.445	1.3	1.288	0.212		0.195	0.298	0.245
SULFIDE					0.03				0.04		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT19	13MWT20	13MWT20	13MWT20	13MWT20	13MWT20	13MWT21	13MWT21	13MWT21	13MWT21	13MWT22
SAMPLING ROUND	03	01	01	01	02	03	01	01	02	03	01
SAMPLE NUMBER	13GWT1903	13GWT2001	13GWT2001-F	13GWT2002	13GWT2003	13GWT2004	13GWT2101	13GWT2101-D	13GWT2102	13GWT2103	13GWT2201
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/27/2004	4/28/2003	4/28/2003	5/9/2003	11/19/2003	7/30/2004	4/25/2003	4/25/2003	11/5/2003	7/28/2004	5/6/2003
TEMPERATURE (C)	18.49	15.78		16.7	15.9	20.04	13.01		15.17	20.07	14.15
TURBIDITY (NTU)	0.4	19		1.4	6.91	3.8	8.2		2.61	4	0
Miscellaneous Parameters (mg/L)											
AMMONIA-N		1.6			1.6 J		0.05	0.04	0.02		0.01 U
NITRITE/NITRATE-N		0.07			0.025 U		0.64	0.65	1.2		0.02 U
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
1,3-DINITROBENZENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.532 U			0.51 U			0.47 U				0.5 U
2,4,6-TRINITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
2,4-DIAMINO-6-NITROTOLUENE	0.266 U			0.26 U			0.24 U				0.25 U
2,4-DINITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
2,6-DIAMINO-4-NITROTOLUENE	0.266 U			0.26 U			0.24 U				0.25 U
2,6-DINITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
2-NITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	1	0.145 U		0.25 UJ
3,5-DINITROANILINE	0.266 U			0.26 U			0.24 U				0.25 U
3-NITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
4-AMINO-2,6-DINITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U
4-NITROTOLUENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 UJ
DNX	0.266 U			0.26 U			0.24 U				0.25 U
HMX	23	23	13	14	16	2.1	2.2	2.2	0.34		0.85
MNX	0.266 U			0.26 U			0.35 J				0.25 U
NITROBENZENE	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U
PICRAMIC ACID											
PICRIC ACID											
RDX	26	26	17	21	17	7.3	9	8.7	0.4		1.2 J
TETRYL	0.266 U	0.27 U	0.5 U	0.26 U	0.26 U	0.65 U	0.24 U	0.27 U	0.145 U		0.25 U
TNX	0.266 U			0.26 U			0.24 U				0.25 U
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	1360 J		192 J	38.2 U		47.3 U	14.2 U		39000 J		73500 J
ANTIMONY	0.03 U		0.04 U	0.02 U		0.03 U	0.02 U		0.35 U		0.44 U
ARSENIC	0.4 U		0.41 U	0.09 U		0.07 U	0.14 U		15.4 J		14.3 J
BARIUM	31.6 J		38.4 J	35 J		22.7 J	18.6 J		303 J		355 J
BERYLLIUM	3.6 J		0.06 U	0.04 U		0.03 U	0.04 U		2.3 J		3.4 J
CADMIUM	0.49 U		0.13 U	0.1 U		0.05 UJ	0.06 U		2.7 J		2.7 J
CALCIUM	12200 J		10300 J	12500 J		34300 J	37900 J		117000 J		53900 J
CHROMIUM	1.7 J		0.55 U	0.35 U		0.37 U	0.27 U		64.9 J		89.9 J
COBALT	69 J		5.1 J	2.4 J		3.7 J	10.1 J		33 J		48 J
COPPER	6.4 J		0.35 U	0.2 U		4 J	0.19 U		89.5 J		82.8 J
IRON	846 J		414 J	118 U		65.7 U	3190 J		36000 J		41000 J
LEAD	3 J		0.36 U	0.14 U		0.18 U	0.09 U		54.3 J		51.3 J
LITHIUM			12.2 J			18.2 J			74.4 J		
MAGNESIUM	10000 J		10800 J	10900 J		34500 J	33600 J		19900 J		22700 J
MANGANESE	327 J		404 J	256 J		525 J	2010 J		2080 J		839 J
MERCURY	0.14 J		0.2 U	0.02 U		0.02 U	0.02 U		0.052 J		0.098 J
NICKEL	138 J		5.5 J	4.9 J		6.3 J	9.4 J		82.1 J		120 J
POTASSIUM	964 J		796 J	875 J		1010 J	1120 J		11000 J		18100 J
SELENIUM	0.1 U		0.24 U	0.19 U		0.29 U	0.2 U		1.8 J		4.1 J
SILVER	0.05 U		0.08 U	0.03 U		0.04 U	0.03 U		1.2 U		1.3 U
SODIUM	15500 J		37200 J	34000 J		44200 J	41000 J		27900 J		31400 J
STRONTIUM			49.9 J			81 J			262 J		
THALLIUM	0.1 U		0.07 U	0.04 U		0.04 U	0.04 U		0.6 U		0.75 U
TIN	0.12 U		0.13 U	0.1 U		0.13 U	0.1 U		0.55 U		1.5 U
TITANIUM	9.1 J		6.9 J	0.55 U		2.1 U	0.13 U		285 J		516 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
VANADIUM	1.4 U		0.51 U	0.08 U		0.06 U	0.06 U		75.3 J		93.5 J
ZINC	273		4 J	4.1 U		8.2 J	3.7 U		260 J		340 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED										344 J	
ANTIMONY, FILTERED										0.29 U	
ARSENIC, FILTERED										0.36 U	
BARIUM, FILTERED										62.6 J	
BERYLLIUM, FILTERED										0.09 U	
CADMIUM, FILTERED										0.47 U	
CALCIUM, FILTERED										64700 J	
CHROMIUM, FILTERED										0.81 U	
COBALT, FILTERED										2.5 J	
COPPER, FILTERED										2.8 J	
IRON, FILTERED										198 J	
LEAD, FILTERED										0.44 U	
LITHIUM, FILTERED										57.3 J	
MAGNESIUM, FILTERED										14100 J	
MANGANESE, FILTERED										460 J	
MERCURY, FILTERED										0.2 U	
NICKEL, FILTERED										26.3 J	
POTASSIUM, FILTERED										5560 J	
SELENIUM, FILTERED										2 J	
SILVER, FILTERED										0.04 U	
SODIUM, FILTERED										27100 J	
STRONTIUM, FILTERED										135 J	
THALLIUM, FILTERED										0.08 U	
TIN, FILTERED										0.11 U	
TITANIUM, FILTERED										7.3 J	
VANADIUM, FILTERED										0.8 U	
ZINC, FILTERED										22.8 J	
Field Parameters (mg/L)											
ALKALINITY	10 U			25			90				
CARBON DIOXIDE	50			23			28				
DISSOLVED OXYGEN	1	2.51		7	3.37		0.5	1.07			
DISSOLVED OXYGEN - METER	1.65		4.09	2.37		2.89	29.68		4.21		0.96
HYDROGEN SULFIDE (H2S)	0			0			0				
IRON(+2)	0.37			0.09			3.21				
MANGANESE(+2)	0.1			0.1			1.8				
NITRITE-N	0.005			0.004			0				
OXIDATION REDUCTION POTENTIAL (MV)	351.6	448.2	131	397.5	141	284	59.9	395	219.1		333
PH (S.U.)	4.09	3.81	5.19	5.5	5.48	5.9	6.14	5.41	6.45		5.29
SPECIFIC CONDUCTANCE (MS/CM)	0.243	0.294	0.314	0.309	0.315	0.671	0.672	0.669	0.511		0.341
SULFIDE	0.06			0.01			0				

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT22	13MWT22	13MWT23	13MWT23	13MWT23	13MWT24	13MWT24	13MWT24	13MWT25	13MWT25	13MWT25
SAMPLING ROUND	02	03	01	02	03	01	02	03	01	01	02
SAMPLE NUMBER	13GWT2202	13GWT2203	13GWT2301	13GWT2302	13GWT2303	13GWT2401	13GWT2402	13GWT2403	13GWT2501	13GWT2501-F	13GWT2502
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	12/4/2003	7/27/2004	5/6/2003	10/28/2003	7/25/2004	4/28/2003	10/28/2003	7/23/2004	4/26/2003	4/26/2003	11/6/2003
TEMPERATURE (C)	11.4	19.61	16.46	13.67	17.26	16.76	14.27	20.16	12		16.7
TURBIDITY (NTU)	1.03	1.5	0.7	2.09	2.1	5.2	1.66	5.82	999 >		39
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.01 U		0.01 U	0.01 U		0.02	0.01 U		0.09		0.05 J
NITRITE/NITRATE-N	0.17 J		0.5	0.51		0.39	0.27		0.02 U		0.17 J
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U
1,3-DINITROBENZENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE					0.538 U		0.505 U		0.515 U		
2,4,6-TRINITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U
2,4-DIAMINO-6-NITROTOLUENE					0.269 U		0.253 U		0.258 U		
2,4-DINITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U
2,6-DIAMINO-4-NITROTOLUENE					0.269 U		0.253 U		0.258 U		
2,6-DINITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U
2-AMINO-4,6-DINITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	7/31/2004
2-NITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
3,5-DINITROANILINE					0.269 U		0.253 U		0.258 U			
3-NITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
4-AMINO-2,6-DINITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
4-NITROTOLUENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
DNX					0.269 U		0.253 U		0.258 U			
HMX		2.3		2.4	2.4	1.8	15	38	0.258 U		0.25 U	
MNX					0.269 U		0.253 U		0.258 U			
NITROBENZENE		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
PICRAMIC ACID												
PICRIC ACID												
RDX		1.6		0.4 J	0.53 J	0.38 J	32	74	0.258 U		0.25 U	
TETRYL		0.27 U		0.19 U	0.269 U	0.26 U	0.253 U	0.27 U	0.258 U		0.25 U	
TNX					0.269 U		0.253 U		0.258 U			
Herbicides (ug/L)												
HEXACHLOROPHENE												
PENTACHLOROPHENOL												
Total Metals (ug/L)												
ALUMINUM		836 J		241	340 J		1980 J		6270 J			
ANTIMONY		0.08 U		0.04 U	0.02 U		0.02 U		2.9 J			
ARSENIC		0.55 U		0.25 U	0.21 U		3.1 J		15.2 J			
BARIUM		39.9 J		21.2 J	13.9 J		78.1 J		65.3 J			
BERYLLIUM		0.99 U		0.03 U	0.03 U		2.3 J		0.27 U			
CADMIUM		0.42 U		0.05 U	0.04 U		0.3 U		0.04 U			
CALCIUM		22900 J		22700 J	27100 J		11100 J		10600 J			
CHROMIUM		2.2 U		0.76 J	0.51 U		3.2 J		11.7 J			
COBALT		56.5 J		5 J	1.7 U		41.1 J		2 J			
COPPER		18.2 J		0.45 U	0.31 U		19.6 J		1.4 U			
IRON		961 J		238 J	334 U		17300 J		2460 J			
LEAD		2.9 J		0.15 U	0.14 U		3.3 J		2.5 U			
LITHIUM				35.7 J								
MAGNESIUM		12800 J		13700 J	14900 J		7520 J		2950 J			
MANGANESE		125 J		391 J	271 U		594 J		66.7 J			
MERCURY		0.03 U		0.02 U	0.007 U		0.007 U		0.007 U			
NICKEL		123 J		8 J	5.9 J		67.4 J		7.1 J			
POTASSIUM		1800 J		474 J	412 J		4170 J		3670 J			
SELENIUM		1.4 U		0.09 U	0.04 U		0.04 U		4.1 J			
SILVER		0.03 U		0.04 U	0.03 U		0.03 U		0.03 U			
SODIUM		39700 J		29200 J	41200 J		14900 J		124000 J			
STRONTIUM				56.9 J								
THALLIUM		0.05 U		0.04 U	0.04 U		0.25 U		0.06 U			
TIN		0.45 U		0.22 U	0.1 U		0.12 U		0.63 U			
TITANIUM				6.8 J	6.5 J		12.4 J		99 J			

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004
VANADIUM		1.4 J		0.46 U	0.55 U		1.9 J		12.5 J		
ZINC		138 J		4.7 J	2.8 U		94.9		6.7 J		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	79.8 U		154 J							102 U	
ANTIMONY, FILTERED	0.22 U		0.07 U							3 J	
ARSENIC, FILTERED	0.17 U		0.11 U							13.6 J	
BARIUM, FILTERED	35.9 J		36.3 J							36.9 J	
BERYLLIUM, FILTERED	0.1 U		0.79 U							0.03 U	
CADMIUM, FILTERED	0.74 U		0.35 U							0.04 U	
CALCIUM, FILTERED	28600 J		20700 J							8960 J	
CHROMIUM, FILTERED	0.34 U		1.1 U							0.81 U	
COBALT, FILTERED	30.5 J		54.2 J							0.55 U	
COPPER, FILTERED	1.8 U		13.1 J							1 U	
IRON, FILTERED	93.6 U		130 J							25.5 U	
LEAD, FILTERED	0.14 U		1.3 U							0.2 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	9360 J		11100 J							1800 J	
MANGANESE, FILTERED	177 J		105 J							3.7 U	
MERCURY, FILTERED	0.007 U		0.03 U							0.007 U	
NICKEL, FILTERED	73.9 J		118 J							3.1 J	
POTASSIUM, FILTERED	2700 J		1550 J							1880 J	
SELENIUM, FILTERED	2.5 J		1.4 U							3.9 J	
SILVER, FILTERED	0.03 U		0.02 U							0.04 U	
SODIUM, FILTERED	29600 J		33300 J							122000 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.04 U		0.02 U							0.04 U	
TIN, FILTERED	0.1 U		0.06 U							0.19 U	
TITANIUM, FILTERED	3.6 J									1.4 U	
VANADIUM, FILTERED	0.27 U		0.06 U							2 J	
ZINC, FILTERED	95.5 J		126 J							3.5 J	
Field Parameters (mg/L)											
ALKALINITY					60		10 U		150		
CARBON DIOXIDE					50		45		10 U		
DISSOLVED OXYGEN		1.87			1.7	0.89	5	4.96	0.5		0.26
DISSOLVED OXYGEN - METER				4.2	1.7		1.67		0.57		
HYDROGEN SULFIDE (H2S)					0		0		0		
IRON(+2)					0		0.21		0.01		
MANGANESE(+2)					0.3		0		0		
NITRITE-N					0.01		0.001		0.007		
OXIDATION REDUCTION POTENTIAL (MV)		717		189	354	752	223.2	423.5	-34.1		73.5
PH (S.U.)		4.58		6.05	5.95	5.27	4.4	3.36	9.15		8.08
SPECIFIC CONDUCTANCE (MS/CM)		0.382		0.352	0.333	0.43	0.288	0.294	0.495		1.217
SULFIDE					0.05		0		0		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT25	13MWT25	13MWT25	13MWT26	13MWT26	13MWT26	13MWT27	13MWT27	13MWT28	13MWT28	13MWT28	13MWT28
SAMPLING ROUND	02	03	03	01	02	03	02	03	02	02	03	03
SAMPLE NUMBER	13GWT2502-F	13GWT2503	13GWT2503-F	13GWT2601	13GWT2602	13GWT2603	13GWT2701	13GWT2702	13GWT2801	13GWT2801-F	13GWT2802	13GWT2802
SUBMATRIX	GF	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/19/2003	7/24/2004	7/24/2004	4/25/2003	11/19/2003	7/23/2004	11/25/2003	7/30/2004	12/7/2003	12/7/2003	7/31/2004	7/31/2004
TEMPERATURE (C)		21.8		12.01	15.68	19.78	14.29	20.1	13.59		17.98	
TURBIDITY (NTU)		40		7.1	9.81	22	110	3.3	260		65	
Miscellaneous Parameters (mg/L)												
AMMONIA-N				0.02	0.005 UJ		0.39		0.46 J			
NITRITE/NITRATE-N				0.03	0.06 J		0.1 J		0.66 J			
TOTAL ORGANIC CARBON												

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
1,3-DINITROBENZENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.51 U		0.485 U		0.581 U		0.532 U		0.5 U		
2,4,6-TRINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,4-DIAMINO-6-NITROTOLUENE	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
2,4-DINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2,6-DIAMINO-4-NITROTOLUENE	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
2,6-DINITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
2-AMINO-4,6-DINITROTOLUENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
2-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.37 J	0.266 U	0.24 U	0.25 U		0.29 U
3,5-DINITROANILINE	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
3-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
4-AMINO-2,6-DINITROTOLUENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
4-NITROTOLUENE	0.039 UJ	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
DNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
HMX	0.97 J	1.7 J	0.243 U	0.26 U	4.5	8.1	0.92	0.86	5.3		11
MNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
NITROBENZENE	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
PICRAMIC ACID											
PICRIC ACID											
RDX	3.8	10	1.1 J	4	9.3	22	2.7 J	2.3	4.3		4.2
TETRYL	0.039 U	0.26 U	0.243 U	0.26 U	0.291 U	0.27 U	0.266 U	0.24 U	0.25 U		0.29 U
TNX	0.25 U		0.243 U		0.291 U		0.266 U		0.25 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	781 J		2680 J		79.1 U		168 U		17100 J		2350 J
ANTIMONY	0.02 U		0.11 U		0.04 U		0.04 U		0.66 U		0.22 U
ARSENIC	0.3 U		1.1 U		0.16 U		0.18 U		4.9 J		2.1 J
BARIUM	23.2 J		21.7 J		41.7 J		38.2 J		103 J		50.6 J
BERYLLIUM	1 U		5.9 J		0.06 U		0.03 U		1.4 U		0.37 U
CADMIUM	0.21 U		0.47 U		0.29 U		0.06 U		0.57 U		0.15 U
CALCIUM	26800 J		25700 J		34700 J		31600 J		6020 J		4300 J
CHROMIUM	4 J		0.86 U		0.36 U		0.34 U		23.8 J		6.1 J
COBALT	69.8 J		104 J		18.9 J		2.2 J		13.4 J		7 J
COPPER	0.68 U		4.5 J		0.6 U		0.45 U		9.6 J		6.9 U
IRON	60900 J		36600 J		61.5 U		276 U		16100 J		6090 J
LEAD	0.39 U		3.8 J		0.07 U		0.24 U		9.4 J		5.1 J
LITHIUM											
MAGNESIUM	18000 J		18800 J		41400 J		20000 J		5930 J		3600 J
MANGANESE	1320 J		3230 J		3170 J		84.8 J		837 J		274 J
MERCURY	0.02 U		0.007 U		0.007 U		0.007 U		0.007 J		0.03 U
NICKEL	173 J		167 J		93.8 J		7.8 J		29.9 J		21.8 J
POTASSIUM	3810 J		4150 J		4430 J		885 J		5580 J		1340 J
SELENIUM	0.04 U		0.12 U		0.14 U		0.51 U		0.53 U		0.25 U
SILVER	0.03 U		0.11 U		0.03 U		0.03 U		0.48 U		0.08 U
SODIUM	44400 J		38500 J		84800 J		31000 J		11800 J		11700 J
STRONTIUM											
THALLIUM	0.15 U		0.24 U		0.04 U		0.04 U		0.7 U		0.14 U
TIN	0.1 U		0.16 U		0.1 U		1 U		1.1 U		0.67 U
TITANIUM	21.6 J		0.61 U		0.72 U		1.9 U		150 J		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
VANADIUM	1 U		0.28 U		0.09 U		0.24 U		25.8 J		6.2 J
ZINC	162 J		280		21.3 J		6.8 U		45.4 J		49.6 J
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED										52.6 U	
ANTIMONY, FILTERED										0.41 U	
ARSENIC, FILTERED										0.87 U	
BARIUM, FILTERED										33.9 J	
BERYLLIUM, FILTERED										0.3 U	
CADMIUM, FILTERED										0.24 U	
CALCIUM, FILTERED										9670 J	
CHROMIUM, FILTERED										0.73 U	
COBALT, FILTERED										14.7 J	
COPPER, FILTERED										1.1 U	
IRON, FILTERED										4810 J	
LEAD, FILTERED										0.34 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED										7230 J	
MANGANESE, FILTERED										1110 J	
MERCURY, FILTERED										0.007 U	
NICKEL, FILTERED										21.6 J	
POTASSIUM, FILTERED										1460 J	
SELENIUM, FILTERED										0.16 U	
SILVER, FILTERED										0.24 U	
SODIUM, FILTERED										13000 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED										0.3 U	
TIN, FILTERED										0.22 U	
TITANIUM, FILTERED										1 U	
VANADIUM, FILTERED										0.54 U	
ZINC, FILTERED										22.4 J	
Field Parameters (mg/L)											
ALKALINITY	10 U										
CARBON DIOXIDE	150										
DISSOLVED OXYGEN	0.02	8.4		7.03		23.4		10.9			5.56
DISSOLVED OXYGEN - METER	0.44		0.88		5.66		8.98		3.75		
HYDROGEN SULFIDE (H2S)	0										
IRON(+2)	3.3 >										
MANGANESE(+2)	1.3										
NITRITE-N	0										
OXIDATION REDUCTION POTENTIAL (MV)	-473	2.8	396.6	142	246.7	518.6	223.6	71	91.7		559.8
PH (S.U.)	5.56	5.62	3.34	5.2	5.67	5.39	6.26	6.99	5.88		4.96
SPECIFIC CONDUCTANCE (MS/CM)	0.589	0.662	0.568	0.795	0.793	1.444	0.386	0.519	0.234		0.091
SULFIDE	0.04										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT29	13MWT29	13MWT30	13MWT30	13MWT31	13MWT31	13MWT32	13MWT32	13MWT33	13MWT33	13MWT33
SAMPLING ROUND	02	03	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT2901	13GWT2902	13GWT3001	13GWT3002	13GWT3101	13GWT3102	13GWT3201	13GWT3202	13GWT3301	13GWT3301-F	13GWT3302
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	11/7/2003	7/27/2004	11/24/2003	7/26/2004	11/24/2003	7/26/2004	11/19/2003	7/27/2004	11/24/2003	11/24/2003	7/26/2004
TEMPERATURE (C)	15.52	19.73	9.18	15.4	10.09	15.98	14.73	18.79	8.83		16.12
TURBIDITY (NTU)	9.36	4	7	0.6	4.69	6.1	3.45	2.8	80		94
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.36		0.42		0.005 UJ		0.005 UJ		0.02		
NITRITE/NITRATE-N	0.025 U		0.05 U		0.13 J		0.25 J		1.2 J		
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U
1,3-DINITROBENZENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.5 U		0.472 U			0.538 U	0.538 U		0.52 U	
2,4,6-TRINITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
2,4-DIAMINO-6-NITROTOLUENE		0.25 U		0.236 U			0.269 U	0.269 U		0.26 U	
2,4-DINITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
2,6-DIAMINO-4-NITROTOLUENE		0.25 U		0.236 U			0.269 U	0.269 U		0.26 U	
2,6-DINITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
2-AMINO-4,6-DINITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
2-NITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
3,5-DINITROANILINE		0.25 U		0.236 U			0.269 U	0.269 U		0.26 U	
3-NITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
4-AMINO-2,6-DINITROTOLUENE		0.29 J	0.26 J	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.5
4-NITROTOLUENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 UJ	0.24 U
DNX		1		0.236 U			0.269 U	0.269 U		1.5 J	
HMX		29	28	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	25	140
MNX		4.5		0.236 U			0.269 U	0.269 U		5.2	
NITROBENZENE		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U
PICRAMIC ACID											
PICRIC ACID											
RDX		460	400	0.236 U		0.25 U	0.27 J	0.275 U	6.1	650	2100
TETRYL		0.25 U	0.24 U	0.236 U		0.25 U	0.269 U	0.275 U	0.27 U	0.04 U	0.24 U
TNX		0.25 U		0.236 U			0.269 UJ	0.269 U		0.73	
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		277 J		20900 J			147 U	655 J		140 U	
ANTIMONY		0.02 U		6.7 J			0.09 U	1.3 U		0.02 U	
ARSENIC		0.13 U		15 J			0.22 U	0.5 U		0.27 U	
BARIUM		17.7 J		94.7 J			30.5 J	33 J		38.8 J	
BERYLLIUM		0.23 U		1 U			0.09 U	1.3 U		0.05 U	
CADMIUM		0.04 U		0.07 U			0.54 U	1.8 U		0.13 U	
CALCIUM		14700 J		18000 J			48800 J	49400 J		21600 J	
CHROMIUM		0.55 U		35 J			0.89 U	1.5 U		0.72 U	
COBALT		10.3 J		5.6 J			3.7 J	4.3 J		14.8 U	
COPPER		1.7 J		6.1 J			0.88 U	1.3 U		0.83 U	
IRON		316 J		10300 J			83.6 U	130 U		1760 J	
LEAD		0.77 U		7.2 J			0.42 U	1.7 U		0.94 U	
LITHIUM											
MAGNESIUM		12300 J		6520 J			45800 J	47400 J		14500 J	
MANGANESE		645 J		118 J			437 J	458 J		834 J	
MERCURY		0.007 U		0.007 U			0.007 U	0.007 U		0.02 U	
NICKEL		42.5 J		22 J			56.4 J	63.3 J		12.9 J	
POTASSIUM		2980 J		10100 J			2330 J	2510 J		1810 J	
SELENIUM		0.26 U		1.7 U			0.28 U	0.54 U		0.1 U	
SILVER		0.03 U		0.03 U			0.04 U	1.2 U		0.03 U	
SODIUM		34500 J		166000 J			49700 J	51200 J		29600 J	
STRONTIUM											
THALLIUM		0.05 U		0.19 U			0.07 U	1.3 U		0.04 U	
TIN		0.13 U		0.51 U			0.12 U	2 U		0.1 U	
TITANIUM		2.8 J		104 J			4.2 J	18.6 J		8 J	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
VANADIUM		0.3 U		31.6 J			0.23 U	1.2 U		0.4 U	
ZINC		28.8 J		30.6 J			31.2 J	36.2 J		16.8 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED	66.5 U				130 U						
ANTIMONY, FILTERED	0.65 U				7.3 J						
ARSENIC, FILTERED	0.33 U				13.1 J						
BARIUM, FILTERED	32.5 J				24 J						
BERYLLIUM, FILTERED	0.39 U				0.03 U						
CADMIUM, FILTERED	0.35 U				0.04 U						
CALCIUM, FILTERED	3290 J				17000 J						
CHROMIUM, FILTERED	1.4 U				2.3 J						
COBALT, FILTERED	6.7 J				3 J						
COPPER, FILTERED	4 U				0.42 U						
IRON, FILTERED	201 J				32.2 U						
LEAD, FILTERED	0.56 U				0.07 U						
LITHIUM, FILTERED											
MAGNESIUM, FILTERED	3300 J				3130 J						
MANGANESE, FILTERED	287 J				9 J						
MERCURY, FILTERED	0.03 U				0.007 U						
NICKEL, FILTERED	21.7 J				0.75 U						
POTASSIUM, FILTERED	562 J				5390 J						
SELENIUM, FILTERED	0.21 U				2.4 U						
SILVER, FILTERED	0.48 U				0.03 U						
SODIUM, FILTERED	12200 J				161000 J						
STRONTIUM, FILTERED											
THALLIUM, FILTERED	0.33 U				0.04 U						
TIN, FILTERED	0.48 U				0.1 U						
TITANIUM, FILTERED					1.2 U						
VANADIUM, FILTERED	0.3 U				2.8 J						
ZINC, FILTERED	19 J				4 J						
Field Parameters (mg/L)											
ALKALINITY		10 U		200			10 U	10 U			
CARBON DIOXIDE		32		10 U			40	40			
DISSOLVED OXYGEN		1	13.42	5.5		0.98	5.5	5.5	16.14		2.9
DISSOLVED OXYGEN - METER		2.35		5.28			4.91			4.82	
HYDROGEN SULFIDE (H2S)		0		0			0	0			
IRON(+2)		0.18		0.02			0.03	0.05			
MANGANESE(+2)		0.8		0			0.3	0.2			
NITRITE-N		0.005		0			0.003	0			
OXIDATION REDUCTION POTENTIAL (MV)		276	149.6	105.2			252.1		350.1	-144.9	133.5
PH (S.U.)		4.97	5.06	9.08		7.58	5.68		5.51	5.75	6.26
SPECIFIC CONDUCTANCE (MS/CM)		0.312	0.347	0.781		0.718	0.721		0.68	0.307	0.174
SULFIDE		0		0.01			0.01	0.01			

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER
LOCATION	13MWT33	13MWT34	13MWT34	13MWT35	13MWT35	13MWT35	13MWT36	13MWT36	13MWT36	13MWT37	13MWT37
SAMPLING ROUND	03	02	03	02	02	03	02	02	03	02	03
SAMPLE NUMBER	13GWT3302-F	13GWT3401	13GWT3402	13GWT3501	13GWT3501-F	13GWT3502	13GWT3601	13GWT3601-D	13GWT3602	13GWT3701	13GWT3702
SUBMATRIX	GF	GW	GW	GW	GF	GW	GW	GW	GW	GW	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
SAMPLE DATE	7/26/2004	12/4/2003	7/29/2004	12/10/2003	12/10/2003	8/1/2004	12/8/2003	12/8/2003	7/29/2004	11/6/2003	7/30/2004
TEMPERATURE (C)		10.94	18.58	13.6		15.91	12.24		15.66	13.32	17.35
TURBIDITY (NTU)		6.07	21	1000 >		1000 >	6.06		9.9	3.2	5
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.04		0.56			0.01 U	0.01 U		0.005 U	
NITRITE/NITRATE-N		0.3 J		0.05 U			0.08	0.06		0.28	
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.24 U	0.253 UJ		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ	
1,3-DINITROBENZENE	0.24 U	0.253 U		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ	
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.505 U			0.52 U			0.51 UJ		0.538 U	
2,4,6-TRINITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
2,4-DIAMINO-6-NITROTOLUENE		0.253 U			0.26 U			0.26 U		0.269 U	
2,4-DINITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
2,6-DIAMINO-4-NITROTOLUENE		0.253 U			0.26 U			0.26 U		0.269 U	
2,6-DINITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
2-AMINO-4,6-DINITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.42 J		0.28 J	0.04 U	0.25 U	0.269 UJ	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
2-NITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
3,5-DINITROANILINE		0.253 U			0.26 U			0.26 U		0.269 U	
3-NITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
4-AMINO-2,6-DINITROTOLUENE	0.47 J	0.253 U		0.24 U	0.56 J		0.5 J	0.52 J	1.1	0.269 UJ	
4-NITROTOLUENE	0.24 U	0.253 UJ		0.24 U	0.04 UJ		0.27 U	0.04 UJ	0.25 U	0.269 UJ	
DNX		0.253 U			43 J			0.9 J		0.269 U	
HMX	150	0.253 U		0.24 U	48 J		74	14	22	0.269 UJ	
MNX		0.253 U			7.7			3.3		0.269 U	
NITROBENZENE	0.24 U	0.253 U		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ	
PICRAMIC ACID											
PICRIC ACID											
RDX	2300	0.253 U		0.24 U	180		190	140	230	0.269 UJ	
TETRYL	0.24 U	0.253 U		0.24 U	0.04 U		0.27 U	0.04 U	0.25 U	0.269 UJ	
TNX		0.253 U			2.4			0.26 U		0.269 U	
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		4720 J			2010 J			221 J		29800 J	
ANTIMONY		3.8 J			0.02 U			0.09 U		5.6 J	
ARSENIC		24.5 J			1.1 U			0.35 U		20.6 J	
BARIUM		32.2 J			104 J			49.2 J		114 J	
BERYLLIUM		0.3 U			0.12 U			0.09 U		1.2 U	
CADMIUM		0.04 U			0.23 U			0.42 U		0.43 U	
CALCIUM		5790 J			52200 J			14900 J		18500 J	
CHROMIUM		12.5 J			4.2 J			0.58 U		38.7 J	
COBALT		1.6 U			5.5 J			31.4 J		11.2 J	
COPPER		1.6 J			2.1 J			1.3 J		10.9 J	
IRON		5410 J			1450 J			272 J		23700 J	
LEAD		5.8 J			1.1 U			0.78 U		12 J	
LITHIUM											
MAGNESIUM		1040 J			14300 J			11800 J		6520 J	
MANGANESE		67.4 J			1290 J			855 J		300 U	
MERCURY		0.02 U			0.02 U			0.02 U		0.007 U	
NICKEL		5.7 J			25.6 J			26.4 J		34 J	
POTASSIUM		5180 J			5110 J			1840 J		7170 J	
SELENIUM		2.2 U			0.11 U			0.39 U		5.1 J	
SILVER		0.03 U			0.03 U			0.22 U		0.05 U	
SODIUM		71400 J			15800 J			33000 J		86700 J	
STRONTIUM											
THALLIUM		0.04 U			0.04 U			0.09 U		0.18 U	
TIN		0.25 U			0.1 U			0.12 U		1.3 U	
TITANIUM		26.6 J			55.3 J			6.1 J		101 J	

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
VANADIUM		25.6 J			4.1 J			0.42 U		33.9 J	
ZINC		11.6 J			14.3 J			14.4 J		77.6 J	
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED			285 J			53.1 U					95.6 U
ANTIMONY, FILTERED			4 J			0.08 U					5.6 J
ARSENIC, FILTERED			21.3 J			0.31 U					9.4 J
BARIUM, FILTERED			9.6 J			93.6 J					16.7 J
BERYLLIUM, FILTERED			0.03 U			0.03 U					0.05 U
CADMIUM, FILTERED			0.04 U			0.33 U					0.1 U
CALCIUM, FILTERED			3980 J			48000 J					17300 J
CHROMIUM, FILTERED			0.8 U			0.17 U					0.34 U
COBALT, FILTERED			1.5 U			5.2 J					3.9 J
COPPER, FILTERED			0.57 U			1.3 U					1.1 U
IRON, FILTERED			85.6 U			447 J					47.3 U
LEAD, FILTERED			0.12 U			0.06 U					0.33 U
LITHIUM, FILTERED											
MAGNESIUM, FILTERED			140 U			13700 J					2810 J
MANGANESE, FILTERED			4.2 U			1190 J					30.9 U
MERCURY, FILTERED			0.02 U			0.02 U					0.007 U
NICKEL, FILTERED			0.48 U			23.8 J					2.6 J
POTASSIUM, FILTERED			4260 J			4540 J					2960 J
SELENIUM, FILTERED			2 U			0.16 U					4.2 J
SILVER, FILTERED			0.03 U			0.03 U					0.03 U
SODIUM, FILTERED			65200 J			15500 J					82100 J
STRONTIUM, FILTERED											
THALLIUM, FILTERED			0.04 U			0.06 U					0.06 U
TIN, FILTERED			0.1 U			0.1 U					0.28 U
TITANIUM, FILTERED			1.6 U			1.2 U					0.9 U
VANADIUM, FILTERED			7 J			0.07 U					0.68 U
ZINC, FILTERED			1.7 U			11.3 J					17 J
Field Parameters (mg/L)											
ALKALINITY		108									
CARBON DIOXIDE		10 U									
DISSOLVED OXYGEN		3.5		1.7			6.07		0.39		
DISSOLVED OXYGEN - METER		4.7			5.35			6.28		3.72	
HYDROGEN SULFIDE (H2S)		0									
IRON(+2)		0									
MANGANESE(+2)		0.1									
NITRITE-N		0									
OXIDATION REDUCTION POTENTIAL (MV)		10.3		72.9	135.1		321	100.3	538	170	
PH (S.U.)		11.39		8.44	6.4		5.85	5.53	5.04	8.36	
SPECIFIC CONDUCTANCE (MS/CM)		0.332		0.665	0.391		0.352	0.273	0.329	0.394	
SULFIDE		0									

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	UPPER	LOWER	LOWER	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER
LOCATION	13MWT37	13MWT38	13MWT38	13MWT38	13MWT39	13MWT39	13MWT39	13MWT40	13MWT40	13MWT41	13MWT41
SAMPLING ROUND	03	02	02	03	02	02	03	02	03	02	02
SAMPLE NUMBER	13GWT3702-D	13GWT3801	13GWT3801-F	13GWT3802	13GWT3901	13GWT3901-F	13GWT3902	13GWT4001	13GWT4002	13GWT4101	13GWT4101-F
SUBMATRIX	GW	GW	GF	GW	GW	GF	GW	GW	GW	GW	GF
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	7/30/2004	11/10/2003	11/10/2003	7/31/2004	11/7/2003	11/7/2003	7/29/2004	11/5/2003	7/30/2004	11/23/2003	11/24/2003
TEMPERATURE (C)		13.18		21.72	13.29		16.31	13.28	15.02	14.01	
TURBIDITY (NTU)		999 >		18	17.9		2.2	6.2	1.28	1000 >	
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.44			0.36			0.11 J		0.18 J	
NITRITE/NITRATE-N		0.11			0.77			0.28		0.025 U	
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
1,3-DINITROBENZENE	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		0.52 UJ			0.481 U		0.51 U		0.515 U		
2,4,6-TRINITROTOLUENE	0.24 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
2,4-DIAMINO-6-NITROTOLUENE		0.26 U			0.24 U		0.255 U		0.258 U		
2,4-DINITROTOLUENE	0.24 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
2,6-DIAMINO-4-NITROTOLUENE		0.26 U			0.24 U		0.255 U		0.258 U		
2,6-DINITROTOLUENE	0.24 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
2-AMINO-4,6-DINITROTOLUENE	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
2-NITROTOLUENE	0.45 J	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
3,5-DINITROANILINE		0.26 U			0.24 U		0.255 U		0.258 U		
3-NITROTOLUENE	0.24 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.34 J		0.24 U
4-AMINO-2,6-DINITROTOLUENE	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
4-NITROTOLUENE	0.24 U	0.04 UJ		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
DNX		0.26 U			0.24 U		0.255 U		0.258 U		
HMX	0.24 U	64		330 J	0.97 J	1.2	0.255 U	0.24 U	0.258 U		0.24 U
MNX		0.32 J			0.24 U		0.255 U		0.258 U		
NITROBENZENE	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
PICRAMIC ACID											
PICRIC ACID											
RDX	0.24 U	41		140 J	0.72 J	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
TETRYL	0.24 U	0.04 U		0.28 UJ	0.24 U	0.27 U	0.255 U	0.24 U	0.258 U		0.24 U
TNX		0.26 U			0.24 U		0.255 U		0.258 U		
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM		24300 J			2500 J		135 J		4300 J		
ANTIMONY		0.26 U			0.04 U		0.65 U		0.81 U		
ARSENIC		5.8 J			1.9 J		1.4 U		2.1 J		
BARIUM		130 J			28.9 J		29.6 J		64.3 J		
BERYLLIUM		0.98 U			3 J		0.03 U		0.13 U		
CADMIUM		0.19 U			1.1 U		0.04 U		0.04 U		
CALCIUM		11800 J			21400 J		20200 J		14000 J		
CHROMIUM		39.6 J			0.72 U		0.43 U		5.6 J		
COBALT		17.8 J			65 J		0.36 U		0.91 U		
COPPER		10 J			4.3 J		0.25 U		4.8 J		
IRON		20000 J			4600 J		168 J		1630 J		
LEAD		8.7 J			1.1 U		1 U		1.5 U		
LITHIUM											
MAGNESIUM		6730 J			9940 J		6020 J		3510 J		
MANGANESE		2330 J			825 J		58.1 J		120 J		
MERCURY		0.02 U			0.007 U		0.007 U		0.007 U		
NICKEL		28.4 J			129 J		1.4 U		3.1 J		
POTASSIUM		8410 J			2890 J		3630 J		3440 J		
SELENIUM		0.28 U			0.18 U		0.46 U		1.2 U		
SILVER		0.14 U			0.03 U		0.03 U		0.13 U		
SODIUM		7420 J			16400 J		145000 J		87500 J		
STRONTIUM											
THALLIUM		0.23 U			0.18 U		0.04 U		0.05 U		
TIN		0.83 U			0.15 U		0.17 U		0.44 U		
TITANIUM		237 J			0.71 U		1.6 U		58.6 J		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
VANADIUM		34.4 J			0.41 U		0.33 U		6.7 J		
ZINC		32.8 J			250		0.5 J		8.5 J		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED			73.6 U							103 U	
ANTIMONY, FILTERED			0.32 U							1 U	
ARSENIC, FILTERED			1.6 J							1.4 U	
BARIUM, FILTERED			30.4 J							43.8 J	
BERYLLIUM, FILTERED			0.1 U							0.03 U	
CADMIUM, FILTERED			0.14 U							0.04 U	
CALCIUM, FILTERED			12000 J							13500 J	
CHROMIUM, FILTERED			0.36 U							0.61 U	
COBALT, FILTERED			13.2 J							3.1 J	
COPPER, FILTERED			0.69 U							1.3 U	
IRON, FILTERED			112 U							31.5 U	
LEAD, FILTERED			0.17 U							0.15 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED			4200 J							3160 J	
MANGANESE, FILTERED			2000 J							104 J	
MERCURY, FILTERED			0.02 U							0.007 U	
NICKEL, FILTERED			12.8 J							1.4 U	
POTASSIUM, FILTERED			2520 J							2360 J	
SELENIUM, FILTERED			0.76 U							1.6 U	
SILVER, FILTERED			0.09 U							0.03 U	
SODIUM, FILTERED			7100 J							91500 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED			0.1 U							0.04 U	
TIN, FILTERED			0.12 U							0.1 U	
TITANIUM, FILTERED			2 U							1.6 U	
VANADIUM, FILTERED			0.23 U							0.68 U	
ZINC, FILTERED			3.3 J							2.8 J	
Field Parameters (mg/L)											
ALKALINITY											
CARBON DIOXIDE											
DISSOLVED OXYGEN	0.53			2.12		3.43		0.56			7.97
DISSOLVED OXYGEN - METER		1.46			4.37		0.79		0.55		
HYDROGEN SULFIDE (H2S)											
IRON(+2)											
MANGANESE(+2)											
NITRITE-N											
OXIDATION REDUCTION POTENTIAL (MV)	149	105		132.1	298.5	364.8	-70	76.3	55.5		116.5
PH (S.U.)	6.85	6.39		5.66	4.47	4.19	7.77	7.74	8.19		6.78
SPECIFIC CONDUCTANCE (MS/CM)	1.001	0.19		0.101	0.303	0.263	0.595	0.853	0.357		0.703
SULFIDE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	UPPER	UPPER	UPPER	UPPER	UPPER	LOWER	LOWER	LOWER	LOWER	LOWER
LOCATION	13MWT41	13MWT42	13MWT42	13MWT42	13MWT43	13MWT43	13MWT44	13MWT44	13MWT45	13MWT45	13MWT45
SAMPLING ROUND	03	02	02	03	02	03	02	03	02	02	03
SAMPLE NUMBER	13GWT4102	13GWT4201	13GWT4201-F	13GWT4202	13GWT4301	13GWT4302	13GWT4401	13GWT4402	13GWT4501	13GWT4501-F	13GWT4502
SUBMATRIX	GW	GW	GF	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	8/1/2004	11/6/2003	11/6/2003	7/31/2004	12/4/2003	8/1/2004	12/4/2003	8/1/2004	12/8/2003	12/10/2003	7/29/2004
TEMPERATURE (C)	14.73	14.03		16.71	12.83	14.5	11.37	23.1	13.36		25.29
TURBIDITY (NTU)	110	1000 >		1000 >	1.9	8.9	4.6	110	75		19
Miscellaneous Parameters (mg/L)											
AMMONIA-N		0.16 J			0.11		0.42		0.26		
NITRITE/NITRATE-N		0.025 U			0.05 U		0.51 J		0.05 U		
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
Volatile Organics (ug/L)											
1,1,1,2-TETRACHLOROETHANE											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHENE											
1,2,3-TRICHLOROPROPANE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROETHANE											
1,2-DICHLOROPROPANE											
1,4-DIOXANE											
2-BUTANONE											
2-HEXANONE											
3-CHLOROPROPENE											
4-METHYL-2-PENTANONE											
ACETONE											
ACETONITRILE											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMODICHLOROMETHANE											
BROMOFORM											
BROMOMETHANE											
CARBON DISULFIDE											
CARBON TETRACHLORIDE											
CHLOROBENZENE											
CHLORODIBROMOMETHANE											
CHLOROETHANE											
CHLOROFORM											
CHLOROMETHANE											
CHLOROPRENE											
CIS-1,2-DICHLOROETHENE											
CIS-1,3-DICHLOROPROPENE											
DIBROMOMETHANE											
DICHLORODIFLUOROMETHANE											
ETHYL METHACRYLATE											
ETHYLBENZENE											
ISOBUTANOL											
METHACRYLONITRILE											
METHYL IODIDE											
METHYL METHACRYLATE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
METHYLENE CHLORIDE											
PROPIONITRILE											
STYRENE											
TETRACHLOROETHENE											
TOLUENE											
TOTAL XYLENES											
TRANS-1,2-DICHLOROETHENE											
TRANS-1,3-DICHLOROPROPENE											
TRANS-1,4-DICHLORO-2-BUTENE											
TRICHLOROETHENE											
TRICHLOROFLUOROMETHANE											
VINYL ACETATE											
VINYL CHLORIDE											
Semivolatile Organics (ug/L)											
1,2,4,5-TETRACHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-NAPHTHOQUINONE											
1,4-PHENYLENEDIAMINE											
1-NAPHTHYLAMINE											
2,2'-OXYBIS(1-CHLOROPROPANE)											
2,3,4,6-TETRACHLOROPHENOL											
2,4,5-TRICHLOROPHENOL											
2,4,6-TRICHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
2,4-DINITROPHENOL											
2,6-DICHLOROPHENOL											
2-ACETYLAMINOFLUORENE											
2-CHLORONAPHTHALENE											
2-CHLOROPHENOL											
2-METHYLNAPHTHALENE											
2-METHYLPHENOL											
2-NAPHTHYLAMINE											
2-NITROANILINE											
2-NITROPHENOL											
2-PICOLINE											
3&4-METHYLPHENOL											
3,3'-DICHLOROBENZIDINE											
3,3'-DIMETHYLBENZIDINE											
3-METHYLCHOLANTHRENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
3-NITROANILINE											
4,6-DINITRO-2-METHYLPHENOL											
4-AMINOBIPHENYL											
4-BROMOPHENYL PHENYL ETHER											
4-CHLORO-3-METHYLPHENOL											
4-CHLOROANILINE											
4-CHLOROPHENYL PHENYL ETHER											
4-NITROANILINE											
4-NITROPHENOL											
4-NITROQUINOLINE-1-OXIDE											
5-NITRO-O-TOLUIDINE											
7,12-DIMETHYLBENZ(A)ANTHRACENE											
A,A-DIMETHYLPHENETHYLAMINE											
ACENAPHTHENE											
ACENAPHTHYLENE											
ACETOPHENONE											
ANILINE											
ANTHRACENE											
ARAMITE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
BENZO(B)FLUORANTHENE											
BENZO(G,H,I)PERYLENE											
BENZO(K)FLUORANTHENE											
BENZYL ALCOHOL											
BIS(2-CHLOROETHOXY)METHANE											
BIS(2-CHLOROETHYL)ETHER											
BIS(2-ETHYLHEXYL)PHTHALATE											
BUTYL BENZYL PHTHALATE											
CHLOROBENZILATE											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIALLATE											
DIBENZO(A,H)ANTHRACENE											
DIBENZOFURAN											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
DIPHENYLAMINE											
ETHYL METHANE SULFONATE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLOPENTADIENE											
HEXACHLOROETHANE											
HEXACHLOROPROPENE											
INDENO(1,2,3-CD)PYRENE											
ISODRIN											
ISOPHORONE											
ISOSAFROLE											
KEPONE											
METHAPYRILENE											
METHYL METHANE SULFONATE											
N-NITROSO-DI-N-BUTYLAMINE											
N-NITROSO-DI-N-PROPYLAMINE											
N-NITROSODIETHYLAMINE											
N-NITROSODIMETHYLAMINE											
N-NITROSOMETHYLETHYLAMINE											
N-NITROSOMORPHOLINE											
N-NITROSOPIPERIDINE											
N-NITROSOPYRROLIDINE											
NAPHTHALENE											
O,O,O-TRIETHYL PHOSPHOROTHIOATE											
O-TOLUIDINE											
P-(DIMETHYLAMINO)AZOBENZENE											
PENTACHLOROBENZENE											
PENTACHLOROETHANE											
PENTACHLORONITROBENZENE											
PHENACETIN											
PHENANTHRENE											
PHENOL											
PRONAMIDE											
PYRENE											
PYRIDINE											
SAFROLE											
Energetics (ug/L)											
1,3,5-TRINITROBENZENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
1,3-DINITROBENZENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	0.556 U		0.521 U								
2,4,6-TRINITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
2,4-DIAMINO-6-NITROTOLUENE	0.278 U		0.26 U								
2,4-DINITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
2,6-DIAMINO-4-NITROTOLUENE	0.278 U		0.26 U								
2,6-DINITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
2-AMINO-4,6-DINITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.39 J		0.266 U

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
2-NITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
3,5-DINITROANILINE	0.278 U		0.26 U								
3-NITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
4-AMINO-2,6-DINITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.62	0.27 U	0.27 U		0.78
4-NITROTOLUENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
DNX	0.278 U		0.26 U								
HMX	0.278 U	0.26 U	0.26 U	0.24 U	0.86	0.85	27	0.27 U	120		17
MNX	0.278 U		0.26 U								
NITROBENZENE	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
PICRAMIC ACID											
PICRIC ACID											
RDX	0.278 U	0.26 U	0.26 U	0.24 U	0.54 J	0.53 J	32	0.27 U	250		190
TETRYL	0.278 U	0.26 U	0.26 U	0.24 U	0.275 U	0.27 U	0.27 U	0.27 U	0.27 U		0.266 U
TNX	0.278 U		0.26 U								
Herbicides (ug/L)											
HEXACHLOROPHENE											
PENTACHLOROPHENOL											
Total Metals (ug/L)											
ALUMINUM	472 J		16500 J	17400 J	8.35 U	16.2 U	39.4 U	93.9 J	1990 J		
ANTIMONY	0.05 U		0.02 U	0.03 U	0.085 U	0.52 U	0.085 U	1.5 U	0.13 U		
ARSENIC	0.5 U		3.2 J	4.1 J	0.21 U	0.37 U	0.43 U	1.2 J	2 J		
BARIUM	23.1 J		14.1 J	14.9 J	100 J	97.8 J	119 J	148 J	67 J		
BERYLLIUM	0.2 U		12.8 J	12.4 J	0.02 U	0.32 U	0.02 U	0.02 U	0.18 U		
CADMIUM	0.04 U		1.5 U	1.4 U	0.33 U	0.65 U	0.039 U	0.04 U	0.1 U		
CALCIUM	67700 J		41500 J	41200 J	148000 J	138000 J	69400 J	62400 J	22700 J		
CHROMIUM	0.67 U		1 U	1.6 U	0.81 U	0.86 U	0.84 U	0.98 U	4.6 J		
COBALT	2.9 J		194 J	249 J	0.97 U	1.1 J	1.1 J	2.2 J	29 J		
COPPER	0.42 U		29.9 J	35.2 J	0.46 U	0.74 U	0.62 U	1.4 J	3.4 U		
IRON	2350 J		24300 J	41600 J	26.9 U	29.6 U	158 J	92.9 J	5620 J		
LEAD	0.37 U		13.3 J	14.8 J	0.069 U	0.35 U	0.08 U	0.14 U	2.8 J		
LITHIUM											
MAGNESIUM	34100 J		37500 J	40500 J	13300 J	13100 J	11800 J	45700 J	9000 J		
MANGANESE	495 J		3960 J	3750 J	156	156	357	146	3370 J		
MERCURY	0.007 U		0.29	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U		
NICKEL	6 J		400 J	463 J	3.2 J	3.5 J	2.2 J	9.7 J	22.4 J		
POTASSIUM	3260 J		2570 J	2860 J	4220 J	4220 J	11900 J	5210 J	20100 J		
SELENIUM	0.13 U		0.11 U	0.11 U	0.094 U	0.31 U	0.094 U	6 J	0.18 U		
SILVER	0.03 U		0.05 U	0.02 U	0.028 U	0.44 U	0.028 U	0.028 U	0.02 U		
SODIUM	120000 J		63900 J	69900 J	32200 J	30100 J	9640 J	146000 J	7740 J		
STRONTIUM											
THALLIUM	0.04 U		0.7 U	0.84 U	0.043 U	0.38 U	0.043 U	0.043 U	0.07 U		
TIN	0.1 U		0.12 U	0.04 U	0.048 U	0.33 U	0.048 U	0.36 U	0.09 U		
TITANIUM	5.4 J		1 U								

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
VANADIUM	0.58 U		0.12 U	0.16 U	1.14 U	1.14 U	1.14 U	1.14 U	4.9 J		
ZINC	6.1 J		1070 J	1220 J	3.5 U	3.1 U	1.8 U	3.5 U	12.4 U		
Dissolved Metals (ug/L)											
ALUMINUM, FILTERED										6.4 U	
ANTIMONY, FILTERED										0.33 U	
ARSENIC, FILTERED										0.55 U	
BARIUM, FILTERED										51.6 J	
BERYLLIUM, FILTERED										0.08 U	
CADMIUM, FILTERED										0.13 U	
CALCIUM, FILTERED										24700 J	
CHROMIUM, FILTERED										0.83 U	
COBALT, FILTERED										30.4 J	
COPPER, FILTERED										1.2 U	
IRON, FILTERED										17.2 U	
LEAD, FILTERED										0.11 U	
LITHIUM, FILTERED											
MAGNESIUM, FILTERED										8400 J	
MANGANESE, FILTERED										3890 J	
MERCURY, FILTERED										0.03 U	
NICKEL, FILTERED										18.8 J	
POTASSIUM, FILTERED										20800 J	
SELENIUM, FILTERED										0.18 U	
SILVER, FILTERED										0.1 U	
SODIUM, FILTERED										7410 J	
STRONTIUM, FILTERED											
THALLIUM, FILTERED										0.1 U	
TIN, FILTERED										0.12 U	
TITANIUM, FILTERED											
VANADIUM, FILTERED										0.06 U	
ZINC, FILTERED										3.5 U	
Field Parameters (mg/L)											
ALKALINITY											
CARBON DIOXIDE											
DISSOLVED OXYGEN		0.05		0.51	0.15		0.3	2.42	8.32		0.91
DISSOLVED OXYGEN - METER	0.99		1.5								
HYDROGEN SULFIDE (H2S)											
IRON(+2)											
MANGANESE(+2)											
NITRITE-N											
OXIDATION REDUCTION POTENTIAL (MV)	-32.5	131	409.9	181.2	113.7		104.4	244.1	299		-68
PH (S.U.)	6.6	6.25	3.46	3.4	6.93		6.37	7.18	5.94		6.87
SPECIFIC CONDUCTANCE (MS/CM)	1.021	0.786	1634	1.056	0.719		0.45	0.881	0.278		1.583
SULFIDE											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	LOWER	LOWER	UPPER	UPPER	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	VALLEY	OVERBURDEN
LOCATION	13MWT46	13MWT46	13MWT47	13MWT47	13MWT48	13MWT48	13MWT49	13MWT50	13MWT51	13MWT51	13TW001
SAMPLING ROUND	02	03	02	03	03	03	03	03	03	03	ES/DI
SAMPLE NUMBER	13GWT4601	13GWT4602	13GWT4701	13GWT4702	13GWT4801	13GWT4801-D	13GWT4901	13GWT5001	13GWT5101	13GWT5101-F	13GWTW001
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GF	GW
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE DATE	12/9/2003	7/30/2004	12/9/2003	8/1/2004	8/14/2004	8/14/2004	8/14/2004	8/14/2004	8/1/2004	8/1/2004	2/14/2006
TEMPERATURE (C)	12.45	14.1	12.42	18.41	19.88		20.31	16.11	20.57		9.8
TURBIDITY (NTU)	8.72	2.81	5.4	7	1.95		1.54	8.34	33		39
Miscellaneous Parameters (mg/L)											
AMMONIA-N	0.12		0.44								
NITRITE/NITRATE-N	0.05 U		0.05 U								
TOTAL ORGANIC CARBON											

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
Volatile Organics (ug/L)										
1,1,1,2-TETRACHLOROETHANE										
1,1,1-TRICHLOROETHANE										
1,1,2,2-TETRACHLOROETHANE										
1,1,2-TRICHLOROETHANE										
1,1-DICHLOROETHANE										
1,1-DICHLOROETHENE										
1,2,3-TRICHLOROPROPANE										
1,2-DIBROMO-3-CHLOROPROPANE										
1,2-DIBROMOETHANE										
1,2-DICHLOROETHANE										
1,2-DICHLOROPROPANE										
1,4-DIOXANE										
2-BUTANONE										
2-HEXANONE										
3-CHLOROPROPENE										
4-METHYL-2-PENTANONE										
ACETONE										
ACETONITRILE										
ACROLEIN										
ACRYLONITRILE										
BENZENE										
BROMODICHLOROMETHANE										
BROMOFORM										
BROMOMETHANE										
CARBON DISULFIDE										
CARBON TETRACHLORIDE										
CHLOROBENZENE										
CHLORODIBROMOMETHANE										
CHLOROETHANE										
CHLOROFORM										
CHLOROMETHANE										
CHLOROPRENE										
CIS-1,2-DICHLOROETHENE										
CIS-1,3-DICHLOROPROPENE										
DIBROMOMETHANE										
DICHLORODIFLUOROMETHANE										
ETHYL METHACRYLATE										
ETHYLBENZENE										
ISOBUTANOL										
METHACRYLONITRILE										
METHYL IODIDE										
METHYL METHACRYLATE										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
METHYLENE CHLORIDE										
PROPIONITRILE										
STYRENE										
TETRACHLOROETHENE										
TOLUENE										
TOTAL XYLENES										
TRANS-1,2-DICHLOROETHENE										
TRANS-1,3-DICHLOROPROPENE										
TRANS-1,4-DICHLORO-2-BUTENE										
TRICHLOROETHENE										
TRICHLOROFLUOROMETHANE										
VINYL ACETATE										
VINYL CHLORIDE										
Semivolatile Organics (ug/L)										
1,2,4,5-TETRACHLOROBENZENE										
1,2,4-TRICHLOROBENZENE										
1,2-DICHLOROBENZENE										
1,3-DICHLOROBENZENE										
1,4-DICHLOROBENZENE										
1,4-NAPHTHOQUINONE										
1,4-PHENYLENEDIAMINE										
1-NAPHTHYLAMINE										
2,2'-OXYBIS(1-CHLOROPROPANE)										
2,3,4,6-TETRACHLOROPHENOL										
2,4,5-TRICHLOROPHENOL										
2,4,6-TRICHLOROPHENOL										
2,4-DICHLOROPHENOL										
2,4-DIMETHYLPHENOL										
2,4-DINITROPHENOL										
2,6-DICHLOROPHENOL										
2-ACETYLAMINOFLUORENE										
2-CHLORONAPHTHALENE										
2-CHLOROPHENOL										
2-METHYLNAPHTHALENE										
2-METHYLPHENOL										
2-NAPHTHYLAMINE										
2-NITROANILINE										
2-NITROPHENOL										
2-PICOLINE										
3&4-METHYLPHENOL										
3,3'-DICHLOROBENZIDINE										
3,3'-DIMETHYLBENZIDINE										
3-METHYLCHOLANTHRENE										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
3-NITROANILINE										
4,6-DINITRO-2-METHYLPHENOL										
4-AMINOBIPHENYL										
4-BROMOPHENYL PHENYL ETHER										
4-CHLORO-3-METHYLPHENOL										
4-CHLOROANILINE										
4-CHLOROPHENYL PHENYL ETHER										
4-NITROANILINE										
4-NITROPHENOL										
4-NITROQUINOLINE-1-OXIDE										
5-NITRO-O-TOLUIDINE										
7,12-DIMETHYLBENZ(A)ANTHRACENE										
A,A-DIMETHYLPHENETHYLAMINE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ACETOPHENONE										
ANILINE										
ANTHRACENE										
ARAMITE										
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE										
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
BENZYL ALCOHOL										
BIS(2-CHLOROETHOXY)METHANE										
BIS(2-CHLOROETHYL)ETHER										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CHLOROBENZILATE										
CHRYSENE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
DIALLATE										
DIBENZO(A,H)ANTHRACENE										
DIBENZOFURAN										
DIETHYL PHTHALATE										
DIMETHYL PHTHALATE										
DIPHENYLAMINE										
ETHYL METHANE SULFONATE										
FLUORANTHENE										
FLUORENE										
HEXACHLOROBENZENE										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
HEXACHLOROBUTADIENE										
HEXACHLOROCYCLOPENTADIENE										
HEXACHLOROETHANE										
HEXACHLOROPROPENE										
INDENO(1,2,3-CD)PYRENE										
ISODRIN										
ISOPHORONE										
ISOSAFROLE										
KEPONE										
METHAPYRILENE										
METHYL METHANE SULFONATE										
N-NITROSO-DI-N-BUTYLAMINE										
N-NITROSO-DI-N-PROPYLAMINE										
N-NITROSODIETHYLAMINE										
N-NITROSODIMETHYLAMINE										
N-NITROSOMETHYLETHYLAMINE										
N-NITROSOMORPHOLINE										
N-NITROSOPIPERIDINE										
N-NITROSOPYRROLIDINE										
NAPHTHALENE										
O,O,O-TRIETHYL PHOSPHOROTHIOATE										
O-TOLUIDINE										
P-(DIMETHYLAMINO)AZOBENZENE										
PENTACHLOROBENZENE										
PENTACHLOROETHANE										
PENTACHLORONITROBENZENE										
PHENACETIN										
PHENANTHRENE										
PHENOL										
PRONAMIDE										
PYRENE										
PYRIDINE										
SAFROLE										
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
1,3-DINITROBENZENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE										
2,4,6-TRINITROTOLUENE	0.275 U	0.275 UJ	4 J	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	7.2
2,4-DIAMINO-6-NITROTOLUENE										
2,4-DINITROTOLUENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
2,6-DIAMINO-4-NITROTOLUENE										
2,6-DINITROTOLUENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
2-AMINO-4,6-DINITROTOLUENE	0.275 U	0.275 UJ	0.95 J	0.25 U	1.7 U	0.76 J	0.281 UJ	0.298 UJ	0.83 J	1.9 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
2-NITROTOLUENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
3,5-DINITROANILINE										
3-NITROTOLUENE	0.275 U	0.275 UJ	6 R	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
4-AMINO-2,6-DINITROTOLUENE	0.69	0.275 UJ	1.3 J	0.59	3.7	2.1 J	0.281 UJ	0.298 UJ	1.4 J	5.6
4-NITROTOLUENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
DNX										
HMX	16	3.6 J	13 J	140	33	150 J	0.281 UJ	1.3 J	81 J	60
MNX										
NITROBENZENE	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
PICRAMIC ACID										
PICRIC ACID										
RDX	170	10 J	160	1200	100	120 J	1.4 J	3.8 J	120 J	240
TETRYL	0.275 U	0.275 UJ	0.248 UJ	0.25 U	1.7 U	0.301 UJ	0.281 UJ	0.298 UJ	0.281 UJ	0.245 U
TNX										
Herbicides (ug/L)										
HEXACHLOROPHENE										
PENTACHLOROPHENOL										
Total Metals (ug/L)										
ALUMINUM										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CALCIUM										
CHROMIUM										
COBALT										
COPPER										
IRON										
LEAD										
LITHIUM										
MAGNESIUM										
MANGANESE										
MERCURY										
NICKEL										
POTASSIUM										
SELENIUM										
SILVER										
SODIUM										
STRONTIUM										
THALLIUM										
TIN										
TITANIUM										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
VANADIUM										
ZINC										
Dissolved Metals (ug/L)										
ALUMINUM, FILTERED										
ANTIMONY, FILTERED										
ARSENIC, FILTERED										
BARIUM, FILTERED										
BERYLLIUM, FILTERED										
CADMIUM, FILTERED										
CALCIUM, FILTERED										
CHROMIUM, FILTERED										
COBALT, FILTERED										
COPPER, FILTERED										
IRON, FILTERED										
LEAD, FILTERED										
LITHIUM, FILTERED										
MAGNESIUM, FILTERED										
MANGANESE, FILTERED										
MERCURY, FILTERED										
NICKEL, FILTERED										
POTASSIUM, FILTERED										
SELENIUM, FILTERED										
SILVER, FILTERED										
SODIUM, FILTERED										
STRONTIUM, FILTERED										
THALLIUM, FILTERED										
TIN, FILTERED										
TITANIUM, FILTERED										
VANADIUM, FILTERED										
ZINC, FILTERED										
Field Parameters (mg/L)										
ALKALINITY										
CARBON DIOXIDE										
DISSOLVED OXYGEN		4.94		9.3				3.89		0.29
DISSOLVED OXYGEN - METER										
HYDROGEN SULFIDE (H2S)										
IRON(+2)										
MANGANESE(+2)										
NITRITE-N										
OXIDATION REDUCTION POTENTIAL (MV)		141		195				-7		28
PH (S.U.)		6.46		7.75				6.38		6.75
SPECIFIC CONDUCTANCE (MS/CM)		1.66		2.479				0.215		0.74
SULFIDE										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN	OVERBURDEN
LOCATION	13TW001	13TW002	13TW003	13TW004	13TW005	13TW006	13TW007	13TW008	13TW009	13TW010
SAMPLING ROUND	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW001-D	13GWTW002	13GWTW003	13GWTW004	13GWTW005	13GWTW006	13GWTW007	13GWTW008	13GWTW009	13GWTW010
SUBMATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/14/2006	2/14/2006	2/15/2006	2/15/2006	2/28/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006	2/16/2006
TEMPERATURE (C)		9.53		3.85				9.66		7.96
TURBIDITY (NTU)		1 >		65				1 >		39
Miscellaneous Parameters (mg/L)										
AMMONIA-N										
NITRITE/NITRATE-N										
TOTAL ORGANIC CARBON										

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
Volatile Organics (ug/L)		
1,1,1,2-TETRACHLOROETHANE		
1,1,1-TRICHLOROETHANE		
1,1,2,2-TETRACHLOROETHANE		
1,1,2-TRICHLOROETHANE		
1,1-DICHLOROETHANE		
1,1-DICHLOROETHENE		
1,2,3-TRICHLOROPROPANE		
1,2-DIBROMO-3-CHLOROPROPANE		
1,2-DIBROMOETHANE		
1,2-DICHLOROETHANE		
1,2-DICHLOROPROPANE		
1,4-DIOXANE		
2-BUTANONE		
2-HEXANONE		
3-CHLOROPROPENE		
4-METHYL-2-PENTANONE		
ACETONE		
ACETONITRILE		
ACROLEIN		
ACRYLONITRILE		
BENZENE		
BROMODICHLOROMETHANE		
BROMOFORM		
BROMOMETHANE		
CARBON DISULFIDE		
CARBON TETRACHLORIDE		
CHLOROBENZENE		
CHLORODIBROMOMETHANE		
CHLOROETHANE		
CHLOROFORM		
CHLOROMETHANE		
CHLOROPRENE		
CIS-1,2-DICHLOROETHENE		
CIS-1,3-DICHLOROPROPENE		
DIBROMOMETHANE		
DICHLORODIFLUOROMETHANE		
ETHYL METHACRYLATE		
ETHYLBENZENE		
ISOBUTANOL		
METHACRYLONITRILE		
METHYL IODIDE		
METHYL METHACRYLATE		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
METHYLENE CHLORIDE		
PROPIONITRILE		
STYRENE		
TETRACHLOROETHENE		
TOLUENE		
TOTAL XYLENES		
TRANS-1,2-DICHLOROETHENE		
TRANS-1,3-DICHLOROPROPENE		
TRANS-1,4-DICHLORO-2-BUTENE		
TRICHLOROETHENE		
TRICHLOROFLUOROMETHANE		
VINYL ACETATE		
VINYL CHLORIDE		
Semivolatile Organics (ug/L)		
1,2,4,5-TETRACHLOROBENZENE		
1,2,4-TRICHLOROBENZENE		
1,2-DICHLOROBENZENE		
1,3-DICHLOROBENZENE		
1,4-DICHLOROBENZENE		
1,4-NAPHTHOQUINONE		
1,4-PHENYLENEDIAMINE		
1-NAPHTHYLAMINE		
2,2'-OXYBIS(1-CHLOROPROPANE)		
2,3,4,6-TETRACHLOROPHENOL		
2,4,5-TRICHLOROPHENOL		
2,4,6-TRICHLOROPHENOL		
2,4-DICHLOROPHENOL		
2,4-DIMETHYLPHENOL		
2,4-DINITROPHENOL		
2,6-DICHLOROPHENOL		
2-ACETYLAMINOFLUORENE		
2-CHLORONAPHTHALENE		
2-CHLOROPHENOL		
2-METHYLNAPHTHALENE		
2-METHYLPHENOL		
2-NAPHTHYLAMINE		
2-NITROANILINE		
2-NITROPHENOL		
2-PICOLINE		
3&4-METHYLPHENOL		
3,3'-DICHLOROBENZIDINE		
3,3'-DIMETHYLBENZIDINE		
3-METHYLCHOLANTHRENE		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
3-NITROANILINE		
4,6-DINITRO-2-METHYLPHENOL		
4-AMINOBIPHENYL		
4-BROMOPHENYL PHENYL ETHER		
4-CHLORO-3-METHYLPHENOL		
4-CHLOROANILINE		
4-CHLOROPHENYL PHENYL ETHER		
4-NITROANILINE		
4-NITROPHENOL		
4-NITROQUINOLINE-1-OXIDE		
5-NITRO-O-TOLUIDINE		
7,12-DIMETHYLBENZ(A)ANTHRACENE		
A,A-DIMETHYLPHENETHYLAMINE		
ACENAPHTHENE		
ACENAPHTHYLENE		
ACETOPHENONE		
ANILINE		
ANTHRACENE		
ARAMITE		
BENZO(A)ANTHRACENE		
BENZO(A)PYRENE		
BENZO(B)FLUORANTHENE		
BENZO(G,H,I)PERYLENE		
BENZO(K)FLUORANTHENE		
BENZYL ALCOHOL		
BIS(2-CHLOROETHOXY)METHANE		
BIS(2-CHLOROETHYL)ETHER		
BIS(2-ETHYLHEXYL)PHTHALATE		
BUTYL BENZYL PHTHALATE		
CHLOROBENZILATE		
CHRYSENE		
DI-N-BUTYL PHTHALATE		
DI-N-OCTYL PHTHALATE		
DIALLATE		
DIBENZO(A,H)ANTHRACENE		
DIBENZOFURAN		
DIETHYL PHTHALATE		
DIMETHYL PHTHALATE		
DIPHENYLAMINE		
ETHYL METHANE SULFONATE		
FLUORANTHENE		
FLUORENE		
HEXACHLOROBENZENE		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
HEXACHLOROBUTADIENE		
HEXACHLOROCYCLOPENTADIENE		
HEXACHLOROETHANE		
HEXACHLOROPROPENE		
INDENO(1,2,3-CD)PYRENE		
ISODRIN		
ISOPHORONE		
ISOSAFROLE		
KEPONE		
METHAPYRILENE		
METHYL METHANE SULFONATE		
N-NITROSO-DI-N-BUTYLAMINE		
N-NITROSO-DI-N-PROPYLAMINE		
N-NITROSODIETHYLAMINE		
N-NITROSODIMETHYLAMINE		
N-NITROSOMETHYLETHYLAMINE		
N-NITROSOMORPHOLINE		
N-NITROSOPIPERIDINE		
N-NITROSOPYRROLIDINE		
NAPHTHALENE		
O,O,O-TRIETHYL PHOSPHOROTHIOATE		
O-TOLUIDINE		
P-(DIMETHYLAMINO)AZOBENZENE		
PENTACHLOROBENZENE		
PENTACHLOROETHANE		
PENTACHLORONITROBENZENE		
PHENACETIN		
PHENANTHRENE		
PHENOL		
PRONAMIDE		
PYRENE		
PYRIDINE		
SAFROLE		
Energetics (ug/L)		
1,3,5-TRINITROBENZENE	0.27 U	0.271 U
1,3-DINITROBENZENE	0.27 U	0.271 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE		
2,4,6-TRINITROTOLUENE	0.27 U	250
2,4-DIAMINO-6-NITROTOLUENE		
2,4-DINITROTOLUENE	0.27 U	0.271 U
2,6-DIAMINO-4-NITROTOLUENE		
2,6-DINITROTOLUENE	0.27 U	6.8 J
2-AMINO-4,6-DINITROTOLUENE	0.27 U	9 J

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
2-NITROTOLUENE	0.27 U	0.271 U
3,5-DINITROANILINE		
3-NITROTOLUENE	0.27 U	0.271 U
4-AMINO-2,6-DINITROTOLUENE	0.27 U	22
4-NITROTOLUENE	0.27 U	1.1 R
DNX		
HMX	1.4 J	270
MNX		
NITROBENZENE	0.27 U	0.271 U
PICRAMIC ACID		
PICRIC ACID		
RDX	7.3	150
TETRYL	0.27 U	0.271 U
TNX		
Herbicides (ug/L)		
HEXACHLOROPHENE		
PENTACHLOROPHENOL		
Total Metals (ug/L)		
ALUMINUM		
ANTIMONY		
ARSENIC		
BARIUM		
BERYLLIUM		
CADMIUM		
CALCIUM		
CHROMIUM		
COBALT		
COPPER		
IRON		
LEAD		
LITHIUM		
MAGNESIUM		
MANGANESE		
MERCURY		
NICKEL		
POTASSIUM		
SELENIUM		
SILVER		
SODIUM		
STRONTIUM		
THALLIUM		
TIN		
TITANIUM		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
VANADIUM		
ZINC		
Dissolved Metals (ug/L)		
ALUMINUM, FILTERED		
ANTIMONY, FILTERED		
ARSENIC, FILTERED		
BARIUM, FILTERED		
BERYLLIUM, FILTERED		
CADMIUM, FILTERED		
CALCIUM, FILTERED		
CHROMIUM, FILTERED		
COBALT, FILTERED		
COPPER, FILTERED		
IRON, FILTERED		
LEAD, FILTERED		
LITHIUM, FILTERED		
MAGNESIUM, FILTERED		
MANGANESE, FILTERED		
MERCURY, FILTERED		
NICKEL, FILTERED		
POTASSIUM, FILTERED		
SELENIUM, FILTERED		
SILVER, FILTERED		
SODIUM, FILTERED		
STRONTIUM, FILTERED		
THALLIUM, FILTERED		
TIN, FILTERED		
TITANIUM, FILTERED		
VANADIUM, FILTERED		
ZINC, FILTERED		
Field Parameters (mg/L)		
ALKALINITY		
CARBON DIOXIDE		
DISSOLVED OXYGEN	0.91	
DISSOLVED OXYGEN - METER		
HYDROGEN SULFIDE (H2S)		
IRON(+2)		
MANGANESE(+2)		
NITRITE-N		
OXIDATION REDUCTION POTENTIAL (MV)	-1	
PH (S.U.)	6.87	
SPECIFIC CONDUCTANCE (MS/CM)	0.559	
SULFIDE		

TABLE G-6

SUMMARY OF ANALYTIC RESULTS
GROUND WATER SAMPLES ROUNDS 1 THROUGH 3 AND EXTERNAL SUMP/DRAINAGE INVESTIGATION
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

WATER BEARING ZONE	OVERBURDEN	OVERBURDEN
LOCATION	13TW011	13TW012
SAMPLING ROUND	ES/DI	ES/DI
SAMPLE NUMBER	13GWTW011	13GWTW012
SUBMATRIX	GW	GW
SAMPLE CODE	NORMAL	NORMAL
SAMPLE DATE	3/1/2006	2/28/2006
TEMPERATURE (C)	1.73	
TURBIDITY (NTU)	6.9	
Miscellaneous Parameters (mg/L)		
AMMONIA-N		
NITRITE/NITRATE-N		
TOTAL ORGANIC CARBON		

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
009	5/18/1998	ICS	165	2	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
012	5/18/1998	ICS	165	2	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.219 J	0.26 U	0.25 U	0.232 J	0.65 U
013	5/18/1998	ICS	165	3	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
015	5/18/1998	ICS	165	3	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
016	5/19/1998	ICS	165	4	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
018	5/19/1998	ICS	165	4	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
019	5/19/1998	ICS	165	5	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
022	5/19/1998	ICS	165	5	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
023	5/19/1998	ICS	165	6	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
025	5/19/1998	ICS	165	6	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
026	5/19/1998	ICS	165	7	0-12	0.25 U	0.25 U	1.19	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
028	5/19/1998	ICS	165	7	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
029	5/19/1998	ICS	165	8	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
032	5/19/1998	ICS	165	8	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
033	5/19/1998	ICS	165	9	0-12	0.25 U	0.25 U	0.421	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.218 J	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
035	5/19/1998	ICS	165	9	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
036	5/19/1998	ICS	165	10	0-12	0.25 U	0.25 U	0.331	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
038	5/19/1998	ICS	165	10	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
039	5/20/1998	ICS	165	11	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
042	5/20/1998	ICS	165	11	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	0.376 J	0.65 U
044	5/20/1998	ICS	165	12	0-12	0.164 J	0.25 U	2	0.25 U	0.26 U	0.772	0.43	0.25 U	2.95	0.25 U	3.21	0.26 U	0.25 U	2.4	0.65 U
046	5/20/1998	ICS	165	12	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
047	5/20/1998	ICS	165	13	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
049	5/20/1998	ICS	165	13	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
051	5/20/1998	ICS	165	14	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
053	5/20/1998	ICS	165	14	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
054	5/20/1998	ICS	165	15	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
056	5/20/1998	ICS	165	15	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
057	5/21/1998	ICS	165	16	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
059	5/21/1998	ICS	165	16	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
060	5/21/1998	ICS	165	17	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
062	5/21/1998	ICS	165	17	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
063	5/21/1998	ICS	165	18	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
065	5/21/1998	ICS	165	18	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
066	5/21/1998	ICS	165	19	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
068	5/21/1998	ICS	165	19	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
069	6/10/1998	ICS	165	20	0-12	0.25 U	0.25 U	0.489	0.25 U	0.26 U	150 J	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
071	6/10/1998	ICS	165	20	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
072	6/10/1998	ICS	165	21	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
074	6/10/1998	ICS	165	21	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
078	6/11/1998	ICS	165	23	0-12	0.25 U	0.25 U	0.653	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.512	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
080	6/11/1998	ICS	165	23	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
081	6/11/1998	ICS	165	24	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
083	6/11/1998	ICS	165	24	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
084	6/23/1998	ICS	165	94	0-12	0.25 U	0.25 U	2.45	0.25 U	0.26 U	0.394 J	0.25 U	0.25 U	0.732	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
086	6/23/1998	ICS	165	94	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
087	6/23/1998	ICS	165	95	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
089	6/23/1998	ICS	165	95	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
090	7/20/1998	ICS	165	96	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
092	7/20/1998	ICS	165	96	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
093	7/21/1998	ICS	165	97	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
095	7/21/1998	ICS	165	97	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
096	7/21/1998	ICS	165	98	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
098	7/21/1998	ICS	165	98	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
099	7/21/1998	ICS	165	99	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
101	7/21/1998	ICS	165	99	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
102	7/21/1998	ICS	165	100	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
104	7/21/1998	ICS	165	100	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
105	7/23/1998	ICS	165	101	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
107	7/23/1998	ICS	165	101	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
750	10/31/2000	ICS	165	277	0-12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
752	10/31/2000	ICS	165	277	24-36	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
753	10/31/2000	ICS	165	278	0-12	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U
289	2/3/1998	ICS	166	112	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
436	7/8/1999	ICS	166	176	0-12	0.238 U	0.238 U	0.268	0.238 U	0.248 U	0.172 J	0.238 U	0.238 U	0.202 J	0.238 U	2.1 U	0.248 U	0.25 U	0.952 U	0.619 U
438	7/8/1999	ICS	166	176	24-36	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.25 U	0.952 U	0.619 U
448	7/9/1999	ICS	166	179	0-12	0.25 U	0.25 U	0.122 J	0.25 U	0.26 U	0.221 J	0.25 U	0.25 U	0.276	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
450	7/9/1999	ICS	166	179	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
451	7/9/1999	ICS	166	180	0-12	0.227 U	0.227 U	0.983	0.227 U	0.236 U	0.215 J	0.227 U	0.227 U	0.259	0.227 U	1.7 J	0.236 U	0.25 U	2.44	0.591 U
453	7/9/1999	ICS	166	180	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
466	7/14/1999	ICS	166	182	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
468	7/14/1999	ICS	166	182	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
469	7/14/1999	ICS	166	183	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
471	7/14/1999	ICS	166	183	24-36	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.25 U	0.952 U	0.619 U
572	9/22/1999	ICS	166	216	0-12	1 U	1 U	1.8	1 U	1 U	1 U	1 U	1 U	0.61 J	1 U	1.4	1 U	2.5 U	2.1	1 U
574	9/22/1999	ICS	166	216	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.71 J	1 U	2.5 U	5.6	1 U
580	9/27/1999	ICS	166	219	0-12	1 U	1 U	0.78 J	1 U	1 U	0.28 J	1 U	1 U	0.42 J	1 U	4.4	1 U	2.5 U	0.67 J	1 U
582	9/27/1999	ICS	166	219	24-36	1 U	1 U	0.52 J	1 U	1 U	0.21 J	1 U	1 U	0.14 J	1 U	1.6	1 U	2.5 U	0.59 J	1 U
586	9/27/1999	ICS	166	221	0-12	1 U	1 U	0.24 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.33 J	1 U	2.5 U	0.67 J	1 U
588	9/27/1999	ICS	166	221	24-36	1 U	1 U	0.82 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.8	1 U	2.5 U	0.49 J	1 U
589	9/27/1999	ICS	166	222	0-12	1 U	1 U	0.2 J	1 U	1 U	0.12 J	1 U	1 U	1 U	1 U	0.33 J	1 U	2.5 U	1 U	1 U
591	9/27/1999	ICS	166	222	24-36	1 U	1 U	0.18 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.39 J	1 U	2.5 U	0.82 J	1 U
592	9/27/1999	ICS	166	223	0-12	1 U	1 U	0.52 J	1 U	1 U	1 U	1 U	1 U	0.1 J	1 U	0.37 J	1 U	2.5 U	2.5	1 U
594	9/27/1999	ICS	166	223	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.92 J	1 U	2.5 U	1.1	1 U
595	9/27/1999	ICS	166	224	0-12	1 U	1 U	0.24 J	1 U	1 U	0.13 J	1 U	1 U	0.25 J	1 U	0.89 J	1 U	2.5 U	1 U	1 U
597	9/27/1999	ICS	166	224	24-36	1 U	1 U	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	1	1 U
610	9/28/1999	ICS	166	229	0-12	1 U	1 U	18	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.8 J	1 U	2.5 U	0.17 J	1 U
612	9/28/1999	ICS	166	229	24-36	1 U	1 U	1.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.93 J	1 U	2.5 U	3.1	1 U
613	9/28/1999	ICS	166	230	0-12	1 U	1 U	0.31 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	2.5 U	1 U	1 U
615	9/28/1999	ICS	166	230	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.43 J	1 U	2.5 U	1 U	1 U
631	10/1/1999	ICS	166	238	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	2.5 U	0.33 J	1 U
633	10/1/1999	ICS	166	238	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.11 J	1 U	2.5 U	0.45 J	1 U
646	10/12/1999	ICS	166	242	0-12	1 U	1 U	0.15 J	1 U	1 U	0.12 J	1 U	1 U	0.19 J	1 U	0.28 J	1 U	2.5 U	1 U	1 U
648	10/12/1999	ICS	166	242	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.98 J	1 U	2.5 U	1 U	1 U
649	10/12/1999	ICS	166	243	0-12	1 U	1 U	0.35 J	1 U	1 U	0.21 J	1 U	1 U	0.44 J	1 U	2.9	1 U	2.5 U	5.2	1 U
651	10/12/1999	ICS	166	243	24-36	1 U	1 U	0.24 J	1 U	1 U	0.17 J	1 U	1 U	0.31 J	1 U	1.4	1 U	2.5 U	1.8	1 U
655	10/12/1999	ICS	166	245	0-12	1 U	1 U	0.79 J	1 U	1 U	1 U	1 U	1 U	0.34 J	1 U	1.2	1 U	2.5 U	0.26 J	1 U
657	10/12/1999	ICS	166	245	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.78 J	1 U	2.5 U	0.29 J	1 U
677	10/19/1999	ICS	166	252	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.3 J	1 U	2.5 U	0.24 J	1 U
678	10/19/1999	ICS	166	253	0-12	1 U	1 U	0.42 J	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	0.24 J	1 U	2.5 U	0.29 J	1 U
680	10/19/1999	ICS	166	253	24-36	1 U	1 U	0.22 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.51 J	1 U	2.5 U	1.1	1 U
681	10/19/1999	ICS	166	254	0-12	1 U	1 U	0.37 J	1 U	1 U	0.25 J	1 U	1 U	0.35 J	1 U	1	1 U	2.5 U	0.55 J	1 U
683	10/19/1999	ICS	166	254	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 J	1 U	2.5 U	0.16 J	1 U
684	10/19/1999	ICS	166	255	0-12	1 U	1 U	0.23 J	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	0.11 J	1 U	2.5 U	0.15 J	1 U
686	10/19/1999	ICS	166	255	24-36	1 U	1 U	1.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.13 J	1 U	2.5 U	0.18 J	1 U
690	10/20/1999	ICS	166	257	0-12	1 U	1 U	1.2	1 U	1 U	0.46 J	1 U	1 U	1.1	1 U	17	1 U	2.5 U	1.6	1 U
692	10/20/1999	ICS	166	257	24-36	1 U	1 U	0.26 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.3	1 U	2.5 U	0.39 J	1 U
726	11/4/1999	ICS	166	269	0-12	1 U	1 U	0.8 J	1 U	1 U	0.3 J	1 U	1 U	0.59 J	1 U	0.65 J	1 U	2.5 U	0.26 J	1 U
728	11/4/1999	ICS	166	269	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.95 J	1 U	2.5 U	0.15 J	1 U
729	11/4/1999	ICS	166	270	0-12	1 U	1 U	2.2	1 U	1 U	0.51 J	1 U	1 U	1.4	1 U	4.4	1 U	2.5 U	0.75 J	1 U
731	11/4/1999	ICS	166	270	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.37 J	1 U	2.5 U	0.24 J	1 U
732	11/4/1999	ICS	166	271	0-12	1 U	1 U	57 D	1 U	1 U	2 U	1 U	1 U	2 U	1 U	0.63 J	1 U	2.5 U	0.99 J	1 U
734	11/4/1999	ICS	166	271	24-36	1 U	1 U	1.2	1 U	1 U	0.26 J	1 U	1 U	0.18 J	1 U	0.74 J	1 U	2.5 U	0.13 J	1 U
735	11/4/1999	ICS	166	272	0-12	1 U	1 U	1.4	1 U	1 U	0.42 J	1 U	1 U	0.66 J	1 U	1.3	1 U	2.5 U	0.1 J	1 U
737	11/4/1999	ICS	166	272	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.83 J	1 U	2.5 U	1 U	1 U
741	1/26/2000	ICS	166	273	0-12	1 U	1 U	0.13 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.36 J	1 U	2.5 U	0.37 J	1 U
743	1/26/2000	ICS	166	273	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.23 J	1 U	2.5 U	1 U	1 U
744	1/26/2000	ICS	166	274	0-12	1 U	1 U	0.13 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
746	1/26/2000	ICS	166	274	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	1 U	1 U	2.5 U	1 U	1 U
738	1/25/2000	ICS	166	275	0-12	1 U	1 U	0.29 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.41 J	1 U	2.5 U	0.14 J	1 U
740	1/25/2000	ICS	166	275	24-36	1 U	1 U	0.31 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.26 J	1 U	2.5 U	1 U	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
266	2/17/2000	PES	166	102	0-6	1 U	1 U	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1 U	2 U	4	1 U
316	3/8/2000	PES	166	103	0-6	2.2	1 U	14	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.1	1 U	2.5 U	9.2	1 U
346	3/28/2000	PES	166	105	0-6	0.25 U	0.25 U	0.2 J	0.25 U	0.25 U	0.13 J	0.25 U	0.25 U	0.25 U	0.25 U	0.33	0.25 U		0.88	0.25 U
280	3/1/2000	PES	166	105	0-6	1 U	1 U	1.9	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.49 J	1 U	2.5 U	3.7	1 U
236	1/8/2000	PES	166	107	0-6	1 U	1 U	3.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.68 J	1 U	2.5 U	0.91 J	1 U
268	2/17/2000	PES	166	113	0-6	1 U	1 U	0 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 J	1 U	2 U	1 J	1 U
318	3/8/2000	PES	166	115	0-6	0.13 J	1 U	1.1	1 U	1 U	1 U	1 U	1 U	0.54 J	1 U	2.2	1 U	2.5 U	2.2	1 U
282	3/1/2000	PES	166	118	0-6	1 U	1 U	1.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.46 J	1 U	2.5 U	3.2	1 U
264	2/17/2000	PES	166	120	0-6	1 U	1 U	0 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0 J	1 U	2 U	1	1 U
244	1/19/2000	PES	166	121	0-6	1 U	1 U	1.9	1 U	1 U	1 U	1 U	1 U	0.31 J	1 U	0.9 J	1 U	2.5 U	2	1 U
246	1/25/2000	PES	166	177	0-6	1 U	1 U	1.5	1 U	1 U	1 U	1 U	1 U	0.5 J	1 U	0.96 J	1 U	2.5 U	3.1	1 U
240	1/19/2000	PES	166	181	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.3 J	1 U	2.5 U	0.37 J	1 U
288	3/2/2000	PES	166	215	0-6	1 U	1 U	0.4 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 J	1 U	2.5 U	5	1 U
242	1/19/2000	PES	166	220	0-6	1 U	1 U	1	1 U	1 U	1 U	1 U	1 U	0.29 J	1 U	0.5 J	1 U	2.5 U	0.34 J	1 U
270	3/1/2000	PES	166	225	0-6	1 U	1 U	0.16 J	1 U	1 U	0.16 J	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	2	1 U
276	3/1/2000	PES	166	226	0-6	1 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.45 J	1 U	2.5 U	1.3	1 U
332	3/8/2000	PES	166	227	0-6	1 U	1 U	0.31 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U	2.5 U	2.5	1 U
326	3/8/2000	PES	166	228	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.97 J	1 U	2.5 U	0.59 J	1 U
238	1/19/2000	PES	166	231	0-6	1 U	1 U	0.19 J	1 U	1 U	0.22 J	1 U	1 U	0.26 J	1 U	0.63 J	1 U	2.5 U	0.47 J	1 U
334	3/8/2000	PES	166	244	0-6	0.23 J	1 U	0.71 J	1 U	1 U	1 U	1 U	1 U	0.3 J	1 U	2.2	1 U	2.5 U	2.7	1 U
292	3/2/2000	PES	166	246	0-6	1 U	1 U	0.22 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.33 J	1 U	2.5 U	2.4	1 U
338	3/10/2000	PES	166	256	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.3	1 U	2.5 U	0.39 J	1 U
347	5/18/2000	PES	166	276	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.57 J	1 U	2.5 U	1.4	1 U
310	3/7/2000	PES	166	113/112	sidewall	1 U	1 U	1.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
312	3/7/2000	PES	166	113/179	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.7	1 U	2.5 U	1 U	1 U
314	3/7/2000	PES	166	113/180	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.81 J	1 U	2.5 U	1 U	1 U
320	3/8/2000	PES	166	115/182	sidewall	1 U	1 U	0.51 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.34 J	1 U	2.5 U	1 U	1 U
322	3/8/2000	PES	166	115/183	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
324	3/8/2000	PES	166	115/229	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.25 J	1 U	2.5 U	0.72 J	1 U
286	3/1/2000	PES	166	118/216	sidewall	1 U	1 U	1.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.43 J	1 U	2.5 U	3.6	1 U
284	3/1/2000	PES	166	118/223	sidewall	1 U	1 U	1.2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.55 J	1 U	2.5 U	3.2	1 U
298	3/2/2000	PES	166	118/224	sidewall	1 U	1 U	0.33 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	2.5 U	0.63 J	1 U
308	3/7/2000	PES	166	120/176	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.41 J	1 U
306	3/7/2000	PES	166	120/238	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.37 J	1 U	2.5 U	1 U	1 U
256	1/26/2000	PES	166	121/221	sidewall	1 U	1 U	12	1 U	1 U	1 U	1 U	1 U	1.4	1 U	2.4	1 U	2.5 U	5.4	1 U
258	1/26/2000	PES	166	177/176	sidewall	1 U	1 U	15	1 U	1 U	1 U	1 U	1 U	1.6	1 U	2.4	1 U	2.5 U	8.7	1 U
262	2/17/2000	PES	166	177/219	sidewall	1 U	1 U	0 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0 J	1 U	2 U	0 J	1 U
252	1/25/2000	PES	166	181/121	sidewall	1 U	1 U	8.6	1 U	1 U	1 U	1 U	1 U	0.61 J	1 U	3.3	1 U	2.5 U	12	1 U
250	1/25/2000	PES	166	181/220	sidewall	1 U	1 U	0.26 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	1 U	1 U
248	1/25/2000	PES	166	181/231	sidewall	1 U	1 U	25 D	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	3.9	1 U	2.5 U	17	1 U
290	3/2/2000	PES	166	215/216	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.21 J	1 U
254	1/26/2000	PES	166	220/221	sidewall	1 U	1 U	14	1 U	1 U	1 U	1 U	1 U	1.1	1 U	3.3	1 U	2.5 U	11	1 U
304	3/7/2000	PES	166	220/273	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
272	3/1/2000	PES	166	225/224	sidewall	1 U	1 U	0.18 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.21 J	1 U	2.5 U	1.7	1 U
274	3/1/2000	PES	166	225/242	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.18 J	1 U	2.5 U	0.8 J	1 U
278	3/1/2000	PES	166	226/243	sidewall	1 U	1 U	0.68 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.46 J	1 U	2.5 U	2	1 U
328	3/8/2000	PES	166	228/229	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.64 J	1 U	2.5 U	1 U	1 U
330	3/8/2000	PES	166	228/245	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	2.5 U	0.11 J	1 U
302	3/7/2000	PES	166	231/273	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.54 J	1 U	2.5 U	0.2 J	1 U
300	3/7/2000	PES	166	231/road	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
336	3/8/2000	PES	166	244/243	sidewall	1 U	1 U	0.33 J	1 U	1 U	0.24 J	1 U	1 U	0.28 J	1 U	3.4	1 U	2.5 U	3.2	1 U
296	3/2/2000	PES	166	246/252	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.52 J	1 U	2.5 U	2.1	1 U
294	3/2/2000	PES	166	246/253	sidewall	1 U	1 U	0.18 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	0.56 J	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
340	3/10/2000	PES	166	256/257	sidewall	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	1 U	1 U	1 U	4	1 U	2.5 U	2.4	1 U
344	3/10/2000	PES	166	256/269	sidewall	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1.8	1 U	2.5 U	0.85 J	1 U
342	3/10/2000	PES	166	256/271	sidewall	1 U	1 U	0.17 J	1 U	1 U	0.12 J	1 U	1 U	1 U	1 U	100 D	1 U	2.5 U	1.6	1 U
460	7/13/1999	ICS	168	33	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	1.03	0.25 U	0.25 U	2.11	0.25 U	2.44	0.26 U	0.25 U	7.92	0.65 U
462	7/13/1999	ICS	168	33	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	1.03	0.25 U	0.25 U	0.749	0.25 U	2.32	0.26 U	0.25 U	3.09	0.65 U
156	11/23/1998	ICS	168	39	0-12	0.238 U	0.238 U	0.449	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	238 U	238 U	0.567 J	0.248 U	238 U	0.952 U	0.619 U
158	11/23/1998	ICS	168	39	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
248	1/26/1999	ICS	168	140	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
526	9/9/1999	ICS	168	201	0-12	1 U	1 U	0.2 J	1 U	1 U	0.25 J	1 U	1 U	0.284 J	1 U	1.84	1 U	2.5 U	0.16 J	1 U
528	9/9/1999	ICS	168	201	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.0995 J	1 U	2.5 U	1 U	1 U
529	9/9/1999	ICS	168	202	0-12	1 U	1 U	1 U	1 U	1 U	0.667 J	1 U	1 U	0.548 J	1 U	0.864 J	1 U	2.5 U	0.208 J	1 U
531	9/9/1999	ICS	168	202	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
532	9/9/1999	ICS	168	203	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	2.5 U	1 U	1 U
534	9/9/1999	ICS	168	203	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.128 J	1 U	2.5 U	1 U	1 U
566	9/22/1999	ICS	168	214	0-12	1 U	1 U	1.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	7.4	1 U	2.5 U	0.25 J	1 U
568	9/22/1999	ICS	168	214	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1 U	2.5 U	11	1 U
640	10/18/1999	ICS	168	240	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.22 J	1 U
642	10/18/1999	ICS	168	240	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
643	10/18/1999	ICS	168	241	0-12	1 U	1 U	1.98	1 U	1 U	1 U	1 U	1 U	0.277 J	1 U	3.66	1 U	2.5 U	7.62	1 U
645	10/18/1999	ICS	168	241	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
126	11/16/1998	ICS	2500	40	0-12	0.25 U	0.25 U	0.262	0.25 U	0.26 U	0.22 J	0.25 U	0.25 U	0.112J	0.25 U	5.26	0.26 U	0.25 U	1 U	0.65 U
128	11/16/1998	ICS	2500	40	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
123	11/16/1998	ICS	2500	41	0-12	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	238 U	238 U	3.81	0.248 U	238 U	0.952 U	0.619 U
125	11/16/1998	ICS	2500	41	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
153	11/23/1998	ICS	2500	42	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
155	11/23/1998	ICS	2500	42	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
150	11/23/1998	ICS	2500	43	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
152	11/23/1998	ICS	2500	43	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
147	11/23/1998	ICS	2500	44	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
149	11/23/1998	ICS	2500	44	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
144	11/18/1998	ICS	2500	45	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
146	11/18/1998	ICS	2500	45	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
141	11/18/1998	ICS	2500	46	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
143	11/18/1998	ICS	2500	46	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
138	11/18/1998	ICS	2500	47	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
140	11/18/1998	ICS	2500	47	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
135	11/18/1998	ICS	2500	48	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
137	11/18/1998	ICS	2500	48	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
132	11/16/1998	ICS	2500	49	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
134	11/16/1998	ICS	2500	49	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
129	11/16/1998	ICS	2500	50	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.156 J	0.25 U	0.25 U	0.185 J	0.25 U	3.54	0.26 U	0.25 U	1 U	0.65 U
131	11/16/1998	ICS	2500	50	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
201	11/8/1999	PES	168	25	0-6	1 U	1 U	1.2	1 U	1 U	0.78 J	1 U	1 U	0.36 J	1 U	2.7	1 U	2.5 U	14	1 U
089	10/4/1999	PES	168	26	0-6	1 U	1 U	4.8	1 U	1 U	2 U	1 U	1 U	0.71 J	1 U	1.7	1 U	2.5 U	7.2	1 U
087	10/4/1999	PES	168	27	0-6	1 U	1 U	9.5	1 U	1 U	2.5	1 U	1 U	1.3	1 U	2.4	1 U	2.5 U	10	1 U
193	11/8/1999	PES	168	28	0-6	1 U	1 U	0.26 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.22 J	1 U	2.5 U	1 U	1 U
189	11/8/1999	PES	168	29	0-6	1 U	1 U	0.19 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.1 J	1 U	2.5 U	1 U	1 U
187	11/8/1999	PES	168	30	0-6	1 U	1 U	0.12 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
185	11/2/1999	PES	168	31	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.68 J	1 U
183	11/2/1999	PES	168	32	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	2.5 U	0.53 J	1 U
199	11/8/1999	PES	168	35	0-6	1 U	1 U	3.2	1 U	1 U	1 U	1 U	1 U	0.37 J	1 U	6.3	1 U	2.5 U	10	1 U
197	11/8/1999	PES	168	36	0-6	1 U	1 U	1.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	2.5 U	1.6	1 U
195	11/8/1999	PES	168	37	0-6	1 U	1 U	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	2.5 U	0.76 J	1 U
191	11/8/1999	PES	168	38	0-6	1 U	1 U	30 D	1 U	1 U	2 U	1 U	1 U	2 U	1 U	2.8	1 U	2.5 U	17	1 U
203	11/8/1999	PES	168	28/27	sidewall	1 U	1 U	0.89 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.2 J	1 U
234	11/9/1999	PES	168	29/39	sidewall	1 U	1 U	7.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.7 J	1 U	2.5 U	7.8	1 U
228	11/9/1999	PES	168	31/241	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.43 J	1 U	2.5 U	1 U	1 U
226	11/9/1999	PES	168	32/240	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
224	11/9/1999	PES	168	32/33	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.1 J	1 U	2.5 U	1.9	1 U
218	11/9/1999	PES	168	35/203	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	2.5 U	0.33 J	1 U
222	11/9/1999	PES	168	35/214	sidewall	1 U	1 U	1.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.41 J	1 U
220	11/9/1999	PES	168	35/26	sidewall	1 U	1 U	0.3 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.13 J	1 U
207	11/8/1999	PES	168	36/202	sidewall	1 U	1 U	2.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.95 J	1 U	2.5 U	0.58 J	1 U
209	11/8/1999	PES	168	36/27	sidewall	1 U	1 U	0.86 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	2.5 U	0.25 J	1 U
205	11/8/1999	PES	168	37/201	sidewall	1 U	1 U	0.43 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
230	11/9/1999	PES	168	38/140	sidewall	1 U	1 U	8.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 J	1 U	2.5 U	4.8	1 U
232	11/9/1999	PES	168	38/39	sidewall	1 U	1 U	39 D	1 U	1 U	1 U	1 U	1 U	2 U	1 U	3.6	2 U	2.5 U	29 D	1 U
245	1/26/1999	ICS	171	123	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.67	0.26 U	0.25 U	1 U	0.65 U
247	1/26/1999	ICS	171	123	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.278	0.25 U	0.25 U	0.593	0.25 U	3.64	0.26 U	0.25 U	11.4	0.65 U
259	1/27/1999	ICS	171	125	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.332	0.25 U	5390	0.26 U	0.25 U	1.46	0.65 U
261	1/27/1999	ICS	171	125	24-36	0.238 U	238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	238 U	238 U	2750	0.248 U	238 U	4.92	619 U
256	1/27/1999	ICS	171	127	0-12	0.25 U	0.25 U	0.285 J	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
258	1/27/1999	ICS	171	127	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
303	2/9/1999	ICS	171	129	0-12	0.25 U	0.25 U	1.16	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	303	0.25 U	2950	0.26 U	0.25 U	10.5	0.65 U
305	2/9/1999	ICS	171	129	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
306	2/17/1999	ICS	171	130	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
308	2/17/1999	ICS	171	130	24-36	238 U	238 U	0.238 U	238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 J	0.238 U	0.952 U	0.619 U
312	2/17/1999	ICS	171	132	0-12	0.25 U	0.25 U	1.06	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.794 J	0.25 U	10.9	0.26 U	0.25 U	12.5	0.65 U
314	2/17/1999	ICS	171	132	24-36	0.25 U	0.25 U	0.565	0.25 U	0.26 U	0.201 J	0.25 U	0.25 U	0.269	0.25 U	0.706 J	0.26 U	0.25 U	0.652 J	0.65 U
317	2/25/1999	ICS	171	133	0-12	0.25 U	0.25 U	0.187 J	0.25 U	0.26 U	0.245 J	0.25 U	0.25 U	0.672	0.25 U	5.56	0.26 U	0.25 U	5.6	0.65 U
319	2/25/1999	ICS	171	133	24-36	0.25 U	0.25 U	0.533	0.25 U	0.26 U	0.191 J	0.25 U	0.25 U	0.249 J	0.25 U	6.81	0.26 U	0.25 U	11.9	0.65 U
322	3/1/1999	ICS	171	135	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
430	7/7/1999	ICS	171	173	0-12	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.238 U	0.952 U	0.619 U
432	7/7/1999	ICS	171	173	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
433	7/7/1999	ICS	171	174	0-12	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.238 U	0.952 U	0.619 U
435	7/7/1999	ICS	171	174	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
442	7/8/1999	ICS	171	175	0-12	0.238 U	0.238 U	5.59	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.43	0.238 U	37.1	0.248 U	0.25 U	0.458 J	0.619 U
444	7/8/1999	ICS	171	175	24-36	0.227 U	0.227 U	0.227 U	0.227 U	0.236 U	0.227 U	0.227 U	0.227 U	0.227 U	0.227 U	4.31	0.236 U	0.25 U	1.26	0.591 U
475	7/15/1999	ICS	171	184	0-12	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.238 U	0.952 U	0.619 U
477	7/15/1999	ICS	171	184	24-36	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.25 U	0.952 U	0.619 U
544	9/15/1999	ICS	171	206	0-12	1 U	1 U	1 U	1 U	1 U	0.714 J	1 U	1 U	0.613 J	1 U	2.11	1 U	2.5 U	6.39	1 U
561	9/22/1999	ICS	171	212	0-12	1 U	1 U	0.24 J	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	4.6	1 U	2.5 U	0.21 J	1 U
577	9/24/1999	ICS	171	218	0-12	1 U	1 U	1.4	1 U	1 U	1 U	1 U	1 U	0.31 J	1 U	0.19 J	1 U	2.5 U	0.27 J	1 U
579	9/24/1999	ICS	171	218	24-36	1 U	1 U	0.5 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.31 J	1 U	2.5 U	0.17 J	1 U
621	9/30/1999	ICS	171	233	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.12 J	1 U	0.44 J	1 U	2.5 U	0.1 J	1 U
623	9/30/1999	ICS	171	234	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.12 J	1 U	1 U	1 U	2.5 U	1 U	1 U
634	10/1/1999	ICS	171	239	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
636	10/1/1999	ICS	171	239	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.12 J	1 U	2.5 U	0.47 J	1 U
664	10/12/1999	ICS	171	248	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.83 J	1 U	2.5 U	0.1 J	1 U
693	10/21/1999	ICS	171	258	0-12	1 U	1 U	0.13 J	1 U	1 U	1 U	1 U	1 U	0.23 J	1 U	10	1 U	2.5 U	2.1	1 U
695	10/21/1999	ICS	171	258	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
696	10/21/1999	ICS	171	259	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	2.5 U	0.38 J	1 U
698	10/21/1999	ICS	171	259	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	2.5 U	1 U	1 U
699	10/21/1999	ICS	171	260	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.11 J	1 U	2.5 U	0.51 J	1 U
701	10/21/1999	ICS	171	260	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
702	10/21/1999	ICS	171	261	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
704	10/21/1999	ICS	171	261	24-36	1 U	1 U	0.16 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.5	1 U	2.5 U	4.8	1 U
371	6/2/2000	PES	171	122	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.8	1 U	2.5 U	13	1 U
373	6/2/2000	PES	171	123	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.7	1 U	2.5 U	5.7	1 U
375	6/2/2000	PES	171	124	0-6	1 U	1 U	0.47 J	1 U	1 U	1 U	1 U	1 U	0.25 J	1 U	3.4	1 U	2.5 U	7.7	1 U
405	7/18/2000	PES	171	126	0-6	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	1 U	0.36 J	1 U	2.4	1 U	2.5 U	4.7	1 U
349	6/1/2000	PES	171	128	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.75 J	1 U	2.5 U	1.5	1 U
377	6/2/2000	PES	171	131	0-6	1 U	1 U	0.8 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.7	1 U	2.5 U	2.8	1 U
397	7/18/2000	PES	171	134	0-6	1 U	1 U	0.4 J	1 U	1 U	0.84 J	1 U	1 U	0.7 J	1 U	2.3	1 U	2.5 U	4.1	1 U
407	7/18/2000	PES	171	136	0-6	1 U	1 U	0.82 J	1 U	1 U	0.48 J	1 U	1 U	0.69 J	1 U	44 D	1 U	2.5 U	180 D	1 U
361	6/1/2000	PES	171	137	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.6 J	1 U	2.5 U	2.2	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
353	6/1/2000	PES	171	138	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.81 J	1 U	2.5 U	1.9	1 U
411	7/18/2000	PES	171	178	0-6	1 U	1 U	1.2	1 U	1 U	0.96 J	1 U	1 U	1.1	1 U	130 D	1 U	2.5 U	290 D	1 U
393	7/18/2000	PES	171	185	0-6	1 U	1 U	0.45 J	1 U	1 U	0.48 J	1 U	1 U	0.92 J	1 U	0.84 J	1 U	2.5 U	1.5	1 U
387	7/18/2000	PES	171	217	0-6	1 U	1 U	8.2	1 U	1 U	2.5 U	1 U	1 U	2.2	1 U	24 D	1 U	470 D	32 D	1 U
385	6/2/2000	PES	171	122/129	sidewall	1 U	1 U	0.39 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	2.5 U	0.12 J	1 U
351	6/1/2000	PES	171	128/127	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.99 J	1 U	2.5 U	2.7	1 U
383	6/2/2000	PES	171	131/130	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
381	6/2/2000	PES	171	131/174	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.27 J	1 U
379	6/2/2000	PES	171	131/175	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.7	1 U	2.5 U	3.5	1 U
403	7/18/2000	PES	171	134/133	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	0.73 J	1 U
401	7/18/2000	PES	171	134/135	sidewall	1 U	1 U	0.88 J	1 U	1 U	1 U	1 U	1 U	0.3 J	1 U	0.72 J	1 U	2.5 U	0.19 J	1 U
399	7/18/2000	PES	171	134/184	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
409	7/18/2000	PES	171	136/135	sidewall	1 U	1 U	1 U	1 U	1 U	0.78 J	1 U	1 U	0.63 J	1 U	1.9	1 U	2.5 U	3.6	1 U
369	6/1/2000	PES	171	137/127	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.38 J	1 U	2.5 U	1 U	1 U
367	6/1/2000	PES	171	137/239	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
363	6/1/2000	PES	171	137/258	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.3	1 U	2.5 U	1 U	1 U
365	6/1/2000	PES	171	137/260	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
355	6/1/2000	PES	171	138/127	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.2	1 U	2.5 U	0.92 J	1 U
359	6/1/2000	PES	171	138/173	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
357	6/1/2000	PES	171	138/239	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
395	7/18/2000	PES	171	185/184	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
391	7/18/2000	PES	171	217/133	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 J	1 U	2.6	1 U	2.5 U	0.57 J	1 U
389	7/18/2000	PES	171	217/233	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U
177	12/1/1998	ICS	173/2501	51	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	4.35	0.26 U	0.25 U	0.488 J	0.65 U
179	12/1/1998	ICS	173/2501	51	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	3.08	0.26 U	0.25 U	1 U	0.65 U
180	12/2/1998	ICS	173/2501	52	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	8	0.26 U	0.25 U	1 U	0.65 U
182	12/2/1998	ICS	173/2501	52	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.96	0.26 U	0.25 U	1 U	0.65 U
183	12/8/1998	ICS	173/2501	53	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	46.5	0.26 U	0.25 U	8.13	0.65 U
185	12/8/1998	ICS	173/2501	53	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	4.73	0.26 U	0.25 U	2.07	0.65 U
412	6/30/1999	ICS	173/2501	147	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13.8	0.26 U	0.25 U	4.75	0.65 U
414	6/30/1999	ICS	173/2501	147	24-36	0.238 U	0.238 U	0.238 U	0.238 U	248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	248 U	0.238 U	1.3 P	0.619 U
418	6/30/1999	ICS	173/2501	169	0-12	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	10.7	0.248 U	0.238 U	0.952 U	0.619 U
420	6/30/1999	ICS	173/2501	169	24-36	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	2.1 U	0.248 U	0.238 U	0.952 U	0.619 U
625	9/30/1999	ICS	173/2501	235	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	38 D	1 U	2.5 U	2.4	1 U
627	9/30/1999	ICS	173/2501	235	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.9	1 U	2.5 U	0.95 J	1 U
661	10/12/1999	ICS	173/2501	247	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U	2.5 U	0.4 J	1 U
663	10/12/1999	ICS	173/2501	247	24-36	1 U	1 U	0.13 J	1 U	1 U	0.17 J	1 U	1 U	0.18 J	1 U	0.85 J	1 U	2.5 U	0.2 J	1 U
669	10/18/1999	ICS	173/2501	250	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	9.38	1 U	2.5 U	0.188 J	1 U
671	10/18/1999	ICS	173/2501	250	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.93	1 U	2.5 U	0.563 J	1 U
708	10/26/1999	ICS	173/2501	263	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.23 J	1 U	4.5	1 U	2.5 U	0.13 J	1 U
710	10/26/1999	ICS	173/2501	263	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.1	1 U	2.5 U	0.47 J	1 U
711	10/26/1999	ICS	173/2501	264	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.7	1 U	2.5 U	1 U	1 U
713	10/26/1999	ICS	173/2501	264	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.5	1 U	2.5 U	0.26 J	1 U
714	11/3/1999	ICS	173/2501	265	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	13	1 U	2.5 U	2.3	1 U
716	11/3/1999	ICS	173/2501	265	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.9	1 U	2.5 U	0.44 J	1 U
717	11/3/1999	ICS	173/2501	266	0-12	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	1 U	0.24 J	1 U	9.4	1 U	2.5 U	0.1 J	1 U
719	11/3/1999	ICS	173/2501	266	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	2.5 U	0.31 J	1 U
720	11/3/1999	ICS	173/2501	267	0-12	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	1 U	0.21 J	1 U	12	1 U	2.5 U	6	1 U
722	11/3/1999	ICS	173/2501	267	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6	1 U	2.5 U	9.8	1 U
723	11/3/1999	ICS	173/2501	268	0-12	1 U	1 U	1 U	1 U	1 U	0.19 J	1 U	1 U	0.24 J	1 U	7.9	1 U	2.5 U	1.4	1 U
725	11/3/1999	ICS	173/2501	268	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.4	1 U	2.5 U	0.59 J	1 U
508	8/26/1999	ICS	173/2501	194	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.92	1 U	2.5 U	2.67	1 U
510	8/26/1999	ICS	173/2501	194	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.687 J	1 U	2.5 U	0.664 J	1 U
511	9/8/1999	ICS	173/2501	196	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	20.8	1 U	2.5 U	1.8	1 U
513	9/8/1999	ICS	173/2501	196	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.11	1 U	2.5 U	6.86	1 U
517	9/8/1999	ICS	173/2501	197	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.76	1 U	2.5 U	0.865 J	1 U
519	9/8/1999	ICS	173/2501	197	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.807 J	1 U	2.5 U	3.46	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
514	9/8/1999	ICS	173/2501	198	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	7.6	1 U	2.5 U	2.72	1 U
516	9/8/1999	ICS	173/2501	198	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.467 J	1 U	2.5 U	2.53	1 U
549	9/22/1999	ICS	173/2501	208	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	18	1 U	2.5 U	10	1 U
551	9/22/1999	ICS	173/2501	208	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.1	1 U	2.5 U	3.8	1 U
552	9/22/1999	ICS	173/2501	209	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	17	1 U	2.5 U	7.4	1 U
554	9/22/1999	ICS	173/2501	209	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.3	1 U	2.5 U	2.6	1 U
341	3/19/1999	ICS	173/2501	151	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	14.7	0.26 U	0.25 U	13	0.65 U
342	3/19/1999	ICS	173/2501	151	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1.35	0.65 U
371	6/17/1999	ICS	173/2501	155	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.43	0.26 U	0.25 U	0.92 J	0.65 U
373	6/17/1999	ICS	173/2501	155	24-36	0.217 U	0.217 U	0.217 U	0.217 U	0.226 U	0.217 U	0.217 U	0.217 U	0.217 U	0.217 U	1.91 U	0.226 U	0.217 U	2.79	0.565 U
374	6/17/1999	ICS	173/2501	156	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	7.77	0.26 U	0.25 U	1.47	0.65 U
376	6/17/1999	ICS	173/2501	156	24-36	0.238 U	0.238 U	0.238 U	0.238 U	0.248 U	0.238 U	0.238 U	0.238 U	0.238 U	0.238 U	1.5 J	0.248 U	0.238 U	2.19	0.619 U
383	6/18/1999	ICS	173/2501	159	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	8.76	0.26 U	0.25 U	3.22	0.65 U
385	6/18/1999	ICS	173/2501	159	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
389	6/18/1999	ICS	173/2501	161	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	5.69	0.26 U	0.25 U	13.1	0.65 U
538	9/14/1999	ICS	173/2501	195	0-12	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.319 J	1 U	2.5 U	1.47	1 U
540	9/14/1999	ICS	173/2501	195	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.173 J	1 U	2.5 U	0.411 J	1 U
236	12/29/1998	ICS	173/2501	62	0-12	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	11.6	0.26 U	0.25 U	1 U	0.65 U
238	12/29/1998	ICS	173/2501	62	24-36	0.25 U	0.25 U	0.25 U	0.25 U	0.26 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.2 U	0.26 U	0.25 U	1 U	0.65 U
563	9/22/1999	ICS	173/2501	213	0-12	1 U	1 U	0.12 J	1 U	1 U	0.1 J	1 U	1 U	0.19 J	1 U	1.2	1 U	2.5 U	0.9 J	1 U
565	9/22/1999	ICS	173/2501	213	24-36	1 U	1 U	0.48 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.56 J	1 U	2.5 U	5.6	1 U
618	9/30/1999	ICS	173/2501	232	0-12	1 U	1 U	0.15 J	1 U	1 U	1 U	1 U	1 U	0.23 J	1 U	4.9	1 U	2.5 U	6.4	1 U
620	9/30/1999	ICS	173/2501	232	24-36	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.19 J	1 U	2.5 U	2.2	1 U
133	10/22/1999	PES	173/2501	54	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.4	1 U	2.5 U	5.4	1 U
135	10/22/1999	PES	173/2501	55	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.48 J	1 U	2.5 U	1.9	1 U
137	10/26/1999	PES	173/2501	141	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4	1 U	2.5 U	3.7	1 U
091	10/5/1999	PES	173/2501	168	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.2	1 U	2.5 U	7.2	1 U
093	10/5/1999	PES	173/2501	204	0-6	1 U	1 U	1 U	1 U	1 U	0.23 J	1 U	1 U	1 U	1 U	1.9	1 U	2.5 U	2	1 U
123	10/16/1999	PES	173/2501	210	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.7	1 U	2.5 U	0.89 J	1 U
127	10/16/1999	PES	173/2501	211	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.47 J	1 U	2.5 U	2.2	1 U
131	10/19/1999	PES	173/2501	236	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.3	1 U	2.5 U	3.9	1 U
129	10/19/1999	PES	173/2501	237	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.67 J	1 U	2.5 U	3.4	1 U
141	10/26/1999	PES	173/2501	249	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.44 J	1 U	2.5 U	1.8	1 U
139	10/26/1999	PES	173/2501	251	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.83 J	1 U	2.5 U	1.2	1 U
214	11/9/1999	PES	173/2501	262	0-6	1 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.87 J	1 U	2.5 U	1.5	1 U
177	11/2/1999	PES	173/2501	141/147	sidewall	1 U	1 U	5.2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	12	1 U	2.5 U	29 D	1 U
175	11/2/1999	PES	173/2501	141/169	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.7	1 U	2.5 U	1.1	1 U
173	11/1/1999	PES	173/2501	168/169	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	0.19 J	1 U
171	11/1/1999	PES	173/2501	210/169	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.3 J	1 U	2.5 U	1 U	1 U
167	11/1/1999	PES	173/2501	210/235	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.8	1 U	2.5 U	2.2	1 U
169	11/1/1999	PES	173/2501	210/247	sidewall	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	1 U	1 U	1 U	1.4	1 U	2.5 U	1.1	1 U
165	11/1/1999	PES	173/2501	211/235	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.8	1 U	2.5 U	1.1	1 U
149	10/28/1999	PES	173/2501	236/250	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.7	1 U	2.5 U	1.2	1 U
147	10/28/1999	PES	173/2501	249/250	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.53 J	1 U	2.5 U	2.3	1 U
151	10/28/1999	PES	173/2501	251/235	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	4.3	1 U
216	11/9/1999	PES	173/2501	251/264	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.76 J	1 U	2.5 U	5.2	1 U
179	11/2/1999	PES	173/2501	54/147	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	2.5 U	2.4	1 U
181	11/2/1999	PES	173/2501	54/53	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.15 J	1 U	5 D	1 U	2.5 U	8.8	1 U
109	10/15/1999	PES	173/2501	56	0-6	1 U	1 U	1 U	1 U	1 U	0.13 J	1 U	1 U	1 U	1 U	2.4	1 U	2.5 U	3.2	1 U
119	10/15/1999	PES	173/2501	57	0-6	1.23 U	1.23 U	0.187 J	1.23 U	1.23 U	1.23 U	1.23 U	1.23 U	1.23 U	1.23 U	0.401 J	1.23 U	3.08 U	3.22	1.23 U
111	10/15/1999	PES	173/2501	66	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.2	1 U	2.5 U	38 D	1 U
113	10/15/1999	PES	173/2501	67	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.26 J	1 U	2.5 U	1.3	1 U
417	8/28/2000	PES	173/2501	68	0-6	1 U	1 U	0.83 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.55 J	1 U	2.5 U	7.2	1 U
421	8/28/2000	PES	173/2501	69	0-6	1.1	1 U	1.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.1	1 U	2.5 U	11	1 U
423	8/28/2000	PES	173/2501	69	sidewall	1 U	1 U	0.26 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	11	1 U
427	8/28/2000	PES	173/2501	70	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.6	1 U	2.5 U	6.6	1 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
429	8/28/2000	PES	173/2501	70	sidewall	1.7	1 U	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.8	1 U	2.5 U	10	1 U
425	8/28/2000	PES	173/2501	71	0-6	1 U	1 U	7.1	1 U	1 U	1.7	1 U	1 U	1.3	1 U	5.5	1 U	2.5 U	41 D	1 U
419	8/28/2000	PES	173/2501	88	0-6	1 U	1 U	0.49 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.39 J	1 U	2.5 U	3.5	1 U
413	8/28/2000	PES	173/2501	89	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.52 J	1 U	2.5 U	3.4	1 U
063	9/21/1999	PES	173/2501	93	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.92 J	1 U	2.5 U	5.4	1 U
125	10/16/1999	PES	173/2501	139	0-6	1 U	1 U	0.19 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.47 J	1 U	2.5 U	2.2	1 U
065	9/21/1999	PES	173/2501	142	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	0.58 J	1 U
043	9/20/1999	PES	173/2501	143	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	3.4	1 U
415	8/28/2000	PES	173/2501	144	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.28 J	1 U	2.5 U	4	1 U
115	10/15/1999	PES	173/2501	145	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 J	1 U	2.5 U	0.82 J	1 U
107	10/15/1999	PES	173/2501	146	0-6	1 U	1 U	0.099 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.5	1 U	2.5 U	2.3	1 U
117	10/15/1999	PES	173/2501	153	0-6	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U	2.94 U	0.875 J	1.18 U
105	10/15/1999	PES	173/2501	154	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.44 J	1 U	2.5 U	3.6	1 U
055	9/21/1999	PES	173/2501	163	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.51 J	1 U	2.5 U	1.7	1 U
039	9/20/1999	PES	173/2501	164	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.3 D	1 U	2.5 U	26 D	1 U
051	9/21/1999	PES	173/2501	165	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.3	1 U	2.5 U	4.5	1 U
049	9/21/1999	PES	173/2501	166	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.6 J	1 U	2.5 U	3.5	1 U
037	9/20/1999	PES	173/2501	167	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.12 J	1 U	2.5 U	0.37 J	1 U
071	9/21/1999	PES	173/2501	170	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.13 J	1 U	2.5 U	1	1 U
103	10/15/1999	PES	173/2501	171	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	2.5 U	1.9	1 U
061	9/21/1999	PES	173/2501	172	0-6	1 U	1 U	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.5	1 U	2.5 U	12	1 U
041	9/20/1999	PES	173/2501	186	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.92 J	1 U	2.5 U	6.2	1 U
045	9/20/1999	PES	173/2501	187	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.42 J	1 U	2.5 U	2.4	1 U
053	9/21/1999	PES	173/2501	188	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.16 J	1 U	2.5 U	1.3	1 U
047	9/21/1999	PES	173/2501	189	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.17 J	1 U	2.5 U	1.1	1 U
057	9/21/1999	PES	173/2501	190	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.19 J	1 U	2.5 U	2.1	1 U
059	9/21/1999	PES	173/2501	191	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U	2.5 U	4.5	1 U
099	10/14/1999	PES	173/2501	192	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1.7	1 U
101	10/14/1999	PES	173/2501	193	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	5.3	1 U
035	9/20/1999	PES	173/2501	199	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J	1 U	2.5 U	1.7	1 U
033	9/20/1999	PES	173/2501	200	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.52 J	1 U	2.5 U	3.6	1 U
097	10/14/1999	PES	173/2501	205	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.97 J	1 U	2.5 U	1.9	1 U
095	10/14/1999	PES	173/2501	207	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	1 U	2.5 U	2.3	1 U
143	10/28/1999	PES	173/2501	186/194	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	1 U	2.5 U	8	1 U
145	10/28/1999	PES	173/2501	187/196	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.5	1 U	2.5 U	11	1 U
153	10/29/1999	PES	173/2501	187/197	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.86 J	1 U	2.5 U	3.1	1 U
155	10/29/1999	PES	173/2501	188/197	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.41 J	1 U	2.5 U	2.1	1 U
157	10/29/1999	PES	173/2501	188/198	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.54 J	1 U	2.5 U	1.6	1 U
159	11/1/1999	PES	173/2501	199/198	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 J	1 U	2.5 U	5.8	1 U
161	11/1/1999	PES	173/2501	205/198	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.8	1 U	2.5 U	13	1 U
163	11/1/1999	PES	173/2501	207/208	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	1 U	2.5 U	3.8	1 U
211	11/9/1999	PES	173/2501	207/209	sidewall	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.94 J	1 U	2.5 U	1.3	1 U
435	8/29/2001	PES	173/2501	72	0-6	0.25 U	0.25 U	0.26	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.73	0.25 U	0.5 U	2.8	0.25 U
433	8/29/2001	PES	173/2501	73	0-6	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.14 J	0.25 U	0.5 U	0.79	0.25 U
431	8/29/2001	PES	173/2501	74	0-6	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.88	0.25 U	0.5 U	6.3	0.25 U
480	9/26/2001	PES	173/2501	74	sidewall	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.106 J	0.5 U	0.5 U	0.5 U	0.5 U	6.65	0.5 U	0.5 U	25.4	0.5 U
003	8/23/1999	PES	173/2501	75	0-6	1 U	1 U	1 U	1 U	1 U	0.32 J	1 U	1 U	0.3 J	1 U	3.1	1 U	2.5 U	7.8	1 U
453	9/26/2001	PES	173/2501	85	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.181 J	0.5 U	0.5 U	0.5 J	0.5 U	2.95	0.5 U	0.5 U	8.89	0.5 U
455	9/26/2001	PES	173/2501	86	0-6	0.5 U	0.5 U	1.16	0.5 U	0.5 U	0.334 J	0.5 U	0.5 U	0.5 J	0.5 U	2.07	0.5 U	0.5 U	10.7	0.5 U
457	9/26/2001	PES	173/2501	87	0-6	0.121 J	0.5 U	11.4	0.5 U	0.5 U	0.319 PJ	0.5 U	0.5 U	0.5 J	0.5 U	1.32	0.5 U	0.5 U	12.1	0.5 U
441	9/17/2001	PES	173/2501	90	0-6	0.5 U	0.5 U	0.035 J	0.5 U	0.5 U	0.131 PJ	0.5 U	0.5 U	0.045 J	0.5 U	0.806	0.5 U	0.5 U	6.42	0.5 U
461	9/26/2001	PES	173/2501	91	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.104 J	0.5 U	0.5 U	0.5 U	0.5 U	0.696	0.5 U	0.5 U	5.76	0.5 U
459	9/26/2001	PES	173/2501	92	0-6	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.776	0.476 U	0.476 U	4.69	0.476 U

TABLE G-7
SWMU 13 MINE FILL B HISTORICAL EXPLOSIVE DATA
(mg/kg)

ANALYTE						135TNB	13DNB	246TNT	24DNT	26DNT	2A46DT	2NT	3NT	4A26DT	4NT	HMX	NB	PETN	RDX	TETRYL
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)															
479	9/26/2001	PES	173/2501	92	sidewall	0.5 U	0.5 U	0.321 J	0.5 U	0.5 U	0.175 J	0.5 U	0.5 U	0.5 J	0.5 U	7.47	0.5 U	0.5 U	14	0.5 U
443	9/17/2001	PES	173/2501	148	0-6	0.5 U	0.5 U	0.437 J	0.5 U	0.5 U	0.238 PJ	0.5 U	0.5 U	0.252 PJ	0.5 U	1.84	0.5 U	0.5 U	15.4	0.5 U
465	9/26/2001	PES	173/2501	149	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.095 PJ	0.5 U	0.5 U	0.5 U	0.5 U	0.358 J	0.5 U	0.5 U	1.42	0.5 U
463	9/26/2001	PES	173/2501	150	0-6	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.102 PJ	0.476 U	0.476 U	0.476 U	0.476 U	0.592	0.476 U	0.476 U	2.3	0.476 U
478	9/26/2001	PES	173/2501	150	sidewall	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.081 J	0.5 U	0.5 U	0.039 PJ	0.5 U
467	9/26/2001	PES	173/2501	151	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.465 PJ	0.5 U	0.5 U	1.68	0.5 U
477	9/26/2001	PES	173/2501	151	sidewall	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.289 J	0.5 U	0.5 U	0.127 J	0.5 U
445	9/17/2001	PES	173/2501	152	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.502	0.5 U	0.5 U	4.41	0.5 U
469	9/26/2001	PES	173/2501	155	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.462 J	0.5 U	0.5 U	0.965	0.5 U
476	9/26/2001	PES	173/2501	155	sidewall	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.138 J	0.5 U	0.5 U	0.5 PJ	0.5 U	1.95	0.5 U	0.5 U	6.12	0.5 U
451	9/17/2001	PES	173/2501	156	0-6	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.055 PJ	0.476 U	0.476 U	0.476 U	0.476 U	4.46	0.476 U	0.476 U	1.47	0.476 U
449	9/17/2001	PES	173/2501	157	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.052 PJ	0.5 U	0.5 U	0.5 U	0.5 U	0.976	0.5 U	0.5 U	2.15	0.5 U
447	9/17/2001	PES	173/2501	158	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.074 PJ	0.5 U	0.5 U	0.5 U	0.5 U	0.912	0.5 U	0.5 U	5.25	0.5 U
437	8/29/2001	PES	173/2501	159	0-6	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1.3	0.25 U	0.5 U	2	0.25 U
439	8/29/2001	PES	173/2501	160	0-6	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	1	0.25 U	0.5 U	0.7	0.25 U
473	9/26/2001	PES	173/2501	161	0-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.16 J	0.5 U	0.5 U	0.238 J	0.5 U
471	9/26/2001	PES	173/2501	162	0-6	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.395 J	0.476 U	0.476 U	0.503	0.476 U
475	9/26/2001	PES	173/2501	162	sidewall	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.185 J	0.5 U	0.5 U	0.251 J	0.5 U
021	9/3/1999	PES	173/2501	58	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.16	1 U	2.5 U	3.04	1 U
023	9/3/1999	PES	173/2501	59	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.28	1 U	2.5 U	6.06	1 U
025	9/3/1999	PES	173/2501	60	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.31	1 U	2.5 U	4.16	1 U
027	9/3/1999	PES	173/2501	61	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.46	1 U	2.5 U	0.482 J	1 U
013	9/2/1999	PES	173/2501	63	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.51	1 U	2.5 U	0.386 J	1 U
015	9/2/1999	PES	173/2501	64	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.21	1 U	2.5 U	7.65	1 U
017	9/2/1999	PES	173/2501	65	0-6	1 U	1 U	1 U	1 U	1 U	0.155 J	1 U	1 U	0.116 J	1 U	2.17	1 U	2.5 U	4.73	1 U
001	8/23/1999	PES	173/2501	76	0-6	1 U	1 U	0.18 J	1 U	1 U	0.18 J	1 U	1 U	1 U	1 U	2.7	1 U	2.5 U	4.5	1 U
005	8/23/1999	PES	173/2501	77	0-6	1 U	1 U	0.82 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	2.5 U	6.5	1 U
009	8/23/1999	PES	173/2501	78	0-6	1 U	1 U	0.99 J	1 U	1 U	0.52 J	1 U	1 U	0.99 J	1 U	2.6	1 U	2.5 U	11	1 U
029	9/3/1999	PES	173/2501	79	0-6	1 U	1 U	9.22	1 U	1 U	1.49	1 U	1 U	1 U	1 U	3.74	1 U	2.5 U	15.6	1 U
079	9/24/1999	PES	173/2501	79	0-6	1.1	1 U	3.6	1 U	1 U	1 U	1 U	1 U	0.21 J	1 U	2.7	1 U	2.5 U	9.1	1 U
075	9/24/1999	PES	173/2501	80	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.14 J	1 U	2.5 U	0.72 J	1 U
081	9/24/1999	PES	173/2501	81	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.27 J	1 U	2.5 U	4.1	1 U
121	10/16/1999	PES	173/2501	82	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.26 J	1 U	2.5 U	2.3	1 U
077	9/24/1999	PES	173/2501	83	0-6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.11 J	1 U	2.5 U	1.5	1 U
007	8/23/1999	PES	173/2501	84	0-6	1 U	1 U	1 U	1 U	1 U	0.13 J	1 U	1 U	0.1 J	1 U	2.9	1 U	2.5 U	12	1 U
755	10/31/2000	ICS	174	279	0-12	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U
758	10/31/2000	ICS	174	279	24-36	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U	0.476 U
759	11/1/2000	ICS	174	280	0-12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
761	11/1/2000	ICS	174	280	24-36	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
762	11/1/2000	ICS	174	281	0-12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
764	11/1/2000	ICS	174	281	24-36	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

U - non-detect
J - an estimated value, the result is less than the quantitation limit but greater than zero
D - identified in an analysis at a secondary dilution factor
P - indicates a difference in quantitation of >25% between primary and secondary columns
E - indicates compounds whose concentrations exceed the calibration range of the instrument

TABLE G-7

SUMMARY OF ANALYTIC RESULTS
VEGETATION ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03	03
LOCATION	13VG01	13VG01	13VG02	13VG02	13VG03	13VG03	13VG04	13VG04	13VG04
SAMPLE NUMBER	13VG001010001	13VG002020001	13VG003010001	13VG004020001	13VG008030001	13VG009010001	13VG005030001	13VG006010001	13VG006010001-D
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004
Energetics (mg/kg)									
1,3,5-TRINITROBENZENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
1,3-DINITROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,4,6-TRINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,4-DIAMINO-6-NITROTOLUENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ
2,4-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,6-DIAMINO-4-NITROTOLUENE	1.4 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UR	0.5 UJ
2,6-DINITROTOLUENE	0.93 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-AMINO-4,6-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
3,5-DINITROANILINE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
3-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4,4'-TN-AZOXY	1 UJ	1 UJ	1.68 J	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
4-AMINO-2,6-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	3.8 J	0.5 UR	0.5 UJ
HMX	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.57 J	0.5 U	0.5 UJ	6.5 J
MNX	1.5 J	0.5 UJ	1.3 J	1.8 J	1.3 J	0.54 J	2.3 J	0.86 J	1.4 J
NITROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	0.5 U	0.5 U	1.9 J	0.5 U	0.5 U	1.6 J	0.5 U	0.5 U	1.9 J
TETRYL	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR
TNX	0.58 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	1.9 J

Vegetation samples were only collected in sampling round 3.

TABLE G-7

SUMMARY OF ANALYTIC RESULTS
VEGETATION ROUNDS 1 THROUGH 3
SWMU 13 (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

SAMPLING ROUND	03	03	03	03	03	03	03	03
LOCATION	13VG04	13VG05	13VG05	13VG06	13VG06	13VG07	13VG08	13VG09
SAMPLE NUMBER	13VG007020001	13VG010030001	13VG011020001	13VG012010001	13VG013020001	13VG014030001	13VG015040001	13VG016030001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004	9/21/2004
Energetics (mg/kg)								
1,3,5-TRINITROBENZENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
1,3-DINITROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,4,6-TRINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,4-DIAMINO-6-NITROTOLUENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
2,4-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2,6-DIAMINO-4-NITROTOLUENE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
2,6-DINITROTOLUENE	3 J	2 J	7.9 J	1.8 J	2.1 J	0.5 U	0.5 U	1.7 J
2-AMINO-4,6-DINITROTOLUENE	3.4 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
3,5-DINITROANILINE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
3-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4,4'-TN-AZOXY	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
4-AMINO-2,6-DINITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-NITROTOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	3.1 J
HMX	0.5 U	0.75 J	0.64 J	2.6 J	0.5 U	0.5 U	0.57 J	0.66 J
MNX	0.5 UJ	1.3 J	1.4 J	1.2 J	2 J	2 J	0.5 UJ	0.5 UJ
NITROBENZENE	0.5 U	0.5 U	1.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
RDX	4.5 J	4.8 J	0.5 U	1.9 J	0.5 U	6 J	0.5 U	8.6 J
TETRYL	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR	0.5 UR
TNX	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

Vegetation samples were only collected in sampling round 3.

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
9	5/18/1998	ICS	165	2	0-12	0.05 J	19100	11.1 J	111	0.04 UJ	21.7 J	22.1 J	1.3 J	0.17 U
12	5/18/1998	ICS	165	2	24-36	0.07	19200	10.2 J	72.6	0.04 UJ	23.8 J	13.7 J	0.75 J	0.15 U
13	5/18/1998	ICS	165	3	0-12	0.06 J	18500	8.2 J	96.8	0.13 J	22.1 J	23.7 J	0.84 J	0.17 U
15	5/18/1998	ICS	165	3	24-36	0.04 J	12700	8.7 J	67.6	0.04 UJ	19.4 J	17 J	1.2 J	0.14 U
16	5/19/1998	ICS	165	4	0-12	0.02 U	10800	8.3 J	84.8	0.04 U	14.9	16.9	1.1 J	0.15 U
18	5/19/1998	ICS	165	4	24-36	0.02 U	9800	6.3 J	61.3	0.04 U	13.5	11.1	0.48 U	0.14 U
19	5/19/1998	ICS	165	5	0-12	0.02 U	13500	8.7 J	70.2	0.03 U	18.9	16.8	0.87 J	0.14 U
22	5/19/1998	ICS	165	5	24-36	0.02 U	6010	3.3 J	39.4	0.03 U	7.7	7	0.46 U	0.14 U
23	5/19/1998	ICS	165	6	0-12	0.02 U	13900	9.6 J	107	0.04 U	17.1	20.1	1 J	0.17 U
25	5/19/1998	ICS	165	6	24-36	0.02 U	12100	8.4 J	74.4	0.04 U	24	23.1	1.2 J	0.14 U
26	5/19/1998	ICS	165	7	0-12	0.02 U	11400	7.3 J	116	0.04 U	14.7	29.1	0.84 J	0.14 U
28	5/19/1998	ICS	165	7	24-36	0.02 U	16100	8.2 J	95.6	0.04 U	17.9	15	1 J	0.15 U
29	5/19/1998	ICS	165	8	0-12	0.02 U	15300	9.9 J	88	0.16 U	19.2	28.7	1.2 J	0.13 U
32	5/19/1998	ICS	165	8	24-36	0.02 U	18200	12.5 J	77.6	0.04 U	22.9	12.7	1.5 J	0.14 U
33	5/19/1998	ICS	165	9	0-12	0.03 J	13500	8.3 J	73.2	0.03 U	18.8	26	0.75 J	0.14 U
35	5/19/1998	ICS	165	9	24-36	0.02 U	13300	6.4 J	84.3	0.03 U	14.8	15.7	0.96 J	0.14 U
36	5/19/1998	ICS	165	10	0-12	0.02 U	8870	6.5 J	47	0.04 U	14.8	21.6	0.49 U	0.15 U
38	5/19/1998	ICS	165	10	24-36	0.02 U	8730	4.9 J	58.9	0.04 U	15	9.7 J	0.58 J	0.14 U
39	5/20/1998	ICS	165	11	0-12	0.02 U	14300	10.7 J	85.6	0.11 U	19.2 J	NA	6.7 J	0.14 U
42	5/20/1998	ICS	165	11	24-36	0.02 U	13800	8.4 J	67.2	0.04 U	19	NA	0.84 J	0.14 U
44	5/20/1998	ICS	165	12	0-12	1.2 J	15700	8.2 J	131	1.3	23.5	NA	1.1 J	0.15 U
46	5/20/1998	ICS	165	12	24-36	0.04 J	13100	5.4 J	91	0.05 U	15.2	NA	0.62 J	0.14 U
47	5/20/1998	ICS	165	13	0-12	0.02 U	14700	5.9 J	119	0.16 U	17.2	NA	0.62 J	0.14 U
49	5/20/1998	ICS	165	13	24-36	0.02 U	13100	7.2 J	64.7	0.04 U	18.3	NA	0.49 U	0.15 U
51	5/20/1998	ICS	165	14	0-12	0.02 U	17100	9.5 J	123	0.06 U	20.3	NA	1 J	0.14 U
53	5/20/1998	ICS	165	14	24-36	0.02 U	11100	4.8 J	58.4	0.03 U	12.2	NA	0.47 U	0.14 U
54	5/20/1998	ICS	165	15	0-12	0.03 J	13600	12.1 J	115	0.51 J	21.4	55.5 J	1 J	0.15 U
56	5/20/1998	ICS	165	15	24-36	0.02 U	17500	10.6 J	110	0.04 U	21.9	NA	0.97 J	0.14 U
57	5/21/1998	ICS	165	16	0-12	0.04 U	16700	10.4 J	86.5	0.03 U	19.9	19.4	0.44 U	0.13 U
59	5/21/1998	ICS	165	16	24-36	0.04 U	11600	6.1 J	48.4	0.04 U	14.6 J	10.4 J	0.47 U	0.14 U
60	5/21/1998	ICS	165	17	0-12	0.04 U	14800	8.5 J	57.5	0.04 U	17.8	13.4	0.48 U	0.14 U
62	5/21/1998	ICS	165	17	24-36	0.04 U	9420	3.7 J	41.6	0.04 U	11.7	7.3 J	0.47 U	0.14 U
63	5/21/1998	ICS	165	18	0-12	0.04 U	13100	6.4 J	42.7	0.03 U	15.7	11.6 J	0.47 U	0.14 U
65	5/21/1998	ICS	165	18	24-36	0.04 U	8440	3.6 J	34	0.03 U	9.6	7.8 J	0.46 U	0.14 U
66	5/21/1998	ICS	165	19	0-12	0.04 U	13800	6.2 J	43.4	0.04 U	19.5	12.1	0.48 U	0.14 U
68	5/21/1998	ICS	165	19	24-36	0.04 U	9870	3.9 J	28.1	0.04 U	10.8	7.3 J	0.48 U	0.14 U
69	6/10/1998	ICS	165	20	0-12	0.05 J	15300	10.5 J	106	0.04 U	18.2	19.8	0.62 J	0.3 U
71	6/10/1998	ICS	165	20	24-36	0.05 J	13800	11.2 J	95.7	0.04 U	20.1	18.1	0.86 J	0.14 U
72	6/10/1998	ICS	165	21	0-12	0.04 U	11900	9.1 J	118	0.05 J	21.4	44.4	0.97 J	0.15 U
74	6/10/1998	ICS	165	21	24-36	0.04 U	18200	15.3 J	64.4	0.04 U	24.1	17.3	0.53 J	0.17 U
78	6/11/1998	ICS	165	23	0-12	0.19 J	14300	8.9 J	1160 J	0.27 J	22.8 J	36.2 J	0.96 J	0.15 U
80	6/11/1998	ICS	165	23	24-36	0.04 J	15700	10.4 J	155 J	0.04 U	18.3	15.7 J	0.8 J	0.15 U
81	6/11/1998	ICS	165	24	0-12	0.05 J	15500	9.6 J	123 J	0.04 U	17.6	18.1 J	1.1 J	0.16 U
83	6/11/1998	ICS	165	24	24-36	0.04 U	13500	6.8 J	88.9 J	0.04 U	17.5	13.1 J	0.66 J	0.14 U
84	6/23/1998	ICS	165	94	0-12	0.04 U	9110	7.9 J	88.7	0.28 U	19.5	19.7	0.48 U	0.14 U
86	6/23/1998	ICS	165	94	24-36	0.04 U	14300	9.8 J	91.6	0.04 U	18	18.1	1.1 J	0.15 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
87	6/23/1998	ICS	165	95	0-12	0.05 J	15600	13.4 J	73.5	0.04 U	22.8	14.6	0.7 J	0.15 U
89	6/23/1998	ICS	165	95	24-36	0.04 U	15000	10.5 J	100	0.04 U	14.7	24.2	0.7 J	0.15 U
90	7/20/1998	ICS	165	96	0-12	0.07 J	10200	9.7 J	76.8	0.07 J	20	16	0.82	0.16 U
92	7/20/1998	ICS	165	96	24-36	0.04 U	11500	7.7 J	101	0.03 U	16.2	10.1 J	0.82	0.14 U
93	7/21/1998	ICS	165	97	0-12	0.06	12400	8.5 J	64.9	0.19	15.8	12.8	0.48 U	0.14 U
95	7/21/1998	ICS	165	97	24-36	0.05	10600	8 J	63.8	0.31 J	15.2	22.4	0.48 U	0.14 U
96	7/21/1998	ICS	165	98	0-12	0.06	10700	8.2 J	57.5	0.17	13.1	13	0.5 U	0.15 U
98	7/21/1998	ICS	165	98	24-36	0.05 J	12400	9.5 J	97.4	0.08 J	15.8	22.8	0.48 U	0.15 U
99	7/21/1998	ICS	165	99	0-12	0.05	10400	8.4 J	68.9	1.7	19.4	15.9	0.48 U	0.14 U
101	7/21/1998	ICS	165	99	24-36	0.04 U	11500	7 J	97.8	0.09 J	15.9	36.7	0.49 U	0.15 U
102	7/21/1998	ICS	165	100	0-12	0.06	10400	6.7 J	87.3	0.53 J	24.1	12.4	0.47 U	0.14 U
104	7/21/1998	ICS	165	100	24-36	0.04 U	9550	6.2 J	93.4	0.07 J	24	10.8 J	0.47 U	0.14 U
105	7/23/1998	ICS	165	101	0-12	0.04 U	10400	8.2 J	68.6	0.22 J	19.5	13.2	0.81 J	0.14 U
107	7/23/1998	ICS	165	101	24-36	0.04 U	9370	8.3 J	192	0.05 J	21.5	17.8	0.53 J	0.14 U
750	10/31/2000	ICS	165	277	0-12	0.03 B	10500	4.8	96.7	0.13 B	12.4	13.3 B	0.46 U	0.32 U
752	10/31/2000	ICS	165	277	24-36	0.03 B	10200	4.6	93.8	0.06 U	10.5	9.4 B	0.45 U	0.31 U
753	10/31/2000	ICS	165	278	0-12	0.05	11800	7	48.8	0.48 B	22	16.4 B	0.95	0.33 U
289	2/3/1998	ICS	166	112	0-12	0.26	11900	8.7 J	53.4	0.23 J	14.5	15.3 J	0.36 U	0.16 U
436	7/8/1999	ICS	166	176	0-12	0.08	15800	8.6	75.9	0.32 B	37.1 N	17.7	0.39 U	0.14 U
438	7/8/1999	ICS	166	176	24-36	0.02 U	15000	7.4	89.9	0.04 U	19.3 N	10	0.44 B	0.14 U
448	7/9/1999	ICS	166	179	0-12	0.09	11800	8.4	79 N	0.21 NB	13.9	17.1 NB	0.67	0.13 U
450	7/9/1999	ICS	166	179	24-36	0.03 B	10200	8.8	96.9 N	0.89 NB	13.5	14.6 NB	0.83	0.14 U
451	7/9/1999	ICS	166	180	0-12	0.13	11300	8.3	76.6 N	0.26 NB	14	23.8 NB	0.68	0.13 U
453	7/9/1999	ICS	166	180	24-36	0.04	9970	8.6	68.3 N	4.6 NB	14.9	16.6 NB	0.73	0.14 U
466	7/14/1999	ICS	166	182	0-12	1.7	9990	8.3 B	59.8 E	0.26 B	15.9	20.9 EB	0.39 U	0.14 U
468	7/14/1999	ICS	166	182	24-36	0.06	12500	4.7 B	64.7 E	0.04 U	14.3	9 EB	0.39 U	0.14 U
469	7/14/1999	ICS	166	183	0-12	0.6	12300	7.9 B	64.7 E	0.19 B	13.3	16.9 EB	0.38 U	0.14 U
471	7/14/1999	ICS	166	183	24-36	0.03	10500	7 B	48.6 E	0.04 U	14.1	11.3 EB	0.39 U	0.14 U
572	9/22/1999	ICS	166	216	0-12	0.097 J	17200	4.6 J	77.3	0.54 U	15.5	30.5	21.6 U	1.1 U
574	9/22/1999	ICS	166	216	24-36	0.041 J	14500	6.6 J	57.7	0.57 U	20.1	15.1	22.8 U	1.1 U
580	9/27/1999	ICS	166	219	0-12	0.073 J	15200	4.9 J	76.1	0.53 U	18.3	26.6	21.3 U	0.4 J
582	9/27/1999	ICS	166	219	24-36	0.016 J	10500	11 U	56.6	0.55 U	15.8	13.3	22 U	0.37 J
586	9/27/1999	ICS	166	221	0-12	0.69	12200	4.6 J	79.9	0.53 U	17.6	22.3	21.4 U	1.1 U
588	9/27/1999	ICS	166	221	24-36	0.053 J	16300	6.2 J	76.3	0.57 U	22.5	19	22.6 U	0.5 J
589	9/27/1999	ICS	166	222	0-12	0.15	24900	10.6 U	62.3	0.53 U	14.7	22.2	21.2 U	1.1 U
591	9/27/1999	ICS	166	222	24-36	0.044 J	10700	13.1 U	46.1	0.66 U	15.4	11.8	26.3 U	0.39 J
592	9/27/1999	ICS	166	223	0-12	0.15	22600	10.3 U	62.3	0.61	11.8	26.2	20.5 U	1 U
594	9/27/1999	ICS	166	223	24-36	0.092 B	15100	12.2 U	57.3	0.61 U	21	13.8	24.4 U	0.44 B
595	9/27/1999	ICS	166	224	0-12	0.088 J	16200	11.6 U	72.6	0.58 U	17.5	20.6	23.3 U	0.38 J
597	9/27/1999	ICS	166	224	24-36	0.014 J	14300	5.7 J	74	0.66 U	19.4	20	26.4 U	0.71 J
610	9/28/1999	ICS	166	229	0-12	0.26	12700	22.2 U	40.4	1.4	10.7	21.1	44.4 U	2.2 U
612	9/28/1999	ICS	166	229	24-36	0.019 J	11900	11.5 U	54.3	0.57 U	14.1	14.4	23 U	1.1 U
613	9/28/1999	ICS	166	230	0-12	0.5	17500	20.7 U	67.1	1	12.7	22.1	41.4 U	2.1 U
615	9/28/1999	ICS	166	230	24-36	0.045 J	14700	11.4 U	85.5	0.55 J	18.7	18.6	22.8 U	0.37 J
631	10/1/1999	ICS	166	238	0-12	0.039 J	15000	4.7 J	144	0.5 J	17.7	19.1	22.6 U	1.1 U
633	10/1/1999	ICS	166	238	24-36	0.017 J	19500	5.5 J	92	0.6 U	25.3	16.6	23.9 U	1.2 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
646	10/12/1999	ICS	166	242	0-12	0.046 J	11400	11.9 U	62.9	0.6 U	14.3	16.3	23.8 U	1.2 U
648	10/12/1999	ICS	166	242	24-36	0.03 J	11600	11.7 U	57.8	0.58 U	15.6	14.1	23.3 U	1.2 U
649	10/12/1999	ICS	166	243	0-12	0.93	17000	7.5 J	65.8	0.6 U	17.7	40.2	24.1 U	1.2 U
651	10/12/1999	ICS	166	243	24-36	0.093 J	14200	10.6 J	78.3	0.6 U	23	23	24.1 U	1.2 U
655	10/12/1999	ICS	166	245	0-12	0.1 J	12500	8.4 J	67.5	0.59 U	18	17.1	23.4 U	1.2 U
657	10/12/1999	ICS	166	245	24-36	0.061 J	17100	8.3 J	67.1	0.59 U	30.1	17.8	23.5 U	1.2 U
677	10/19/1999	ICS	166	252	24-36	0.007 B	8570	11 U	34	0.55 U	13.3	9.5	22.1 U	1.1 U
678	10/19/1999	ICS	166	253	0-12	0.078 B	15500	8.6 B	61.3	0.58 U	17.5	13.8	23.2 U	1.2 U
680	10/19/1999	ICS	166	253	24-36	0.019 B	10700	11.3 U	39.2	0.57 U	13.4	9.5	22.6 U	1.1 U
681	10/19/1999	ICS	166	254	0-12	0.21	19200	12.1 U	79.1	0.55 B	14.5	39.7	24.2 U	1.2 U
683	10/19/1999	ICS	166	254	24-36	0.038 B	10700	11.6 U	40.6	0.58 U	13	10.3	23.3 U	1.2 U
684	10/19/1999	ICS	166	255	0-12	0.13	14200	12.2 U	70.8	0.56 B	14.5	23.3	24.4 U	1.2 U
686	10/19/1999	ICS	166	255	24-36	0.02 B	11100	4.2 B	47	0.56 U	20.2	11.4	22.6 U	1.1 U
690	10/20/1999	ICS	166	257	0-12	0.69	16500	6.3 J	87.8	0.51 J	18.5	50.1	23 U	1.1 U
692	10/20/1999	ICS	166	257	24-36	0.061 J	13900	8.1 J	136	0.58 U	18.3	29.2	23.4 U	1.2 U
726	11/4/1999	ICS	166	269	0-12	0.8	17100	10.9 J	78.7	0.58 U	19.2	50.4	23.1 U	1.2 U
728	11/4/1999	ICS	166	269	24-36	0.14	16100	13.1	61.5	0.6 U	22.7	19.2	24.1 U	1.2 U
729	11/4/1999	ICS	166	270	0-12	1.6 A	20800	5.8 J	76.7	0.66	15.6	49.4	23.1 U	1.2 U
731	11/4/1999	ICS	166	270	24-36	0.067 J	15100	14.3	72.7	0.6 U	20	21.2	24.2 U	1.2 U
732	11/4/1999	ICS	166	271	0-12	0.22	16300	10.7 J	70.4	0.6 U	23.3	27.4	24 U	1.2 U
734	11/4/1999	ICS	166	271	24-36	0.072 J	20000	15.6	80.6	0.63 U	24.7	18.3	25.1 U	1.3 U
735	11/4/1999	ICS	166	272	0-12	1.5 A	19700	5.5 J	199	0.59 U	19.7	67.5	23.5 U	1.2 U
737	11/4/1999	ICS	166	272	24-36	0.096 J	19300	17.7	61.4	0.6 U	23.4	16	24.1 U	1.2 U
741	1/26/2000	ICS	166	273	0-12	0.032 J	11400	7.2 J	89.1	0.56 U	19.1	30	22.5 U	1.1 U
743	1/26/2000	ICS	166	273	24-36	0.064 J	7970	10.6 J	65.9	0.55 U	15.2	14.4	22.1 U	1.1 U
744	1/26/2000	ICS	166	274	0-12	0.04 J	12400	12.1 U	126	0.61 U	17	19.9	24.3 U	1.2 U
746	1/26/2000	ICS	166	274	24-36	0.036 J	10100	12 U	103	0.6 U	14.7	15.2	24 U	1.2 U
738	1/25/2000	ICS	166	275	0-12	0.066 J	13200	13.3 U	78.1	0.66 U	17	23.9	26.5 U	1.3 U
740	1/25/2000	ICS	166	275	24-36	0.072 J	13900	6.5 J	101	0.63 U	16.8	42.1	25.3 U	1.3 U
266	2/17/2000	PES	166	102	0-6	0 J	12900	12 U	76	1 U	22	18	24 U	1 U
316	3/8/2000	PES	166	103	0-6	0.045 J	13400	8.4 J	80.6	0.59 U	19.4	14.3	23.6 U	1.2 U
346	3/28/2000	PES	166	105	0-6	metals analysis not requested in this sample								
280	3/1/2000	PES	166	106	0-6	0.12 U	11900	9.1 J	44.3	0.59 U	32	19.4	23.5 U	1.2 U
236	1/8/2000	PES	166	107	0-6	0.042 J	18200	5.3 J	95.9	0.62 U	21.4	16.1	24.8 U	1.2 U
268	2/17/2000	PES	166	113	0-6	0 J	13400	12 U	56	1 U	22	15	24 U	1 U
318	3/8/2000	PES	166	115	0-6	0.019 J	10200	11.4 U	52.4	0.57 U	13.5	25.2	22.8 U	1.1 U
282	3/1/2000	PES	166	118	0-6	0.12 U	10500	4.1 J	38.7	0.58 U	12.9	11.7	23 U	1.2 U
264	2/17/2000	PES	166	120	0-6	0 U	12700	14 U	63	1 U	18	9	27 U	1 U
244	1/19/2000	PES	166	121	0-6	0.12	15100	11.8 U	77.1	0.59 U	19.1	21.5	23.5 U	1.2 U
246	1/25/2000	PES	166	177	0-6	0.032 J	13200	12.8 U	65.4	0.64 U	17.7	19.3	25.6 U	1.3 U
240	1/19/2000	PES	166	181	0-6	0.044 J	13900	3.9 J	80.6	0.61 U	16.3	15.9	24.4 U	1.2 U
288	3/2/2000	PES	166	215	0-6	0.01 J	20500	4.9 J	59.6	0.63 U	22.2	14.4	25.4 U	1.3 U
242	1/19/2000	PES	166	220	0-6	0.075 J	11700	5.5 J	63.7	0.6 U	15.3	16.1	23.8 U	1.2 U
270	3/1/2000	PES	166	225	0-6	0.031 J	14100	12.1 U	58.7	0.61 U	19.5	15.9	24.3 U	1.2 U
276	3/1/2000	PES	166	226	0-6	0.049 J	13800	12 U	67.4	0.6 U	16.5	16.6	24.1 U	1.2 U
332	3/8/2000	PES	166	227	0-6	0.021 J	10800	11.6 U	59.4	0.58 U	15.1	12.4	23.2 U	1.2 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
326	3/8/2000	PES	166	228	0-6	0.03 J	10400	11.7 U	127	0.58 U	14.5	17.7	23.4 U	1.2 U
238	1/19/2000	PES	166	231	0-6	0.13	11900	12.1 U	91.2	0.61 U	14.9	25.5	24.2 U	1.2 U
334	3/8/2000	PES	166	244	0-6	0.043 J	12300	11.9 U	71.9	0.59 U	16.1	12.2	23.7 U	1.2 U
292	3/2/2000	PES	166	246	0-6	0.07 J	21000	12 U	62.3	0.6 U	22.7	15.3	24 U	1.2 U
338	3/10/2000	PES	166	256	0-6	0.047 J	17500	5.3 J	81.3	0.58 U	25.8	16.8	23.4 U	1.2 U
347	5/18/2000	PES	166	276	0-6	0.068 J	20000	14.8	71.8	0.62 U	28.1	20.1	10.7 J	1.2 U
310	3/7/2000	PES	166	113/112	sidewall	0.039 J	16400	12.2	84	0.58 U	20.6	20.8	23.4 U	1.2 U
312	3/7/2000	PES	166	113/179	sidewall	0.043 J	15300	9.4 J	90.9	0.6 U	20.9	22.5	24.1 U	1.2 U
314	3/7/2000	PES	166	113/180	sidewall	0.041 J	16800	12 U	119	0.6 U	20.9	19.7	24 U	1.2 U
320	3/8/2000	PES	166	115/182	sidewall	0.028 J	11200	11.6 U	44.5	0.58 U	14.1	12.3	23.1 U	1.2 U
322	3/8/2000	PES	166	115/183	sidewall	0.024 J	14900	5.1 J	47.9	0.58 U	18.9	7.9	23.4 U	1.2 U
324	3/8/2000	PES	166	115/229	sidewall	0.12 U	14300	11.7 U	57.6	0.58 U	16.2	12.7	23.4 U	1.2 U
286	3/1/2000	PES	166	118/216	sidewall	0.12 U	13200	11.6 U	52.8	0.58 U	13.8	8.1	23.2 U	1.2 U
284	3/1/2000	PES	166	118/223	sidewall	0.0066 J	11300	11.2 U	42.1	0.56 U	11.9	9.7	22.5 U	1.1 U
298	3/2/2000	PES	166	118/224	sidewall	0.077 J	15400	11.8 U	86.1	0.59 U	19.5	16.5	23.7 U	1.2 U
308	3/7/2000	PES	166	120/176	sidewall	0.045 J	20700	6.8 J	97.4	0.63 U	24.1	10.2	25.3 U	1.3 U
306	3/7/2000	PES	166	120/238	sidewall	0.0097 J	19100	13.4	86.2	0.62 U	25.8	16.7	24.8 U	1.2 U
256	1/26/2000	PES	166	121/221	sidewall	0.32	15300	7.5 J	136	0.61 U	18.7	17.6	24.4 U	1.2 U
258	1/26/2000	PES	166	177/176	sidewall	0.26	15200	7.2 J	131	0.62 U	19.3	16.5	24.7 U	1.2 U
262	2/17/2000	PES	166	177/219	sidewall	0 J	11800	12 U	54	1 U	16	12	24 U	1 U
252	1/25/2000	PES	166	181/121	sidewall	3.6	10200	6.5 J	60.9	0.56 U	13.7	19.3	22.3 U	1.1 U
250	1/25/2000	PES	166	181/220	sidewall	0.48	14400	10.6 U	95.5	0.53 U	16.6	22.9	21.3 U	1.1 U
248	1/25/2000	PES	166	181/231	sidewall	0.036 J	17500	12.5 U	125	0.62 U	22.2	19.2	24.9 U	1.2 U
290	3/2/2000	PES	166	215/216	sidewall	0.007 J	17200	12.7 U	47.2	0.63 U	17.7	16.4	25.4 U	1.3 U
254	1/26/2000	PES	166	220/221	sidewall	0.049 J	14700	12 J	128	0.62 U	19.6	20.6	24.6 U	1.2 U
304	3/7/2000	PES	166	220/273	sidewall	0.027 J	16000	6.7 J	67.7	0.57 U	18	11.1	22.9 U	1.1 U
272	3/1/2000	PES	166	225/224	sidewall	0.016 J	14500	12.3 U	64.5	0.62 U	17.3	18.2	24.6 U	1.2 U
274	3/1/2000	PES	166	225/242	sidewall	0.033 J	15100	7.8 J	63	0.63 U	20	14.6	25.1 U	1.3 U
278	3/1/2000	PES	166	226/243	sidewall	0.023 J	16300	12.3 U	86.2	0.62 U	20.7	17.5	24.7 U	1.2 U
328	3/8/2000	PES	166	228/229	sidewall	0.0065 J	8970	11.6 U	44.1	0.58 U	10	11.3	23.1 U	1.2 U
330	3/8/2000	PES	166	228/245	sidewall	0.12	13100	5 J	97.5	0.58 U	14.1	16.1	9.1 J	1.2 U
302	3/7/2000	PES	166	231/273	sidewall	0.063 J	14300	11.7 U	81.1	0.59 U	17.4	18.1	23.4 U	1.2 U
300	3/7/2000	PES	166	231/road	sidewall	0.041 J	19700	8.4 J	117	0.61 U	21.4	18	24.2 U	1.2 U
336	3/8/2000	PES	166	244/243	sidewall	0.026 J	13700	5.9 J	73.4	0.61 U	18.7	13.5	24.4 U	1.2 U
296	3/2/2000	PES	166	246/252	sidewall	0.006 J	9570	4 J	32.3	0.57 U	13.2	11	22.7 U	1.1 U
294	3/2/2000	PES	166	246/253	sidewall	0.12 U	8540	11.5 U	28.8	0.58 U	22.3	35.8	23.1 U	1.2 U
340	3/10/2000	PES	166	256/257	sidewall	0.035 J	15300	7.4 J	314	0.6 U	19.8	25.8	12.4 J	1.2 U
344	3/10/2000	PES	166	256/269	sidewall	0.069 J	11300	5 J	48.7	0.6 U	17.2	11.9	10.1 J	1.2 U
342	3/10/2000	PES	166	256/271	sidewall	0.02 J	19600	8.6 J	90	0.62 U	26.4	15.8	24.7 U	1.2 U
460	7/13/1999	ICS	168	33	0-12	0.03	10700	18.1	72	0.04 U	35.8	13.9 B	0.97 B	0.14 U
462	7/13/1999	ICS	168	33	24-36	0.02	9350	7	73.1	0.04 U	12.9	10.7 B	0.46 B	0.14 U
156	11/23/1998	ICS	168	39	0-12	0.04 U	13800	9.3	70.5	0.06 J	18.4	16.9	1.1	0.14 U
158	11/23/1998	ICS	168	39	24-36	0.03 U	13600	6.7	67.9	0.03 U	20	275 J	1.4 J	0.14 U
248	1/26/1999	ICS	168	140	0-12	0.05	18400	10.3	73.5	0.04 U	22.8	14.6	0.49 U	0.15 U
526	9/9/1999	ICS	168	201	0-12	0.0343 J	15400	11.6 U	62.6	0.578 U	17.6	16.2	23.1 U	1.16 U
528	9/9/1999	ICS	168	201	24-36	0.0263 J	15000	5.99 J	72.1	0.607 U	18.3	15.8	24.3 U	1.21 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
529	9/9/1999	ICS	168	202	0-12	0.0254 J	12600	4.82 D	83.4	0.558 U	16.1	14.4	22.3 U	1.12 U
531	9/9/1999	ICS	168	202	24-36	0.0119 J	13400	9.33 J	273	0.607 U	27.8	15	24.3 U	1.21 U
532	9/9/1999	ICS	168	203	0-12	0.0328 J	15500	3.76 J	70	0.554 U	20.5	17.9	22.2 U	1.11 U
534	9/9/1999	ICS	168	203	24-36	0.00958 B	10700	11.8 U	35.2	0.588 U	27.7	11.9	23.5 U	1.18 U
566	9/22/1999	ICS	168	214	0-12	0.033 J	14200	6.6 J	62.7	1.3	17.5	29.3	22.9 U	1.1 U
568	9/22/1999	ICS	168	214	24-36	0.034 J	10000	5 J	104	0.61 U	11.6	11.2	24.5 U	1.2 U
640	10/18/1999	ICS	168	240	0-12	0.0315 B	14700	12.1 U	89	0.603 U	18	14.5	24.1 U	1.21 U
642	10/18/1999	ICS	168	240	24-36	0.0555 J	11000	8.26 J	57.3	0.598 U	22	13.8	23.9 U	1.2 U
643	10/18/1999	ICS	168	241	0-12	0.0247 J	11700	4.24 J	73.1	0.613 U	17.2	14.8	24.5 U	1.23 U
645	10/18/1999	ICS	168	241	24-36	0.0651 J	15600	5.15 J	76.1	0.609 U	20	13.3	24.3 U	1.22 U
126	11/16/1998	ICS	2500	40	0-12	0.04 U	13000	10.4	94	0.24 J	16.3	15.9	0.47 U	0.14 U
128	11/16/1998	ICS	2500	40	24-36	0.04 U	17100	8.9	73.4	0.13 J	21.1	13.2	0.71	0.14 U
123	11/16/1998	ICS	2500	41	0-12	0.04 U	17300	9.9	83.5	0.17 J	20.6	24.8	1.1	0.14 U
125	11/16/1998	ICS	2500	41	24-36	0.04 U	10500	7.2	53.4	0.05 J	14.5	11.1	1.3	0.14 U
153	11/23/1998	ICS	2500	42	0-12	0.07	13800	8.1	81.9	0.04 U	18.2	14.5	1.6	0.14 U
155	11/23/1998	ICS	2500	42	24-36	0.06	12700	12	80.7	0.04 U	17.4	13.5	1.1	0.14 U
150	11/23/1998	ICS	2500	43	0-12	0.05	10800	9.6	85.5	0.09 J	14	16	1.1	0.15 U
152	11/23/1998	ICS	2500	43	24-36	0.06	11100	7.9	59.7	0.04 U	14.4	12.2	0.53 J	0.15 U
147	11/23/1998	ICS	2500	44	0-12	0.15	9270	8.9	70.6	0.04 U	12.9	14.3	0.66	0.15 U
149	11/23/1998	ICS	2500	44	24-36	0.04 U	9800	7.9	91.5	0.1 J	12.2	16	0.99	0.14 U
144	11/18/1998	ICS	2500	45	0-12	0.04	10500	8.9	74.3	0.04 U	15	12.4	1.1	1.2 U
146	11/18/1998	ICS	2500	45	24-36	0.04 U	8560	5.6	68.3	0.03 U	13.2	11.4	0.6	1.1 U
141	11/18/1998	ICS	2500	46	0-12	0.04 U	9480	6.8	51.7	0.04 U	13.9	9.6	0.9	1.2 U
143	11/18/1998	ICS	2500	46	24-36	0.04 U	14200	10.5	84.3	0.03 U	16.9	12.6	1.1	1.1 U
138	11/18/1998	ICS	2500	47	0-12	0.04	9990	8.5	105	0.25 J	13.7	29.7 J	1.5	1.2 U
140	11/18/1998	ICS	2500	47	24-36	0.04 U	14100	10.5	75.2	0.03 U	17.4	13.2	1.6	1.1 U
135	11/18/1998	ICS	2500	48	0-12	1.4	10800	4.4	61.7	0.04 U	14.1	11.2	0.9	1.2 U
137	11/18/1998	ICS	2500	48	24-36	0.04 U	13400	9.5	87	0.04 U	16.4	15.3	1.2	1.2 U
132	11/16/1998	ICS	2500	49	0-12	0.04 U	15400	5	82.4	0.18 J	19.6	15.3	0.88	0.15 U
134	11/16/1998	ICS	2500	49	24-36	0.04 U	15400	8.6	96.2	0.14 J	17.1	16.6	0.99	0.14 U
129	11/16/1998	ICS	2500	50	0-12	0.04 U	12600	7.1	70.8	0.17 J	16.4	14.8	1	0.14 U
131	11/16/1998	ICS	2500	50	24-36	0.04 U	12000	7.8	77.4	0.13 J	14.6	16.1	1.4	0.14 U
201	11/8/1999	PES	168	25	0-6	0.027 J	12500	8.7 J	96.6	0.61 U	16.9	15.7	24.4 U	1.2 U
89	10/4/1999	PES	168	26	0-6	0.048 J	13800	4 J	80.8	0.61 U	18.2	14.4	24.3 U	1.2 U
87	10/4/1999	PES	168	27	0-6	0.04 J	15200	6.3 J	102	0.61 U	20.6	16.4	24.3 U	1.2 U
193	11/8/1999	PES	168	28	0-6	0.028 J	10900	12.2 U	59.4	0.61 U	14.3	19.2	24.4 U	1.2 U
189	11/8/1999	PES	168	29	0-6	0.028 J	12300	5.5 J	95.6	0.62 U	17.8	17.2	24.6 U	1.2 U
187	11/8/1999	PES	168	30	0-6	0.032 J	12400	5.9 J	90.9	0.61 U	16.7	15.4	24.6 U	1.2 U
185	11/2/1999	PES	168	31	0-6	0.013 J	10400	9.7 J	35.3	0.6 U	23.2	21.7	24.1 U	1.2 U
183	11/2/1999	PES	168	32	0-6	0.021 J	12900	4.9 J	44.5	0.62 U	18.2	15.1	24.9 U	1.2 U
199	11/8/1999	PES	168	35	0-6	0.12 U	10100	9.9 J	89	0.59 U	34	28.1	23.5 U	1.2 U
197	11/8/1999	PES	168	36	0-6	0.044 J	9360	6.9 J	46.9	0.57 U	15.6	13	22.9 U	1.1 U
195	11/8/1999	PES	168	37	0-6	0.021 J	4310	20.4	10.5	0.6 U	7.2	7.9	24 U	1.2 U
191	11/8/1999	PES	168	38	0-6	0.013 J	9760	8.7 J	42	0.58 U	20	17.5	23.3 U	1.2 U
203	11/8/1999	PES	168	28/27	sidewall	0.12 U	11100	12.1 U	81.2	0.61 U	20.1	15.3	24.3 U	1.2 U
234	11/9/1999	PES	168	29/39	sidewall	0.035 J	11800	4.8 J	121	0.6 U	14.9	19.5	23.9 U	1.2 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
228	11/9/1999	PES	168	31/241	sidewall	0.032 J	11700	5.2 J	63.5	0.57 U	16.5	11.4	23 U	1.1 U
226	11/9/1999	PES	168	32/240	sidewall	0.036 J	13200	9.8 J	67.9	0.57 U	19.1	15.4	22.8 U	1.1 U
224	11/9/1999	PES	168	32/33	sidewall	0.039 J	12900	10.1 J	65.4	0.57 U	17.8	13.3	22.9 U	1.1 U
218	11/9/1999	PES	168	35/203	sidewall	0.041 J	9810	4.3 J	83.1	0.59 U	16.5	12.3	23.6 U	1.2 U
222	11/9/1999	PES	168	35/214	sidewall	0.022 J	11200	5.9 J	83.1	0.68 U	14.7	15.4	27.3 U	1.4 U
220	11/9/1999	PES	168	35/26	sidewall	0.032 J	10500	11.6 J	84.9	0.59 U	38.8	20.9	23.7 U	1.2 U
207	11/8/1999	PES	168	36/202	sidewall	0.023 J	10900	11.9 U	84.1	0.6 U	16.7	17.5	23.9 U	1.2 U
209	11/8/1999	PES	168	36/27	sidewall	0.022 J	11200	30.5	69.2	0.6 U	50.9	25.4	24 U	1.2 U
205	11/8/1999	PES	168	37/201	sidewall	0.019 J	9970	10.6 J	65.3	0.6 U	25.5	13.3	23.9 U	1.2 U
230	11/9/1999	PES	168	38/140	sidewall	0.04 J	12200	12.1 U	121	0.61 U	14.8	20.8	24.2 U	1.2 U
232	11/9/1999	PES	168	38/39	sidewall	0.04 J	12800	12 U	126	0.6 U	16.7	21.1	23.9 U	1.2 U
245	1/26/1999	ICS	171	123	0-12	0.1	20900	8.3	88.7	0.27 U	19.5	19.7	0.47 U	0.14 U
247	1/26/1999	ICS	171	123	24-36	0.07	15900	9.9	91.6	0.13 U	18	18.1	0.47 U	0.14 U
259	1/27/1999	ICS	171	125	0-12	0.63	20900	6.2	101	0.19 U	16.2	23	0.49 U	0.15 U
261	1/27/1999	ICS	171	125	24-36	0.13	14100	7.8	64.9	0.03 U	15.8	12.8	0.46 U	0.14 U
256	1/27/1999	ICS	171	127	0-12	0.05	29200	6.7	97.4	0.3 U	15.8	22.8	0.47 U	0.14 U
258	1/27/1999	ICS	171	127	24-36	0.03 U	11600	4.9	68.9	0.03 U	19.4	15.9	0.46 U	0.14 U
303	2/9/1999	ICS	171	129	0-12	0.04 U	16500	6.9	59.6	0.21 U	20.6	27.9	0.84	0.14 U
305	2/9/1999	ICS	171	129	24-36	0.04 U	13500	6.6	58	0.04 U	15.7	14.2	0.63	0.15 U
306	2/17/1999	ICS	171	130	0-12	0.04 U	17300	5.3	61.6	0.17 U	19.1	13.7 J	0.47 U	0.14 U
308	2/17/1999	ICS	171	130	24-36	0.04	21100	5.9	87.2	0.41 U	14.9	10.9 J	0.8	0.14 U
312	2/17/1999	ICS	171	132	0-12	0.15 U	27100	6.1	55.4	0.37 U	12.9	22.9 J	0.47 U	0.14 U
314	2/17/1999	ICS	171	132	24-36	0.04	13100	6	74.7	0.2 U	20.4	12.8 J	0.48 U	0.14 U
317	2/25/1999	ICS	171	133	0-12	0.38	15468	9.2	81.7	0.13 U	17.2	11.8	1.2	0.15 U
319	2/25/1999	ICS	171	133	24-36	8.9	8858	5.4	51.8	0.11 U	15.1	8.9	0.95	0.14 U
322	3/1/1999	ICS	171	135	0-12	0.11	20300	7	98.9	0.18	18.5	11.8	2.4	0.14 U
430	7/7/1999	ICS	171	173	0-12	1	15200	6.4	55.4	0.59 B	17.6 N*	20.6	0.92	0.14 U
432	7/7/1999	ICS	171	173	24-36	0.03 B	10300	64.7	64.5	0.27 B	19.8 N*	20.3	3.5	0.14 U
433	7/7/1999	ICS	171	174	0-12	0.02 B	12500	4.8	53.6	0.29 B	11.4 N*	14.2	1	0.13 U
435	7/7/1999	ICS	171	174	24-36	0.02 U	7970	5.9	34.9	0.08 B	14.4 N*	16.7	0.61	0.13 U
442	7/8/1999	ICS	171	175	0-12	0.42	23900	5.6	57	0.21 B	12.6 N	21.2	0.51 B	0.13 U
444	7/8/1999	ICS	171	175	24-36	0.1	17900	8.3	64.2	0.04 U	19.7 N	14.9	0.52 B	0.14 U
475	7/15/1999	ICS	171	184	0-12	0.03 U	15500	6.4	63.2	0.15 B	11.4	20.6 B	0.52 B	0.14 U
477	7/15/1999	ICS	171	184	24-36	0.02 U	7790	6	67.8	0.03 U	12	10.8 B	0.37 U	0.13 U
544	9/15/1999	ICS	171	206	0-12	0.753	29600	10.6 U	64.5	0.531 U	17.3	26.4	21.2 U	1.06 U
561	9/22/1999	ICS	171	212	0-12	0.16	45100	4.4 J	62.9	0.53 U	95.8	22.5	21.1 U	1.1 U
577	9/24/1999	ICS	171	218	0-12	0.04 J	17400	10.5 U	81.3	0.53 U	15.2	69	21.1 U	1.1 U
579	9/24/1999	ICS	171	218	24-36	0.019 J	10900	10.7 U	68.4	0.54 U	14.4	17.3	21.5 U	1.1 U
621	9/30/1999	ICS	171	233	0-12	0.0082 J	7320	24.2 U	44	1.1 J	12.3	21.7	48.4 U	2.4 U
623	9/30/1999	ICS	171	234	0-12	0.044 J	15400	25.9 U	62.1	1.6	11.3	21.6	51.8 U	2.6 U
634	10/1/1999	ICS	171	239	0-12	0.11 U	4050	11.1 U	26.3	0.55 U	6.3	7.6	22.2 U	1.1 U
636	10/1/1999	ICS	171	239	24-36	0.013 J	14100	8 J	44.5	1.2 U	21.5	17.5	48 U	2.4 U
664	10/12/1999	ICS	171	248	0-12	0.14	25200	6.7 J	71.3	0.59 U	19.1	39.2	23.5 U	1.2 U
693	10/21/1999	ICS	171	258	0-12	0.033 J	18300	11.7 U	70	0.68	14.1	31.2	23.5 U	1.2 U
695	10/21/1999	ICS	171	258	24-36	0.014 J	7570	11.7 U	55.1	0.59 U	11	13.4	23.5 U	1.2 U
696	10/21/1999	ICS	171	259	0-12	0.024 J	12900	11.4 U	60	0.57 U	12.6	18.6	22.8 U	1.1 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
698	10/21/1999	ICS	171	259	24-36	0.019 J	12700	5.1 J	64.9	0.59 U	13.9	16.1	23.4 U	1.2 U
699	10/21/1999	ICS	171	260	0-12	0.012 J	8860	11.6 U	65.6	0.58 U	11.8	16.1	23.2 U	1.2 U
701	10/21/1999	ICS	171	260	24-36	0.014 J	8050	13.7	38.8	0.58 U	41.2	31.2	23 U	0.26 J
702	10/21/1999	ICS	171	261	0-12	0.02 J	11700	11.1 U	46.5	0.56 U	11.4	14.7	22.3 U	1.1 U
704	10/21/1999	ICS	171	261	24-36	0.0082 J	9020	11.4 U	58.9	0.57 U	9.4	41.1	22.8 U	1.1 U
371	6/2/2000	PES	171	122	0-6	0.024 J	16500	4.7 J	66	0.6 U	21.1	13.4	24.1 U	1.2 U
373	6/2/2000	PES	171	123	0-6	0.018 J	16500	9.7 J	85	0.6 U	22.1	18.8	23.9 U	1.2 U
375	6/2/2000	PES	171	124	0-6	0.03 J	15100	7.4 J	61.2	0.58 U	17.8	14.4	23.3 U	1.2 U
405	7/18/2000	PES	171	126	0-6	0.044 J	15300	6 J	86.8	0.63 U	18.5	14.2	25.4 U	1.3 U
349	6/1/2000	PES	171	128	0-6	0.03 B	14400	3.8 B	67	0.58 U	17.5	15.7	23 U	1.2 U
377	6/2/2000	PES	171	131	0-6	0.026 J	14900	13	81.4	0.59 U	22.2	20.5	23.7 U	1.2 U
397	7/18/2000	PES	171	134	0-6	0.015 J	9920	11.5 U	54	0.58 U	23.5	13.2	23.1 U	1.2 U
407	7/18/2000	PES	171	136	0-6	0.49	12700	4.2 J	50.3	0.61 U	15	20.1	24.3 U	1.2 U
361	6/1/2000	PES	171	137	0-6	0.051 B	12100	11.3 U	52.5	0.56 U	12.2	19.1	22.6 U	1.1 U
353	6/1/2000	PES	171	138	0-6	0.018 B	13700	10.9 B	71.4	0.58 U	16.4	18.3	23.1 U	1.2 U
411	7/18/2000	PES	171	178	0-6	1 A	19400	11.6 U	73.6	0.58 U	13.9	28	23.1 U	1.2 U
393	7/18/2000	PES	171	185	0-6	0.05 J	9940	5.4 J	60.2	0.75	18	17	22.9 U	1.1 U
387	7/18/2000	PES	171	217	0-6	2.9 A	15000	4.4 J	101	0.58 U	17.5	34.6	23.1 U	1.2 U
385	6/2/2000	PES	171	122/129	sidewall	0.037 J	11100	7.4 J	94.7	0.6 U	16	18.2	24.1 U	1.2 U
351	6/1/2000	PES	171	128/127	sidewall	0.019 B	14300	5.3 B	69.4	0.61 U	20.6	13.7	24.4 U	1.2 U
383	6/2/2000	PES	171	131/130	sidewall	0.02 J	15000	4.1 J	79.8	0.58 U	20.4	19.3	23.1 U	1.2 U
381	6/2/2000	PES	171	131/174	sidewall	0.03 J	20900	11.1 J	69.7	0.6 U	15.1	16.8	24 U	1.2 U
379	6/2/2000	PES	171	131/175	sidewall	0.028 J	15700	9 J	67.6	0.59 U	24.7	17.5	9.3 J	1.2 U
403	7/18/2000	PES	171	134/133	sidewall	0.019 J	13600	4.8 J	56.9	0.59 U	18.4	13.2	23.7 U	1.2 U
401	7/18/2000	PES	171	134/135	sidewall	0.033 J	15400	7.3 J	85.6	0.63 U	17.3	18.2	25.3 U	1.3 U
399	7/18/2000	PES	171	134/184	sidewall	0.014 J	13000	13.6 U	69.2	0.68 U	18	16.2	27.2 U	1.4 U
409	7/18/2000	PES	171	136/135	sidewall	0.13	6300	4.3 J	137	0.57 U	18.9	11.5	22.8 U	1.1 U
369	6/1/2000	PES	171	137/127	sidewall	0.035 B	13900	8.4 B	75	0.58 U	30.8	17.2	23.4 U	1.2 U
367	6/1/2000	PES	171	137/239	sidewall	0.0093 B	12500	11.8 U	40.6	0.59 U	11	12.6	23.7 U	1.2 U
363	6/1/2000	PES	171	137/258	sidewall	0.017 B	7510	6.8 B	60.7	0.58 U	14.6	19.5	23.4 U	1.2 U
365	6/1/2000	PES	171	137/260	sidewall	0.009 B	10700	11.9 U	43.8	0.6 U	11.6	14.3	23.8 U	1.2 U
355	6/1/2000	PES	171	138/127	sidewall	0.032 B	15500	10.2 B	71.9	0.6 U	20	17.3	24 U	1.2 U
359	6/1/2000	PES	171	138/173	sidewall	0.02 B	13100	6.5 B	94.5	0.6 U	16.2	18.7	23.9 U	1.2 U
357	6/1/2000	PES	171	138/239	sidewall	0.037 B	58500	11 B	73.5	0.65 U	36.3	27.8	25.8 U	1.3 U
395	7/18/2000	PES	171	185/184	sidewall	0.023 J	16900	11.5 J	81.1	0.58 U	17.7	25.5	23.2 U	1.2 U
391	7/18/2000	PES	171	217/133	sidewall	0.99	25800	5.1 J	103	0.6 U	15.1	24.9	24.1 U	1.2 U
389	7/18/2000	PES	171	217/233	sidewall	0.0069 J	9350	3.8 J	88	0.58 U	17.3	22.2	23.3 U	1.2 U
177	12/1/1998	ICS	173	51	0-12	0.05	11200	8.6	75	0.19 J	19	18.6	0.5 U	0.15 U
179	12/1/1998	ICS	173	51	24-36	0.05	8590	7.4	69.6	0.21 J	12.9	15.7	0.68	0.14 U
180	12/2/1998	ICS	173	52	0-12	0.05	9530	7.3	65	0.15 J	11.7	13.7	0.47 U	0.14 U
182	12/2/1998	ICS	173	52	24-36	0.04	9530	8.8	63.1	0.13 J	15.6	15.9	0.78	0.14 U
183	12/8/1998	ICS	173	53	0-12	0.06 J	10800	9.4 J	104	0.34 J	18.1	40	0.66 J	0.15 U
185	12/8/1998	ICS	173	53	24-36	0.05 J	10400	8.9 J	82.9	0.19 J	13.9	13.7 J	0.48 U	0.14 U
412	6/30/1999	ICS	173	147	0-12	0.02 U	9450	10	55.5	0.03 U	22.8 N	18.8 B	0.36 U	0.13 U
414	6/30/1999	ICS	173	147	24-36	0.02 U	9970	7.4	46.9	0.03 U	15.2 N	9.5 B	0.38 U	0.14 U
418	6/30/1999	ICS	173	169	0-12	0.03 B	9500	9	82.9	0.2 B	13.2 N	22.5 B	0.54 B	0.13 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
420	6/30/1999	ICS	173	169	24-36	0.03 B	15100	11	66.4	0.04 U	31.9 N	13.4 B	0.39 U	0.14 U
625	9/30/1999	ICS	173	235	0-12	0.048 D	14700	11.6 U	77.9	0.58 U	17.9	18.9	23.2 U	1.2 U
627	9/30/1999	ICS	173	235	24-36	0.033 J	13100	12.3 U	98.6	0.62 U	16.5	15.2	24.6 U	1.2 U
661	10/12/1999	ICS	173	247	0-12	0.04 J	16300	5.1 J	103	0.6 U	19.8	18.3	23.9 U	1.2 U
663	10/12/1999	ICS	173	247	24-36	0.041 J	12400	7.4 J	112	0.62 U	14.1	18.8	24.7 U	1.2 U
669	10/18/1999	ICS	173	250	0-12	0.0358 J	15800	6.9 J	79.5	0.594 U	19.2	14.6	23.8 U	1.19 U
671	10/18/1999	ICS	173	250	24-36	0.0148 J	13200	9.29 J	60.4	0.597 U	17.4	11.2	23.9 U	1.19 U
708	10/26/1999	ICS	173	263	0-12	0.054 J	16000	12.3 U	93.8	0.62 U	17	25.2	24.6 U	1.2 U
710	10/26/1999	ICS	173	263	24-36	0.038 J	11400	12.5 U	154	0.63 U	13.9	18.4	25.1 U	1.3 U
711	10/26/1999	ICS	173	264	0-12	0.051 J	14100	14.4	98.3	0.59 U	17.4	22.6	23.7 U	1.2 U
713	10/26/1999	ICS	173	264	24-36	0.039 J	11500	4.4 J	91	0.61 U	14.3	16.6	24.5 U	1.2 U
714	11/3/1999	ICS	173	265	0-12	0.033 J	14300	9.5 J	78.5	0.58 U	17.9	18.9	23.1 U	1.2 U
716	11/3/1999	ICS	173	265	24-36	0.013 J	16200	11.2 J	70.9	0.61 U	17.5	18.2	24.5 U	1.2 U
717	11/3/1999	ICS	173	266	0-12	0.034 J	16900	11.3 J	87.4	0.6 U	20.2	19.5	24 U	1.2 U
719	11/3/1999	ICS	173	266	24-36	0.032 J	18800	14.8	75.3	0.63 U	24.8	21	25.3 U	1.3 U
720	11/3/1999	ICS	173	267	0-12	0.036 J	14600	12.7	119	0.6 U	18.6	23	24.1 U	1.2 U
722	11/3/1999	ICS	173	267	24-36	0.062 J	18300	14.5	64.8	0.61 U	25.1	18.5	24.6 U	1.2 U
723	11/3/1999	ICS	173	268	0-12	0.052 J	17400	8.7 J	118	0.62 U	19.7	26.3	24.7 U	1.2 U
725	11/3/1999	ICS	173	268	24-36	0.033 J	16400	10.3 J	74	0.62 U	19.6	20.9	24.7 U	1.2 U
508	8/26/1999	ICS	173	194	0-12	0.00771 B	17000	11.6 U	81.6	0.582 U	18.7	16.3	23.3 U	1.16 U
510	8/26/1999	ICS	173	194	24-36	0.0314 B	10800	12 U	80.1	0.602 U	14.3	12.9	24.1 U	1.2 U
511	9/8/1999	ICS	173	196	0-12	0.0105 J	13200	5.87 J	125	0.562 U	14.9	14.4	22.5 U	1.12 U
513	9/8/1999	ICS	173	196	24-36	0.118 U	16000	11.8 U	117	0.588 U	19.2	14.6	23.5 U	1.18 U
517	9/8/1999	ICS	173	197	0-12	0.00669 J	9240	11.1 U	39.3	0.554 U	14	11.2	22.1 U	1.11 U
519	9/8/1999	ICS	173	197	24-36	0.123 U	11100	8.51 J	50.3	0.615 U	19.1	12.3	24.6 U	1.23 U
514	9/8/1999	ICS	173	198	0-12	0.0268 J	15600	7.69 J	66.7	0.564 U	21	16.9	22.6 U	1.13 U
516	9/8/1999	ICS	173	198	24-36	0.113 U	8100	11.3 U	43.2	0.566 U	11.6	5.82	22.6 U	1.13 U
549	9/22/1999	ICS	173	208	0-12	0.034 J	17200	10.1 J	67.1	0.56 U	22.6	14.3	22.3 U	1.1 U
551	9/22/1999	ICS	173	208	24-36	0.0058 J	11600	9.4 J	55.7	0.57 U	18.3	12.4	22.7 U	1.1 U
552	9/22/1999	ICS	173	209	0-12	0.058 J	19600	10.9 J	94.4	0.56 U	23.9	20.1	22.5 U	1.1 U
554	9/22/1999	ICS	173	209	24-36	0.017 J	15900	4.7 J	72.6	0.6 U	21.3	14.4	24 U	1.2 U
341	3/19/1999	ICS	173	151	0-12	0.02 U	15700	5.7	68.3	0.03 U	16	13.8 J	0.95	0.14 U
342	3/19/1999	ICS	173	151	24-36	0.02 U	19700	6.6	87.2	0.03 U	26.1	16.4 J	2.1	0.14 U
371	6/17/1999	ICS	173	155	0-12	0.02 U	12300	4.6	67.8	0.03 U	11.6	15.8	0.4 B	0.13 U
373	6/17/1999	ICS	173	155	24-36	0.02 U	12300	6.4	119	0.04 U	14.2	11.9	0.41 U	0.15 U
374	6/17/1999	ICS	173	156	0-12	0.02 U	11100	4.3	62.2	0.03 U	11.1	13.1	0.37 U	0.13 U
376	6/17/1999	ICS	173	156	24-36	0.02 U	8680	4.1	74.1	0.04 U	13.6	12.2	0.39 U	0.14 U
383	6/18/1999	ICS	173	159	0-12	0.02 U	10900	3.9	93.3	0.04 NU	13.7	15.2	0.45 B	0.14 U
385	6/18/1999	ICS	173	159	24-36	0.02 U	7810	1.9	73.3	0.03 NU	14.4	10	1	0.13 U
389	6/18/1999	ICS	173	161	0-12	0.02 U	9470	4.1	62.6	0.03 NU	10.6	12.6	0.38 U	0.14 U
538	9/14/1999	ICS	173	195	0-12	0.0133 J	32500	11 U	150	0.748	18	37.3	21.9 U	1.1 U
540	9/14/1999	ICS	173	195	24-36	0.0155 J	11900	11.7 U	79.2	0.584 U	15.8	20.5	23.4 U	1.17 U
236	12/29/1998	ICS	173	62	0-12	0.04 U	8510	14.6	59.9	0.62 J	13.3	15.7 J	0.49 U	0.15 U
238	12/29/1998	ICS	173	62	24-36	0.04 U	8620	8	72.2	0.83 J	15.6	11 J	0.49 U	0.15 U
563	9/22/1999	ICS	173	213	0-12	0.03 J	14900	9.1 J	79	0.58 U	23.1	18.8	23.1 U	1.2 U
565	9/22/1999	ICS	173	213	24-36	0.12 U	14600	11.8 U	72.8	0.59 U	22	13.1	23.7 U	1.2 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
618	9/30/1999	ICS	173	232	0-12	0.024 J	8550	13.4 J	52.9	1.3 U	33.9	25.4	51.4 U	0.95 J
620	9/30/1999	ICS	173	232	24-36	0.0067 J	5610	11.2 U	35.1	0.56 U	18.7	9	22.4 U	1.1 U
133	10/22/1999	PES	173	54	0-6	0.044 J	12300	12 U	78.9	0.6 U	16	15	24 U	1.2 U
135	10/22/1999	PES	173	55	0-6	0.049 J	15300	4.2 J	104	0.62 U	19.5	16.9	24.6 U	1.2 U
137	10/26/1999	PES	173	141	0-6	0.036 J	14300	11.9 U	77.9	0.6 U	18.2	18.5	23.9 U	1.2 U
91	10/5/1999	PES	173	168	0-6	0.027 J	14400	7.7 J	69.3	0.59 U	18.1	16.4	23.6 U	1.2 U
93	10/5/1999	PES	173	204	0-6	0.03 J	12200	12.8 U	169	0.64 U	22.5	17.8	25.6 U	1.3 U
123	10/16/1999	PES	173	210	0-6	0.025 J	10500	12.8 U	132	0.64 U	12.2	15.1	25.7 U	1.3 U
127	10/16/1999	PES	173	211	0-6	0.12 U	13600	6.4 J	57	0.6 U	72.2	14.4	23.8 U	1.2 U
131	10/19/1999	PES	173	236	0-6	0.12 U	10700	11.6 U	54.8	0.58 U	13.9	11.9	23.3 U	1.2 U
129	10/19/1999	PES	173	237	0-6	0.018 J	10400	11.7 U	56.9	0.58 U	22.3	18.6	23.3 U	1.2 U
141	10/26/1999	PES	173	249	0-6	0.0088 J	10800	12.1 U	81.2	0.6 U	32.2	16.2	24.2 U	1.2 U
139	10/26/1999	PES	173	251	0-6	0.12 U	10700	11.6 U	63.4	0.58 U	13.7	10.9	23.3 U	1.2 U
214	11/9/1999	PES	173	262	0-6	0.017 J	14600	12.4 U	184	0.62 U	17.9	13.3	24.8 U	1.2 U
177	11/2/1999	PES	173	141/147	sidewall	0.042 J	15000	3.7 J	83.2	0.56 U	20.3	22.8	22.3 U	1.1 U
175	11/2/1999	PES	173	141/169	sidewall	0.048 J	14600	12.1 U	105	0.61 U	20.5	31	24.2 U	1.2 U
173	11/1/1999	PES	173	168/169	sidewall	0.019 J	11800	11.5 U	71.8	0.57 U	16.7	15.3	23 U	1.1 U
171	11/1/1999	PES	173	210/169	sidewall	0.052 J	16300	12.2 U	91.2	0.61 U	19.8	16.8	24.4 U	1.2 U
167	11/1/1999	PES	173	210/235	sidewall	0.036 J	12100	4.2 J	146	0.65 U	25.7	12.9	25.9 U	1.3 U
169	11/1/1999	PES	173	210/247	sidewall	0.036 J	13300	6.8 J	142	0.64 U	23.1	18.8	25.5 U	1.3 U
165	11/1/1999	PES	173	211/235	sidewall	0.037 J	14900	12.2 U	93.2	0.61 U	18.2	17.5	24.3 U	1.2 U
149	10/28/1999	PES	173	236/250	sidewall	0.12 U	9910	11.5 U	60.6	0.58 U	23.3	9.6	23 U	1.2 U
147	10/28/1999	PES	173	249/250	sidewall	0.023 J	13200	11.9 U	132	0.59 U	17	13.5	23.8 U	1.2 U
151	10/28/1999	PES	173	251/235	sidewall	0.11 U	8160	4.2 J	45.7	0.56 U	20.2	11.9	22.5 U	1.1 U
216	11/9/1999	PES	173	251/264	sidewall	0.015 J	7900	11.6 U	42.4	0.58 U	14.7	13.1	23.3 U	1.2 U
179	11/2/1999	PES	173	54/147	sidewall	0.011 J	11500	11.8 U	106	0.59 U	15.1	17.8	23.6 U	1.2 U
181	11/2/1999	PES	173	54/53	sidewall	0.19	15000	9.1 J	80.5	0.52 U	21.9	20.8	21 U	1 U
109	10/15/1999	PES	173	56	0-6	0.048 J	12700	5.1 J	91.1	0.61 U	16.8	18.1	24.3 U	1.2 U
119	10/15/1999	PES	173	57	0-6	0.0266 J	14500	8.46 J	119	0.617 U	18.6	19	24.7 U	1.23 U
111	10/15/1999	PES	173	66	0-6	0.024 J	13200	12.2 J	154	0.64 U	23.2	19.4	25.4 U	1.3 U
113	10/15/1999	PES	173	67	0-6	0.013 J	11000	5.4 J	78.7	0.72 U	13.9	9.2	29 U	1.4 U
417	8/28/2000	PES	173	68	0-6	0.0064 J	17100	12.1 U	109	0.6 U	21.2	12.9	24.2 U	1.2 U
421	8/28/2000	PES	173	69	0-6	0.12 U	10800	11.5 U	53.2	0.58 U	20	21.3	23 U	1.2 U
423	8/28/2000	PES	173	69	sidewall	0.014 J	13600	11.8 U	55.9	0.59 U	19.4	9.3	23.6 U	1.2 U
427	8/28/2000	PES	173	70	0-6	0.03 J	12100	12.1 U	84.9	0.61 U	16.8	17.6	24.3 U	1.2 U
429	8/28/2000	PES	173	70	sidewall	0.03 J	12200	11.7 U	63.6	0.58 U	15.7	13.9	23.4 U	1.2 U
425	8/28/2000	PES	173	71	0-6	0.018 J	11600	12.1 U	65.5	0.61 U	14.4	12.2	24.2 U	1.2 U
419	8/28/2000	PES	173	88	0-6	0.012 J	9500	11.7 U	53.9	0.59 U	9.7	15.2	23.4 U	1.2 U
413	8/28/2000	PES	173	89	0-6	0.011 J	15400	12.3 U	95.5	0.61 U	17.1	12.6	24.5 U	1.2 U
63	9/21/1999	PES	173	93	0-6	0.021 J	14400	6 J	147	0.6 U	18.3	14.6	24 U	1.2 U
125	10/16/1999	PES	173	139	0-6	0.064 J	15400	6.2 J	64.4	0.64 U	21	13.4	25.4 U	1.3 U
65	9/21/1999	PES	173	142	0-6	0.017 J	12600	11.2 U	87.8	0.56 U	17.2	13.9	22.3 U	1.1 U
43	9/20/1999	PES	173	143	0-6	0.01 J	11600	5.6 J	83.9	0.58 U	19.3	12.5	23.1 U	1.2 U
415	8/28/2000	PES	173	144	0-6	0.018 J	17800	11.8 U	190	0.59 U	20	12.1	23.6 U	1.2 U
115	10/15/1999	PES	173	145	0-6	0.12 U	12200	11.6 U	62.3	0.58 U	15.8	9.1	23.3 U	1.2 U
107	10/15/1999	PES	173	146	0-6	0.03 J	13800	8.5 J	56.1	0.64 U	43.3	18.2	25.8 U	1.3 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
117	10/15/1999	PES	173	153	0-6	0.118 U	12600	4.08 J	84.7	0.588 U	20.9	23.7	23.5 U	1.18 U
105	10/15/1999	PES	173	154	0-6	0.12 U	12000	7.9 J	88.5	0.59 U	15.7	11.7	23.4 U	1.2 U
55	9/21/1999	PES	173	163	0-6	0.01 J	14600	11.1 U	261	0.56 U	22.2	17.8	22.2 U	1.1 U
39	9/20/1999	PES	173	164	0-6	0.015 J	11900	5.5 J	105	0.57 U	20.5	13.2	22.7 U	1.1 U
51	9/21/1999	PES	173	165	0-6	0.0099 J	13400	5.2 J	185	0.59 U	18	23.2	23.5 U	1.2 U
49	9/21/1999	PES	173	166	0-6	0.014 J	12000	11.6 U	82.6	0.58 U	21.1	14.4	23.3 U	1.2 U
37	9/20/1999	PES	173	167	0-6	0.04 J	11500	7 J	104	0.58 U	18.8	16.3	23.1 U	1.2 U
71	9/21/1999	PES	173	170	0-6	0.12 U	15200	11.6 U	108	0.58 U	27.1	16.9	23.3 U	1.2 U
103	10/15/1999	PES	173	171	0-6	0.13 U	6950	12.6 U	31.9	0.63 U	12.4	7.5	25.1 U	1.3 U
61	9/21/1999	PES	173	172	0-6	0.016 J	13900	11.5 U	73.9	0.58 U	24.1	18.2	23.1 U	1.2 U
41	9/20/1999	PES	173	186	0-6	0.11 U	4820	11.1 U	23.9	0.56 U	5.7	10.8	22.2 U	1.1 U
45	9/20/1999	PES	173	187	0-6	0.11 U	5680	7.4 J	35.9	0.56 U	7.1	13.4	22.3 U	1.1 U
53	9/21/1999	PES	173	188	0-6	0.016 J	15000	7.9 J	378	0.57 U	20.8	30.6	23 U	1.1 U
47	9/21/1999	PES	173	189	0-6	0.027 J	19700	11.9 U	158	0.59 U	26.9	16.5	23.7 U	1.2 U
57	9/21/1999	PES	173	190	0-6	0.0091 J	12400	11 U	124	0.55 U	19.5	10.7	22 U	1.1 U
59	9/21/1999	PES	173	191	0-6	0.018 J	17900	11.3 J	283	0.57 U	24.5	18.5	22.8 U	1.1 U
99	10/14/1999	PES	173	192	0-6	0.0064 J	6740	4.2 J	34	0.56 U	13.9	12.7	22.4 U	1.1 U
101	10/14/1999	PES	173	193	0-6	0.12 U	12700	4.2 J	106	0.59 U	15.1	21.1	23.6 U	1.2 U
35	9/20/1999	PES	173	199	0-6	0.019 J	13100	5.3 J	71.8	0.59 U	22.3	15.1	23.5 U	1.2 U
33	9/20/1999	PES	173	200	0-6	0.012 J	16600	11.5 J	123	0.62 U	32.8	43.9	24.6 U	1.2 U
97	10/14/1999	PES	173	205	0-6	0.03 J	16400	6.8 J	128	0.62 U	21.1	14.5	24.9 U	1.2 U
95	10/14/1999	PES	173	207	0-6	0.018 J	16300	9.7 J	75.1	0.61 U	21.1	16.4	24.3 U	1.2 U
143	10/28/1999	PES	173	186/194	sidewall	0.12 U	12500	11.7 U	97.6	0.59 U	15.7	11.4	23.4 U	1.2 U
145	10/28/1999	PES	173	187/196	sidewall	0.12 U	12200	11.6 U	567	0.58 U	12.6	14.3	23.2 U	1.2 U
153	10/29/1999	PES	173	187/197	sidewall	0.022 J	14900	12.3 U	136	0.61 U	18.2	16.4	24.5 U	1.2 U
155	10/29/1999	PES	173	188/197	sidewall	0.036 J	8180	11.5 U	62.3	0.57 U	16.8	9.7	22.9 U	1.1 U
157	10/29/1999	PES	173	188/198	sidewall	0.026 J	9880	7.8 J	87.7	0.57 U	14.3	12.2	22.9 U	1.1 U
159	11/1/1999	PES	173	199/198	sidewall	0.11 U	10300	11.1 U	46.6	0.55 U	13.3	8.7	22.2 U	1.1 U
161	11/1/1999	PES	173	205/198	sidewall	0.0066 J	16200	4.4 J	68.5	0.58 U	20.3	14.2	23.4 U	1.2 U
163	11/1/1999	PES	173	207/208	sidewall	0.017 J	14900	4.2 J	60.3	0.57 U	20.8	14.7	23 U	1.1 U
211	11/9/1999	PES	173	207/209	sidewall	0.021 J	13200	12.5 U	158	0.62 U	17.5	12.1	25 U	1.2 U
435	8/29/2001	PES	173	72	0-6	0.027 J	16100	7.5	72.8	0.23 U	20.9	13.6	0.6	0.59 U
433	8/29/2001	PES	173	73	0-6	0.03 J	19400	7.2	91.9	0.24 U	22.3	14.8	0.51 J	0.6 U
431	8/29/2001	PES	173	74	0-6	0.049 U	12000	5.5	65.6	0.25 U	19.8	9.4	0.62 U	0.62 U
480	9/26/2001	PES	173	74	sidewall	0.06	15200	9.1	80.4	0.16 U	18.3	14.6	1.8 B	0.16 U
3	8/23/1999	PES	173	75	0-6	0.039 J	14600	9.3 J	100	0.56 U	17.4	16.8	22.5 U	1.1 U
453	9/26/2001	PES	173	85	0-6	0.02 B	11100	5.4	83.6	0.16 U	14.7	11.5	2.1	0.16 U
455	9/26/2001	PES	173	86	0-6	0.05	12000	5.5	92.7	0.16 U	16.6	13.6	2.2	0.16 U
457	9/26/2001	PES	173	87	0-6	0.02 U	11000	3.9	70	0.15 U	14.2	13.4	2	0.15 U
441	9/17/2001	PES	173	90	0-6	0.03 B	10100	4	65.5	0.25 B	13.3	17.7	2.9	0.2 U
461	9/26/2001	PES	173	91	0-6	0.03 B	11200	4.1	85.4	0.14 U	12.7	13.6	2	0.14 U
459	9/26/2001	PES	173	92	0-6	0.02 U	8410	3.1	55.1	0.15 U	12.9	10.4	2.2	0.15 U
479	9/26/2001	PES	173	92	sidewall	0.03 B	4430	2.4	25.6	0.49 B	7.4	30.2	0.59 B	0.17 U
443	9/17/2001	PES	173	148	0-6	0.02 B	14300	4.7	98.7	0.12 U	18.7	17.1	3.8	0.2 U
465	9/26/2001	PES	173	149	0-6	0.02 U	7710	1.2	38.6	0.14 U	8.9	10.6	2.2	0.14 U
463	9/26/2001	PES	173	150	0-6	0.04	11300	2.7	50.9	0.15 U	12.1	10.9	2.2	0.15 U

TABLE G-8
SWMU 13 MINE FILL B HISTORICAL METALS DATA
(mg/kg)

ANALYTE						MERCURY	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	SELENIUM	SILVER
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)									
478	9/26/2001	PES	173	150	sidewall	0.02 B	5440	3.2	40.3	0.14 U	10.7	7	0.81 B	0.14 U
467	9/26/2001	PES	173	151	0-6	0.02 U	12600	2.2	125	0.15 U	15.2	12.7	3.4	0.15 U
477	9/26/2001	PES	173	151	sidewall	0.02 B	8250	3.6	44.8	0.14 U	10.5	9.6	1.5 B	0.14 U
445	9/17/2001	PES	173	152	0-6	0.02 B	10300	3.2	157	0.14 B	14	23.3	3.1	0.19 U
469	9/26/2001	PES	173	155	0-6	0.02 B	12200	2.3	106	0.16 U	22.4	16.4	7.5	0.16 U
476	9/26/2001	PES	173	155	sidewall	0.03 B	18200	2.8	45.4	0.5 B	13.5	59.4	0.77 B	0.14 U
451	9/17/2001	PES	173	156	0-6	0.02 B	13700	4.5	123	0.13 U	15.8	14.8	4.6	0.22 U
449	9/17/2001	PES	173	157	0-6	0.02 B	13000	5.5	72	0.13 U	15.4	13.2	3.5	0.21 U
447	9/17/2001	PES	173	158	0-6	0.03 B	11100	3.7	94.1	0.12 U	17.6	18	7.4	0.2 U
437	8/29/2001	PES	173	159	0-6	0.0063 J	13800	3.9	58.6	0.23 U	15.4	12.5	0.57 U	0.57 U
439	8/29/2001	PES	173	160	0-6	0.0096 J	11600	4.6	62.2	0.23 U	13	17	0.51 J	0.57 U
473	9/26/2001	PES	173	161	0-6	0.03 B	10600	0.71 B	98.2	0.15 U	15.1	10.9	3.4	0.15 U
471	9/26/2001	PES	173	162	0-6	0.02 U	12500	1.7	86.8	0.15 U	13.3	11.3	2.9	0.15 U
475	9/26/2001	PES	173	162	sidewall	0.02 B	7450	4.6	29.6	0.16 U	10.3	13.4	2.1	0.16 U
21	9/3/1999	PES	173	58	0-6	0.0202 J	10400	11.5 U	70	0.574 U	12.5	15.5	22.9 U	1.15 U
23	9/3/1999	PES	173	59	0-6	0.0192 J	12400	8.83 J	71.6	0.568 U	18.9	16.8	22.7 U	1.14 U
25	9/3/1999	PES	173	60	0-6	0.0345 J	13100	7.81 J	78.5	0.569 U	16.4	15.2	22.8 U	1.14 U
27	9/3/1999	PES	173	61	0-6	0.0297 J	11300	9.52 J	61.4	0.538 U	21.4	16.8	21.5 U	1.08 U
13	9/2/1999	PES	173	63	0-6	0.00824 J	13200	10 J	62.1	0.542 U	24.1	16	21.7 U	1.08 U
15	9/2/1999	PES	173	64	0-6	0.016 J	12600	5.65 J	71.2	0.543 U	23.7	14.6	21.7 U	1.09 U
17	9/2/1999	PES	173	65	0-6	0.047 J	13000	11.7 U	77.9	0.587 U	16.5	16.4	23.5 U	1.17 U
1	8/23/1999	PES	173	76	0-6	0.058 J	15700	10.4 J	75.2	0.6 U	20.1	14	24.1 U	1.2 U
5	8/23/1999	PES	173	77	0-6	0.036 J	12900	11.3 U	83.4	0.57 U	16.3	15.4	22.7 U	1.1 U
9	8/23/1999	PES	173	78	0-6	0.026 J	13500	4.6 J	62.9	0.57 U	18.9	16.8	22.8 U	1.1 U
11	8/23/1999	PES	173	79	0-6	0.046 J	17700	10 J	73.4	0.58 U	21.2	15.9	23.2 U	1.2 U
79	9/24/1999	PES	173	79	0-6	0.049 J	18700	11.8 U	88.3	0.59 U	23.2	18.4	23.6 U	0.25 J
75	9/24/1999	PES	173	80	0-6	0.025 J	13400	11.8 U	86	0.59 U	16.7	14.8	23.6 U	1.2 U
81	9/24/1999	PES	173	81	0-6	0.036 J	15200	11.6 U	113	0.58 U	17	18.4	23.1 U	1.2 U
121	10/16/1999	PES	173	82	0-6	0.023 J	13000	8 J	87.6	0.6 U	15	15.9	24 U	1.2 U
77	9/24/1999	PES	173	83	0-6	0.04 J	15700	11.8 U	111	0.59 U	18.2	16.4	23.6 U	0.25 J
7	8/23/1999	PES	173	84	0-6	0.018 J	12300	12.5	53	0.59 U	19.1	10.6	23.5 U	1.2 U
755	10/31/2000	ICS	174	279	0-12	0.03 B	9840 E	4.5	70.5	0.09 B	13.2	25.7 B	0.47 U	0.32 U
758	10/31/2000	ICS	174	279	24-36	0.03 B	5280 E	3	30.9	0.06 U	6.4	10.5 B	0.43 U	0.3 U
759	11/1/2000	ICS	174	280	0-12	0.03 B	6820 E	4.6 N	46.1 EN	0.06 NU	11 N	10.4 NB	0.47 NU	0.33 NU
761	11/1/2000	ICS	174	280	24-36	0.03 B	8450 E	4.2 N	165 EN	0.06 NU	11.5 N	10.4 NB	0.45 NU	0.31 NU
762	11/1/2000	ICS	174	281	0-12	0.06	6640	5.8 N	70.2 EN	0.27 NB	9.6 N	16 NB	0.48 NU	0.33 NU
764	11/1/2000	ICS	174	281	24-36	0.07	8310	8 N	70.4 EN	0.43 NB	15.5 N	19.9 NB	0.47 NU	0.33 NU

* - relative percent difference exceeded laboratory window of 0 - 20%
B - indicates the compound is found in the associated blank
E - estimated because of the presence of interference
J - indicates an estimated value. The result is less than the sample quantitation limit but greater than zero.
N - spike recovery not within control limits of 75 - 125%
U - non-detect

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
MFBICS011	5/18/1998	ICS	165	2	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS014	5/18/1998	ICS	165	3	12	0.011 U	0.006 U	0.006 U	0.011 U	0.006 U	0.006 U
MFBICS017	5/19/1998	ICS	165	4	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS021	5/19/1998	ICS	165	5	12	0.013 U	0.006 U	0.006 U	0.013 U	0.006 U	0.006 U
MFBICS024	5/19/1998	ICS	165	6	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS027	5/19/1998	ICS	165	7	12	0.012 U	0.006 U	0.009	0.012 U	0.006 U	0.006 U
MFBICS031	5/19/1998	ICS	165	8	12	0.021	0.007 U	0.007 U	0.013 U	0.007 U	0.007 U
MFBICS034	5/19/1998	ICS	165	9	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS037	5/19/1998	ICS	165	10	12	0.014 U	0.007 U	0.007 U	0.014 U	0.007 U	0.007 U
MFBICS041	5/20/1998	ICS	165	11	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS043	5/20/1998	ICS	165	11	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS045	5/20/1998	ICS	165	12	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS048	5/20/1998	ICS	165	13	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS052	5/20/1998	ICS	165	14	12	0.012 U	0.006 U	0.009	0.012 U	0.006 U	0.006 U
MFBICS055	5/20/1998	ICS	165	15	12	0.013 U	0.006 U	0.005 J	0.013 U	0.006 U	0.006 U
MFBICS058	5/21/1998	ICS	165	16	12	0.012 U	0.006 U	0.018	0.012 U	0.006 U	0.006 U
MFBICS061	5/21/1998	ICS	165	17	12	0.012 U	0.006 U	0.018	0.012 U	0.006 U	0.006 U
MFBICS064	5/21/1998	ICS	165	18	12	0.012 U	0.006 U	0.019	0.012 U	0.006 U	0.006 U
MFBICS067	5/21/1998	ICS	165	19	12	0.012 U	0.006 U	0.017	0.012 U	0.006 U	0.006 U
MFBICS070	6/10/1998	ICS	165	20	12	0.065 J	0.005 U	0.008 U	0.011 U	0.005 U	0.005 U
MFBICS073	6/10/1998	ICS	165	21	12	0.026 J	0.005 U	0.01 U	0.011 U	0.005 U	0.005 U
MFBICS079	6/15/1998	ICS	165	23	12	0.007 U	0.007 U	0.007 U	0.014 U	0.007 U	0.007 U
MFBICS082	6/15/1998	ICS	165	24	12	0.017 U	0.008 U	0.008 U	0.017 U	0.008 U	0.008 U
MFBICS085	6/23/1998	ICS	165	94	12	0.016	0.006 U	0.006 U	0.013 U	0.006 U	0.006 U
MFBICS088	6/23/1998	ICS	165	95	12	0.005 J	0.006 U	0.006 U	0.013 U	0.006 U	0.006 U
MFBICS091	7/20/1998	ICS	165	96	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS094	7/21/1998	ICS	165	97	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS097	7/21/1998	ICS	165	98	12	0.013 U	0.006 U	0.006 U	0.013 U	0.006 U	0.006 U
MFBICS100	7/21/1998	ICS	165	99	12	0.014	0.007 U	0.007 U	0.014	0.007 U	0.007 U
MFBICS103	7/21/1998	ICS	165	100	12	0.012 U	0.006 U	0.006 U	0.012 U	0.006 U	0.006 U
MFBICS106	7/23/1998	ICS	165	101	12	0.009 U	0.005 U	0.005 U	0.01 U	0.005 U	0.005 U
MFBICS751	10/31/2000	ICS	165	277	12	0.043 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
MFBICS754	10/31/2000	ICS	165	278	12	0.007	0.006 U	0.004 BJ	0.006 U	0.006 U	0.006 U
MFBICS290	2/3/1999	ICS	166	112	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS437	7/8/1999	ICS	166	176	12	0.005 U	0.005 U	0.002 JB	0.005 U	0.005 U	0.005 U
MFBICS449	7/9/1999	ICS	166	179	12	0.005 U	0.005 U	0.01 JB	0.005 U	0.005 U	0.005 U
MFBICS452	7/9/1999	ICS	166	180	12	0.005 U	0.005 U	0.004 JB	0.005 U	0.005 U	0.005 U
MFBICS467	7/14/1999	ICS	166	182	12	0.009 U	0.009 U	0.002 JB	0.009 U	0.009 U	0.009 U
MFBICS470	7/14/1999	ICS	166	183	12	0.005 U	0.005 U	0.006 B	0.005 U	0.005 U	0.005 U
MFBICS573	9/22/1999	ICS	166	216	12	0.095 B	0.021	0.0054 U	0.0054 U	0.0054 U	0.0054 U
MFBICS581	9/27/1999	ICS	166	219	12	0.018 J	0.011 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U
MFBICS587	9/27/1999	ICS	166	221	12	0.033 B	0.011 U	0.0055 U	0.0055 U	0.0055 U	0.0055 U
MFBICS590	9/27/1999	ICS	166	222	12	0.022 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
MFBICS593	9/27/1999	ICS	166	223	12	0.038 B	0.011 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U
MFBICS596	9/27/1999	ICS	166	224	12	0.033 B	0.011 U	0.0053 U	0.0053 U	0.0053 U	0.0053 U
MFBICS611	9/28/1999	ICS	166	229	12	0.009 J	0.011 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
MFBICS614	9/28/1999	ICS	166	230	12	0.041 B	0.011 U	0.0055 U	0.0055 U	0.0055 U	0.0055 U
MFBICS632	10/1/1999	ICS	166	238	12	0.063 B	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
MFBICS647	10/12/1999	ICS	166	242	12	0.097 B	0.012 U	0.0058 U	0.0058 U	0.0011 J	0.0058 U
MFBICS650	10/12/1999	ICS	166	243	12	0.082 B	0.011 U	0.0057 U	0.0057 U	0.0042 J	0.0032 J
MFBICS656	10/12/1999	ICS	166	245	12	0.099 B	0.011 U	0.0057 U	0.0057 U	0.0014 J	0.0057 U
MFBICS675	10/19/1999	ICS	166	252	12	0.08	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS678	10/19/1999	ICS	166	253	12	0.018 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS681	10/19/1999	ICS	166	254	12	0.03	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS684	10/19/1999	ICS	166	255	12	0.042	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
MFBICS691	10/20/1999	ICS	166	257	12	0.056	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
MFBICS727	11/4/1999	ICS	166	269	12	0.027 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS730	11/4/1999	ICS	166	270	12	0.035 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS733	11/4/1999	ICS	166	271	12	0.044 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
MFBICS736	11/4/1999	ICS	166	272	12	0.035 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS742	1/26/2000	ICS	166	273	12	0.081 B	0.013 U	0.0067 U	0.0067 U	0.0067 U	0.0067 U
MFBICS745	1/26/2000	ICS	166	274	12	0.032 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS745	1/26/2000	ICS	166	274	12	0.043 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
267	2/17/2000	PES	166	102	6	0.025 U	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
317	3/8/2000	PES	166	103	6	0.022 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
281	3/1/2000	PES	166	106	6	0.057	0.056	0.0059 U	0.0059 U	0.0059 U	0.0059 U
237	1/8/2000	PES	166	107	6	0.035	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
269	2/17/2000	PES	166	113	6	0.0078 J	0.013 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U
319	3/8/2000	PES	166	115	6	0.038 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
283	3/1/2000	PES	166	118	6	0.012 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
265	2/17/2000	PES	166	120	6	0.025 U	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
245	1/19/2000	PES	166	121	6	0.014 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
247	1/25/2000	PES	166	177	6	0.018 JB	0.013 U	0.0064 U	0.0064 U	0.0064 U	0.0064 U
241	1/19/2000	PES	166	181	6	0.0065 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
289	3/2/2000	PES	166	215	6	0.02 J	0.013 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U
243	1/19/2000	PES	166	220	6	0.014 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
271	3/1/2000	PES	166	225	6	0.014 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
277	3/1/2000	PES	166	226	6	0.012 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
333	3/8/2000	PES	166	227	6	0.025 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
327	3/8/2000	PES	166	228	0-6	0.011 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
239	1/19/2000	PES	166	231	6	0.0074 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
335	3/8/2000	PES	166	244	6	0.15 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
293	3/2/2000	PES	166	246	6	0.019 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
339	3/10/2000	PES	166	256	6	0.0087 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
348	5/18/2000	PES	166	276	6	0.02 J	0.0095 J	0.0062 U	0.0062 U	0.0062 U	0.0062 U
311	3/7/2000	PES	166	113/112	sidewall	0.051 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
313	3/7/2000	PES	166	113/179	sidewall	0.042 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
315	3/7/2000	PES	166	113/180	sidewall	0.079 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
321	3/8/2000	PES	166	115/182	sidewall	0.012 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
323	3/8/2000	PES	166	115/183	sidewall	0.027 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
325	3/8/2000	PES	166	115/229	sidewall	0.017 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
287	3/1/2000	PES	166	118/216	sidewall	0.011 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
285	3/1/2000	PES	166	118/223	sidewall	0.0078 J	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
299	3/2/2000	PES	166	118/224	sidewall	0.037	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
309	3/7/2000	PES	166	120/176	sidewall	0.0085 J	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
307	3/7/2000	PES	166	120/238	sidewall	0.011 J	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
257	1/26/2000	PES	166	121/221	sidewall	0.021 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
259	1/26/2000	PES	166	177/176	sidewall	0.019 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
263	2/17/2000	PES	166	177/219	sidewall	0.0072 JB	0.014 U	0.0069 U	0.0069 U	0.0069 U	0.0069 U
253	1/25/2000	PES	166	181/121	sidewall	0.023 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
251	1/25/2000	PES	166	181/220	sidewall	0.045 B	0.014 U	0.0072 U	0.0072 U	0.0018 J	0.0017 J
249	1/25/2000	PES	166	181/231	sidewall	0.026 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
291	3/2/2000	PES	166	215/216	sidewall	0.02 J	0.013 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U
255	1/26/2000	PES	166	220/221	sidewall	0.026 B	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
305	3/7/2000	PES	166	220/273	sidewall	0.035 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
273	3/1/2000	PES	166	225/224	sidewall	0.018 J	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
275	3/1/2000	PES	166	225/242	sidewall	0.013 J	0.013 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U
279	3/1/2000	PES	166	226/243	sidewall	0.012 J	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
329	3/8/2000	PES	166	228/229	sidewall	0.024 U	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
331	3/8/2000	PES	166	228/245	sidewall	0.094 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
303	3/7/2000	PES	166	231/273	sidewall	0.024 U	0.012 U	0.0059 U	0.0059 U	0.0027 J	0.0059 U
301	3/7/2000	PES	166	231/road	sidewall	0.12 B	0.013 U	0.0066 U	0.0066 U	0.0016 J	0.0066 U
337	3/8/2000	PES	166	244/243	sidewall	0.064 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
297	3/2/2000	PES	166	246/252	sidewall	0.022 J	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
295	3/2/2000	PES	166	246/253	sidewall	0.015 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
341	3/10/2000	PES	166	256/257	sidewall	0.037	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
345	3/10/2000	PES	166	256/269	sidewall	0.011 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
343	3/10/2000	PES	166	256/271	sidewall	0.01 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
MFBICS461	7/13/1999	ICS	168	33	12	0.005 U	0.005 U	0.011 B	0.005 U	0.005 U	0.005 U
MFBICS157	11/23/1998	ICS	168	39	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS249	1/26/1999	ICS	168	140	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS527	9/9/1999	ICS	168	201	12	0.0207 J	0.00726 J	0.00608 U	0.00608 U	0.00608 U	0.00608 U
MFBICS530	9/9/1999	ICS	168	202	12	0.0167 J	0.0121 U	0.00605 U	0.00605 U	0.00605 U	0.00605 U
MFBICS533	9/9/1999	ICS	168	203	12	0.0126 J	0.0111 U	0.00555 U	0.00555 U	0.00555 U	0.00555 U
MFBICS567	9/22/1999	ICS	168	214	12	0.086 B	0.0099 J	0.0054 U	0.0054 U	0.0054 U	0.0054 U
MFBICS641	10/18/1999	ICS	168	240	12	0.104 B	0.0119 U	0.00596 U	0.00596 U	0.00707	0.00476 J
MFBICS644	10/18/1999	ICS	168	241	12	1.23 U	0.616 U	0.308 U	0.308 U	0.308 U	0.308 U
MFBICS127	11/16/1998	ICS	168	40	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS124	11/16/1998	ICS	168	41	12	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
MFBICS154	11/23/1998	ICS	168	42	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS151	11/23/1998	ICS	168	43	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS148	11/23/1998	ICS	168	44	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS145	11/18/1998	ICS	168	45	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS142	11/18/1998	ICS	168	46	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS139	11/18/1998	ICS	168	47	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS136	11/18/1998	ICS	168	48	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS133	11/16/1998	ICS	168	49	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS130	11/16/1998	ICS	168	50	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
202	11/8/1999	PES	168	25	6	0.043 B	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
090	10/4/1999	PES	168	26	6	0.048 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
088	10/4/1999	PES	168	27	6	0.035 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
194	11/8/1999	PES	168	28	6	0.034 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
190	11/8/1999	PES	168	29	6	0.059 B	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
188	11/8/1999	PES	168	30	6	0.03 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
186	11/2/1999	PES	168	31	6	0.032 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
184	11/2/1999	PES	168	32	6	0.021 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
200	11/8/1999	PES	168	35	6	0.13 B	0.016 U	0.008 U	0.008 U	0.008 U	0.008 U
198	11/8/1999	PES	168	36	6	0.091 B	0.015 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U
196	11/8/1999	PES	168	37	6	0.04 B	0.016 U	0.008 U	0.008 U	0.008 U	0.008 U
192	11/8/1999	PES	168	38	6	0.015 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
204	11/8/1999	PES	168	28/27	sidewall	0.052 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
235	11/9/1999	PES	168	29/39	sidewall	0.18	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
229	11/9/1999	PES	168	31/241	sidewall	0.14	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
227	11/9/1999	PES	168	32/240	sidewall	0.1	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
225	11/9/1999	PES	168	32/33	sidewall	0.085	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
219	11/9/1999	PES	168	35/203	sidewall	0.096	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
223	11/9/1999	PES	168	35/214	sidewall	0.024 U	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
221	11/9/1999	PES	168	35/26	sidewall	0.024 U	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
208	11/8/1999	PES	168	36/202	sidewall	0.038 B	0.014 U	0.0069 U	0.0069 U	0.0069 U	0.0069 U
210	11/8/1999	PES	168	36/27	sidewall	laboratory failed to report VOC data for this sample					
206	11/8/1999	PES	168	37/201	sidewall	0.051 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
231	11/9/1999	PES	168	38/140	sidewall	0.085	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
233	11/9/1999	PES	168	38/39	sidewall	0.098	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS246	1/26/1999	ICS	171	123	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS260	1/27/1999	ICS	171	125	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS257	1/27/1999	ICS	171	127	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS304	2/9/1999	ICS	171	129	12	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U	0.008 U
MFBICS307	2/17/1999	ICS	171	130	12	0.008	0.008	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS313	2/17/1999	ICS	171	132	12	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS318	2/25/1999	ICS	171	133	12	0.009 U	0.009 U	0.035	0.006 U	0.006 U	0.006 U
MFBICS323	3/1/1999	ICS	171	135	12	0.004 U	0.004 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS431	7/7/1999	ICS	171	173	12	0.006 U	0.006 U	0.001 JB	0.006 U	0.006 U	0.006 U
MFBICS434	7/7/1999	ICS	171	174	12	0.085	0.085	0.002 JB	0.005 U	0.005 U	0.005 U
MFBICS443	7/8/1999	ICS	171	175	12	0.004 U	0.004 U	0.002 JB	0.004 U	0.004 U	0.004 U
MFBICS476	7/15/1999	ICS	171	184	12	0.005 U	0.005 U	0.01 JB	0.005 U	0.005 U	0.005 U
MFBICS545	9/15/1999	ICS	171	206	12	0.0242	0.0242	0.00575 U	0.00575 U	0.00435 J	0.00575 U
MFBICS562	9/22/1999	ICS	171	212	12	0.022 U	0.022 U	0.0054 U	0.0054 U	0.0036 J	0.0054 U
MFBICS578	9/24/1999	ICS	171	218	12	0.022 U	0.022 U	0.0055 U	0.0055 U	0.0027 J	0.0055 U
MFBICS622	9/30/1999	ICS	171	233	12	0.022 U	0.022 U	0.0055 U	0.0055 U	0.0041 J	0.0033 J
MFBICS624	9/30/1999	ICS	171	234	12	0.024 U	0.024 U	0.0061 U	0.0061 U	0.0065	0.0041 J
MFBICS635	10/1/1999	ICS	171	239	12	0.014 J	0.014 J	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS665	10/12/1999	ICS	171	248	12	0.065 B	0.065 B	0.0066 U	0.0066 U	0.0066 U	0.0066 U
MFBICS694	10/21/1999	ICS	171	258	12	0.058	0.058	0.0058 U	0.0058 U	0.0076	0.0019 J
MFBICS697	10/21/1999	ICS	171	259	12	0.025	0.025	0.0057 U	0.0057 U	0.0047 J	0.0053 J
MFBICS700	10/21/1999	ICS	171	260	12	0.021 J	0.021 J	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS703	10/21/1999	ICS	171	261	12	0.033	0.033	0.0056 U	0.0056 U	0.0056 U	0.0056 U
372	6/2/2000	PES	171	122	6	0.012 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
374	6/2/2000	PES	171	123	6	0.01 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
376	6/2/2000	PES	171	124	6	0.15 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
406	7/18/2000	PES	171	126	6	0.064 B	0.008 J	0.0063 U	0.0063 U	0.0063 U	0.0063 U
350	6/1/2000	PES	171	128	6	0.14 B	0.0064 J	0.0058 U	0.0058 U	0.0058 U	0.0058 U
378	6/2/2000	PES	171	131	6	0.13 B	0.011 J	0.0059 U	0.0059 U	0.0059 U	0.0059 U
398	7/18/2000	PES	171	134	6	0.029 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
408	7/18/2000	PES	171	136	6	0.048 B	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
362	6/1/2000	PES	171	137	6	0.02 JB	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
354	6/1/2000	PES	171	138	6	0.16 B	0.012	0.0058 U	0.0058 U	0.0058 U	0.0058 U
412	7/18/2000	PES	171	178	6	0.12 B	0.016 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
394	7/18/2000	PES	171	185	6	0.017 JB	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
388	7/18/2000	PES	171	217	6	0.19 B	0.011 J	0.0058 U	0.0058 U	0.0058 U	0.0058 U
386	6/2/2000	PES	171	122/129	sidewall	0.11 B	0.02	0.006 U	0.006 U	0.006 U	0.006 U
352	6/1/2000	PES	171	128/127	sidewall	0.034 B	0.0084 J	0.0061 U	0.0061 U	0.0061 U	0.0061 U
384	6/2/2000	PES	171	131/130	sidewall	0.028 B	0.006 J	0.0058 U	0.0058 U	0.0058 U	0.0058 U
382	6/2/2000	PES	171	131/174	sidewall	0.058 B	0.0088 J	0.006 U	0.006 U	0.006 U	0.006 U
380	6/2/2000	PES	171	131/175	sidewall	0.024 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
404	7/18/2000	PES	171	134/133	sidewall	0.037 B	0.015 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
402	7/18/2000	PES	171	134/135	sidewall	0.087 B	0.012 J	0.0063 U	0.0063 U	0.0063 U	0.0063 U
400	7/18/2000	PES	171	134/184	sidewall	0.06 B	0.007 J	0.0068 U	0.0068 U	0.0068 U	0.0068 U
410	7/18/2000	PES	171	136/135	sidewall	0.096 B	0.014 J	0.0082 U	0.0082 U	0.0082 U	0.0082 U
370	6/1/2000	PES	171	137/127	sidewall	0.026 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
368	6/1/2000	PES	171	137/239	sidewall	0.14 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
364	6/1/2000	PES	171	137/258	sidewall	0.034 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
366	6/1/2000	PES	171	137/260	sidewall	0.019 JB	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
356	6/1/2000	PES	171	138/127	sidewall	0.092 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
360	6/1/2000	PES	171	138/173	sidewall	0.042 B	0.01 J	0.006 U	0.006 U	0.0021 J	0.006 U
358	6/1/2000	PES	171	138/239	sidewall	0.3 B	0.013 U	0.0065 U	0.0065 U	0.0065 U	0.0065 U
396	7/18/2000	PES	171	185/184	sidewall	0.042 B	0.0063 J	0.0058 U	0.0058 U	0.0058 U	0.0058 U
392	7/18/2000	PES	171	217/133	sidewall	0.083 B	0.014	0.006 U	0.006 U	0.006 U	0.006 U
390	7/18/2000	PES	171	217/233	sidewall	0.063 B	0.0063 J	0.0058 U	0.0058 U	0.0014 J	0.0058 U
MFBICS178	12/1/1998	ICS	173	51	12	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U	0.014
MFBICS181	12/2/1998	ICS	173	52	12	0.009 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS184	12/8/1998	ICS	173	53	12	0.018	0.005 J	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS237	12/29/1998	ICS	173	62	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS413	6/30/1999	ICS	173	147	12	0.0051	0.005 U	0.01 B	0.005 U	0.005 U	0.005 U
MFBICS419	6/30/1999	ICS	173	169	12	0.005 U	0.005 U	0.01 B	0.005 U	0.005 U	0.005 U
MFBICS509	8/26/1999	ICS	173	194	12	0.0191 JB	0.0114 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
MFBICS539	9/14/1999	ICS	173	195	12	0.148	0.0259	0.00571 U	0.00571 U	0.00571 U	0.00571 U
MFBICS512	9/8/1999	ICS	173	196	12	0.0134 J	0.00892 J	0.0058 U	0.0058 U	0.0058 U	0.0058 U
MFBICS518	9/8/1999	ICS	173	197	12	0.00633 J	0.011 U	0.00552 U	0.00552 U	0.00552 U	0.00552 U
MFBICS515	9/8/1999	ICS	173	198	12	0.00952 J	0.011 U	0.00549 U	0.00549 U	0.00549 U	0.00549 U
MFBICS550	9/22/1999	ICS	173	208	12	0.023 U	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
MFBICS553	9/22/1999	ICS	173	209	12	0.041 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
MFBICS564	9/22/1999	ICS	173	213	12	0.022 J	0.0064 J	0.0062 U	0.0062 U	0.0062 U	0.0062 U
MFBICS619	9/30/1999	ICS	173	232	12	0.17 B	0.013 U	0.0063 U	0.0063 U	0.0095	0.0059 J
MFBICS626	9/30/1999	ICS	173	235	12	0.11 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
MFBICS662	10/12/1999	ICS	173	247	12	0.1 B	0.012 U	0.0062 U	0.0062 U	0.0011 J	0.0062 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
MFBICS670	10/18/1999	ICS	173	250	12	0.0171 J	0.0118 U	0.00591 U	0.00591 U	0.00591 U	0.00591 U
MFBICS709	10/26/1999	ICS	173	263	12	0.056	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
MFBICS712	10/26/1999	ICS	173	264	12	0.13 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
MFBICS715	11/3/1999	ICS	173	265	12	0.06 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
MFBICS718	11/3/1999	ICS	173	266	12	0.039 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
MFBICS721	11/3/1999	ICS	173	267	12	0.026 B	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
MFBICS724	11/3/1999	ICS	173	268	12	0.054 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
134	10/22/1999	PES	173	54	6	0.09	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
136	10/22/1999	PES	173	55	6	0.028	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
110	10/15/1999	PES	173	56	6	0.039 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
120	10/15/1999	PES	173	57	6	0.0475 B	0.0123 U	0.00616 U	0.00616 U	0.00616 U	0.00616 U
022	9/3/1999	PES	173	58	6	0.0514	0.012 U	0.00598 U	0.00598 U	0.00598 U	0.00598 U
024	9/3/1999	PES	173	59	6	0.0228 J	0.0116 U	0.00579 U	0.00579 U	0.00579 U	0.00579 U
026	9/3/1999	PES	173	60	6	0.0309	0.0116 U	0.00581 U	0.00581 U	0.00581 U	0.00581 U
028	9/3/1999	PES	173	61	6	0.0241 U	0.012 U	0.00602 U	0.00602 U	0.00602 U	0.00602 U
014	9/2/1999	PES	173	63	6	0.0218 U	0.0109 U	0.00545 U	0.00545 U	0.00545 U	0.00545 U
016	9/2/1999	PES	173	64	6	0.0213 U	0.0107 U	0.00533 U	0.00533 U	0.00533 U	0.00533 U
018	9/2/1999	PES	173	65	6	0.0199 J	0.0122 U	0.00609 U	0.00609 U	0.00609 U	0.00609 U
112	10/15/1999	PES	173	66	6	0.018 J	0.012 U	0.0062 U	0.0062 U	0.011	0.0064
114	10/15/1999	PES	173	67	6	0.018 J	0.013 U	0.0064 U	0.0064 U	0.0064 U	0.0064 U
418	8/28/2000	PES	173	68	6	0.011 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
422	8/28/2000	PES	173	69	6	0.012 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
424	8/28/2000	PES	173	69	sidewall	0.32 B	0.059 U	0.029 U	0.029 U	0.029 U	0.029 U
428	8/28/2000	PES	173	70	6	0.014 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
430	8/28/2000	PES	173	70	sidewall	0.26 B	0.058 U	0.029 U	0.029 U	0.029 U	0.029 U
426	8/28/2000	PES	173	71	6	0.019 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
436	8/29/2001	PES	173	72	6	0.012 U	0.012 U	0.012 U	0.012 U	5.9 U	0.006 U
434	8/29/2001	PES	173	73	6	0.012 B	0.012 U	0.012 U	0.012 U	6 U	0.006 U
432	8/29/2001	PES	173	74	6	0.01 JB	0.012 U	0.012 U	0.012 U	6.2 U	0.006 U
480	9/26/2001	PES	173	74	sidewall	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U
004	8/23/1999	PES	173	75	6	0.085 B	0.017 B	0.0057 U	0.0057 U	0.0057 U	0.0057 U
002	8/23/1999	PES	173	76	6	0.02 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
006	8/23/1999	PES	173	77	6	0.052 B	0.012 B	0.0058 U	0.0058 U	0.0058 U	0.0058 U
010	8/23/1999	PES	173	78	6	0.049 B	0.0087 J	0.0059 U	0.0059 U	0.0059 U	0.0059 U
030	9/3/1999	PES	173	79	6	0.0233 J	0.0122 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
080	9/24/1999	PES	173	79	6	0.032 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
076	9/24/1999	PES	173	80	6	0.02 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
082	9/24/1999	PES	173	81	6	0.022 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
122	10/16/1999	PES	173	82	6	0.028 B	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
078	9/24/1999	PES	173	83	6	0.043 B	0.012 U	0.0058 U	0.0058 U	0.0054 J	0.0058 U
008	8/23/1999	PES	173	84	6	0.013 J	0.011 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U
454	9/26/2001	PES	173	85	6	0.006	0.005 U	0.013 B	0.005 U	0.005 U	0.005 U
456	9/26/2001	PES	173	86	6	0.043	0.005 U	0.012 B	0.005 U	0.005 U	0.005 U
458	9/26/2001	PES	173	87	6	0.005 U	0.005 U	0.01 B	0.005 U	0.005 U	0.005 U
420	8/28/2000	PES	173	88	6	0.014 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
414	8/28/2000	PES	173	89	6	0.018 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
442	9/17/2001	PES	173	90	6	0.037	0.004 U	0.004 U	0.004 U	4 U	0.004 U
462	9/26/2001	PES	173	91	6	0.006 U	0.006 U	0.012 B	0.006 U	0.006 U	0.006 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
460	9/26/2001	PES	173	92	6	0.005 U	0.005 U	0.008 B	0.005 U	0.005 U	0.005 U
479	9/26/2001	PES	173	92	sidewall	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
064	9/21/1999	PES	173	93	6	0.025 U	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
126	10/16/1999	PES	173	139	6	0.044 B	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
138	10/26/1999	PES	173	141	6	0.074	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
066	9/21/1999	PES	173	142	6	0.014 J	0.011 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U
044	9/20/1999	PES	173	143	6	0.012 J	0.0077 J	0.0056 U	0.0056 U	0.0056 U	0.0056 U
416	8/28/2000	PES	173	144	6	0.009 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
116	10/15/1999	PES	173	145	6	0.031 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
108	10/15/1999	PES	173	146	6	0.061 B	0.013 U	0.0064 U	0.0064 U	0.0064 U	0.0064 U
444	9/17/2001	PES	173	148	6	0.005 U	0.005 U	0.005 U	0.005 U	5 U	0.005 U
466	9/26/2001	PES	173	149	6	0.006	0.005 U	0.012 B	0.005 U	0.005 U	0.005 U
464	9/26/2001	PES	173	150	6	0.38 E	0.005 U	0.011 B	0.005 U	0.005 U	0.6 U
478	9/26/2001	PES	173	150	sidewall	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
468	9/26/2001	PES	173	151	6	0.005	0.005 U	0.011 B	0.005 U	0.005 U	0.005 U
477	9/26/2001	PES	173	151	sidewall	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U
446	9/17/2001	PES	173	152	6	0.02	0.005 U	0.005 U	0.005 U	5 U	0.005 U
118	10/15/1999	PES	173	153	6	0.0245 U	0.0122 U	0.00612 U	0.00612 U	0.00612 U	0.00612 U
106	10/15/1999	PES	173	154	6	0.024 U	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
470	9/26/2001	PES	173	155	6	0.007	0.005 U	0.01 B	0.005 U	0.005 U	0.005 U
476	9/26/2001	PES	173	155	sidewall	0.004 U	0.004 U	0.013 B	0.004 U	0.001 J	0.004 U
452	9/17/2001	PES	173	156	6	0.069	0.005 U	0.005 U	0.005 U	5 U	0.005 U
450	9/17/2001	PES	173	157	6	0.016	0.004 U	0.004 U	0.004 U	4 U	0.004 U
448	9/17/2001	PES	173	158	6	0.005 U	0.005 U	0.005 U	0.005 U	5 U	0.005 U
438	8/29/2001	PES	173	159	6	0.006 JB	0.011 U	0.011 U	0.011 U	5.7 U	0.006 U
440	8/29/2001	PES	173	160	6	0.007 JB	0.011 U	0.011 U	0.011 U	5.7 U	0.006 U
474	9/26/2001	PES	173	161	6	0.006 U	0.006 U	0.011 B	0.006 U	0.006 U	0.012
472	9/26/2001	PES	173	162	6	0.005	0.005 U	0.009 B	0.005 U	0.005 U	0.81 U
475	9/26/2001	PES	173	162	sidewall	0.005	0.005 U	0.01 B	0.005 U	0.005 U	0.001 J
056	9/21/1999	PES	173	163	6	0.039 B	0.015 B	0.0054 U	0.0054 U	0.0054 U	0.0054 U
040	9/20/1999	PES	173	164	6	0.011 J	0.0061 J	0.0056 U	0.0056 U	0.0056 U	0.0056 U
052	9/21/1999	PES	173	165	6	0.021 J	0.011 J	0.006 U	0.006 U	0.006 U	0.006 U
050	9/21/1999	PES	173	166	6	15 B	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
038	9/20/1999	PES	173	167	6	0.0071 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
092	10/5/1999	PES	173	168	6	0.018 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
072	9/21/1999	PES	173	170	6	0.024 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
104	10/15/1999	PES	173	171	6	0.014 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
062	9/21/1999	PES	173	172	6	0.0094 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
042	9/20/1999	PES	173	186	6	0.032 B	0.012 B	0.0056 U	0.0056 U	0.0056 U	0.0056 U
046	9/20/1999	PES	173	187	6	0.016 J	0.0099 J	0.0065 U	0.0065 U	0.0065 U	0.0065 U
054	9/21/1999	PES	173	188	6	0.017 J	0.014 B	0.0058 U	0.0058 U	0.0058 U	0.0058 U
048	9/21/1999	PES	173	189	6	0.0095 J	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
058	9/21/1999	PES	173	190	6	0.044 B	0.0087 J	0.0056 U	0.0056 U	0.0056 U	0.0056 U
060	9/21/1999	PES	173	191	6	0.024 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
100	10/14/1999	PES	173	192	6	0.024 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
102	10/14/1999	PES	173	193	6	0.028 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
036	9/20/1999	PES	173	199	6	0.011 J	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
034	9/20/1999	PES	173	200	6	0.014 J	0.012 B	0.0061 U	0.0061 U	0.0061 U	0.0061 U

TABLE G-9
SWMU 13 MINE FILL B HISTORICAL
VOLATILE ORGANIC COMPOUND DATA
(mg/kg)

ANALYTE						ACETONE	MEK	METH. CHL.	MIBK	TOLUENE	XYLENES
MFB ICS OR PES #	Sample Date	Analysis	Building #	Grid #	Depth (in.)						
094	10/5/1999	PES	173	204	6	0.058 B	0.013 U	0.0063 U	0.0063 U	0.0063 U	0.0063 U
098	10/14/1999	PES	173	205	6	0.01 J	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
096	10/14/1999	PES	173	207	6	0.022 J	0.012 U	0.006 U	0.006 U	0.0021 J	0.006 U
124	10/16/1999	PES	173	210	6	0.12	0.013 U	0.0067 U	0.0067 U	0.0049 J	0.0062 J
128	10/16/1999	PES	173	211	6	0.023 J	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
132	10/19/1999	PES	173	236	6	0.016 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
130	10/19/1999	PES	173	237	6	0.017 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
142	10/26/1999	PES	173	249	6	0.056	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
140	10/26/1999	PES	173	251	6	0.076	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
215	11/9/1999	PES	173	262	6	0.025 U	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
178	11/2/1999	PES	173	141/147	sidewall	0.077 B	0.012 U	0.0014 J	0.0059 U	0.0059 U	0.0059 U
176	11/2/1999	PES	173	141/169	sidewall	0.03 B	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
174	11/1/1999	PES	173	168/169	sidewall	0.078	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
144	10/28/1999	PES	173	186/194	sidewall	0.031 B	0.012 U	0.0021 J	0.0061 U	0.0024 J	0.0041 J
146	10/28/1999	PES	173	187/196	sidewall	0.021 J	0.012 U	0.0059 U	0.0059 U	0.0059 U	0.0059 U
154	10/29/1999	PES	173	187/197	sidewall	0.022 J	0.013 U	0.0019 J	0.0063 U	0.0014 J	0.0063 U
156	10/29/1999	PES	173	188/197	sidewall	0.062	0.013 U	0.0063 U	0.0063 U	0.001 J	1.3
158	10/29/1999	PES	173	188/198	sidewall	0.019 J	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
160	11/1/1999	PES	173	199/198	sidewall	0.1 B	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
162	11/1/1999	PES	173	205/198	sidewall	0.026	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
164	11/1/1999	PES	173	207/208	sidewall	0.023 U	0.012 U	0.0058 U	0.0058 U	0.0058 U	0.0058 U
213	11/9/1999	PES	173	207/209	sidewall	0.028 U	0.014 U	0.0069 U	0.0069 U	0.0069 U	0.0069 U
172	11/1/1999	PES	173	210/169	sidewall	0.059	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
168	11/1/1999	PES	173	210/235	sidewall	0.095 B	0.013 U	0.0064 U	0.0064 U	0.0064 U	0.0064 U
170	11/1/1999	PES	173	210/247	sidewall	0.072	0.012 U	0.0062 U	0.0062 U	0.0062 U	0.0062 U
166	11/1/1999	PES	173	211/235	sidewall	0.037	0.012 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U
150	10/28/1999	PES	173	236/250	sidewall	0.04 B	0.011 U	0.0057 U	0.0057 U	0.0057 U	0.0057 U
148	10/28/1999	PES	173	249/250	sidewall	0.013 J	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
152	10/28/1999	PES	173	251/235	sidewall	0.023 U	0.011 U	0.0056 U	0.0056 U	0.0056 U	0.0056 U
217	11/9/1999	PES	173	251/264	sidewall	0.029 U	0.015 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
180	11/2/1999	PES	173	54/147	sidewall	0.04 B	0.012 U	0.006 U	0.006 U	0.006 U	0.006 U
182	11/2/1999	PES	173	54/53	sidewall	0.037 B	0.013 U	0.0065 U	0.0065 U	0.0065 U	0.0065 U
MFBICS756	11/2/2000	ICS	174	279	12	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
MFBICS757	10/31/2000	ICS	174	279	18	0.02	0.005 U	0.002 J	0.005 U	0.005 U	0.077
MFBICS760	11/1/2000	ICS	174	280	12	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U
MFBICS763	11/1/2000	ICS	174	281	12	0.032	0.006 U	0.002 J	0.006 U	0.03	0.006 U

APPENDIX H

ANALYTICAL DATA QUALITY REVIEW

APPENDIX H DATA QUALITY REVIEW AND DATA REDUCTION METHODS

This section contains a description of the data review processes used to determine whether analytical laboratory data were of acceptable technical quality for use in decision making. The review began with data validation, which is a comparison of data quality indicators (DQIs) against prescribed acceptance criteria. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. The output of this review was a set of alphabetic flags such as "U," "J," "R," or combinations thereof, that may have been assigned to individual results based on the validation effort. These flags were used to infer the general quality of the data. The data validation was followed by a summary of quantitative data quality measures to provide the user with a more quantitative estimate of any bias or imprecision associated with the data. Also evaluated were the measures of data completeness, sensitivity, comparability and representativeness.

Sections H.1 and H.2 provide an overview of the data validation process, Sections H.3 and H.4 present an evaluation of the data quality beyond data validation. Appendix G contains all the qualified data and the associated reasons for the data qualifications.

H.1 DATA VALIDATION PROCESS

Samples were collected by TolTest during recent bioremediation efforts conducted at Mine Fill B (SWMU 13) (TolTest, 2002). Soil was excavated from explosives-contaminated areas of the Mine Fill, then composted to reduce the concentrations of explosives in the soil. Thousands of samples were collected and analyzed. Analyses included primarily explosives but, in several cases, metals or other parameters were measured. Initial characterization samples (ICSs) were collected prior to excavation. These samples were used to identify areas that had explosives concentrations in excess of applicable screening levels. After excavation, post-excavation samples (PESs) were collected from sidewalls and floors of the excavations to verify that the extent of excavation was adequate. The excavated soil was composted in windrows at the NSWC bioremediation facility. During composting, chemical concentrations of the compost were monitored. When the explosives concentrations had decreased to acceptable levels, a final round of compost sampling was conducted to characterize the explosives concentrations. The treated soil was eventually returned to the excavations.

QC samples such as matrix spikes and spike duplicates, laboratory control samples and their duplicates, and laboratory blanks were also analyzed. The compost sample data and the QC data generated during

these bioremediation efforts are referred to as composting data in this report. Additional details of the composting operation and associated data are provided elsewhere (TolTest, 2002).

One laboratory, Southwest Laboratory of Oklahoma, conducted most of the analyses for the composting operations. The data from Mine Fill B soil composting were supplied to TtNUS primarily in electronic format. This made possible the summarization of a variety of quality characteristics that demonstrate the composting data to be of sufficient quality to support the composting operation, as well as human health and ecological risk assessments described in this RFI report. Whereas a detailed data quality review and summary of MFB data are provided in this section, a brief data quality summary is also provided in the Mine Fill B Interim Measures Report (TolTest, 2002).

Field and laboratory data were generated by TtNUS in conjunction with the recent RFI. The RFI field activities are described in Section 2.0 of this RFI report text. The resulting data are referred to as Round1 (earliest), Round2, and Round 3 (most recent) data. The following table shows various data sets and how the data are, or have been, being used.

Data Type	Data Use
Composting Data	• Composting operation monitoring • RFI (risk assessments and determining nature and extent of contamination)
RFI Data, Round 1	• RFI (risk assessments and determining nature and extent of contamination)
RFI Data, Round 2	• RFI (risk assessments and determining nature and extent of contamination)
RFI Data, Round 3	• RFI (risk assessments and determining nature and extent of contamination)

Field analytical data and sampling location coordinates for Rounds 1 through 3 were reviewed both in the field and after completing the field event to assure data users that the results and sampling location coordinates were accurate. Calibration logs and QC check sample results were reviewed for accuracy. In addition, field data were reviewed for comparability among sampling locations and consistency with theoretical expectations. For example, low pH values would not be expected if alkalinity values were high. These evaluations were based, in part, on professional judgment. Well stabilization parameters were required to represent stable sampling conditions (manifested as reproducible measurements) prior to sample collection but were not required to compare well to field test kit results.

Results generated for the composting operation were validated independently of TtNUS (TolTest, 2002). All of the TtNUS results from analytical laboratory samples (Rounds 1 through 3) were validated by TtNUS according to several specifications. Assignment of data qualification flags by TtNUS conformed to U.S. EPA Region 5 Standard Operating Procedures for Validation of Contract Laboratory Program Organic Data (U.S. EPA, 1993c); to Region 5 Standard Operating Procedures for Validation of Contract

Laboratory Program Inorganic Data (U.S. EPA, 1993d); to the U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (U.S. EPA, 1994a); and to U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (U.S. EPA, 1994b) to the greatest extent practicable for non-contract laboratory program data.

Data validation specifications require that various data qualifiers be assigned when a deficiency is detected or when a result is less than its detection limit. If no qualifier is assigned to a result that has been validated, the data user is assured that no technical deficiencies were identified during validation. The qualification flags used are defined below:

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

UR – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration non-compliances, and extremely low analyte recoveries).

R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

BU - Indicates that the associated organic chemical was detected in this sample as well as the associated laboratory method blank, but has been qualified as non-detected because the concentration was less than the blank level adjusted for uncertainties (i.e., the blank action level) per the validation guidelines.

BJ - Indicates that the associated organic chemical was detected in this sample as well as the associated method blank and rather than being considered a non-detect, is considered to be an estimate because the concentration is in excess of the blank action level. The use of "B" qualifiers is a U.S. EPA Region 5-specific requirement.

> - Indicates that the true value is probably greater than the reported value. This "qualifier flag" is used to identify reported values that exceed the calibration range of field measurements but could not be re-analyzed for various reasons.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with UR or R data validation qualifiers. These data are considered invalid and are not used for decision making purposes unless they are used in a qualitative way and the use is justified and documented. Minor problems are defined as issues resulting in the estimation of data, and qualification with U, J, B, BJ, BU, and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. It is noteworthy that a U qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the U qualifier regardless of whether a quality deficiency has been detected.

H.2 DATA VALIDATION OUTPUTS

After data were validated, a list was developed of non-conformities requiring data qualifier flags that were used to alert the data user to inaccurate or imprecise data. For situations in which several QC criteria were out of specification, the data validator made professional judgements and or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications. The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Validators incorporated data qualifiers into the electronic database and submitted the information to the data management group. TolTest data are presented elsewhere (TolTest, 2002). A complete printout of the TtNUS data with validation flags is presented in Appendix G. Pertinent quality estimates are summarized in a more quantitative format in the following section.

H.3 GENERAL DATA QUALITY REVIEW

DQIs are parameters that are monitored to help establish the quality of data generated during an investigation. Some of the DQIs are generated from analysis of field samples (e.g., field duplicates) and some are generated from the analysis of laboratory samples (e.g., laboratory duplicates). Individually, field and laboratory DQIs provide measures of the performance of the respective investigative operations (field or laboratory). During data validation, individual QC results were evaluated. If individual QC results were acceptable, no validation flag was assigned to an analytical result, otherwise a flag indicating the type of QC deficiency was assigned to the result. The data quality review provided in this section, which was implemented after the data validation process was completed, is not designed to identify data that are acceptable or unacceptable according to data QC criteria. Instead, it is designed to provide an overall quantitative measure of analytical performance not provided by data validation. These quantitative evaluations are frequently analyte-specific. They reflect, for example, biases associated with the quantification of particular analytes in a particular matrix. Many of the summary tables provided in the sections below reflect this and the data user must know that even chemicals in the same analytical fraction (e.g. VOCs) may exhibit different data quality. Taken together, the DQIs provide a measure of overall analytical performance.

TtNUS collected data at NSWC Crane SWMUs 12 and 16 at the same time that data were collected at SWMU 13 . Consequently, samples from more than one SWMU but of a similar matrix may have arrived at the analytical laboratory in a similar time frame. Samples from different SWMUs may have been combined into the same sample preparation or analysis groups. The number of QC results obtained under such circumstances is greater than if only SWMU 13 QC data were available. This provides more robust estimates of analytical performance, especially for quantitative measures such as accuracy and precision. The titles of the data tables (Table H-1 through H-15) identify which SWMUs are represented by the data.

The data for the Mine Fill B were of generally acceptable quality with the following significant exceptions:

Composting Data

Explosives – Analytical performance for the metals analyses was within expectations. No data were rejected.

VOCs - Analytical performance for the metals analyses was within expectations. No data were rejected.

Metals – Analytical performance for the metals analyses was generally within expectations. RPD values, which reflect analytical precision (laboratory duplicates) or field precision (field duplicates) occasionally exceeded the 50 percent point of reference, however, there was no consistent indication of an analytical problem with respect to accuracy, precision, or any other QC measure. No metals results from the composting operation were rejected.

Details of the Composting Operation data quality are provided in TolTest, 2002.

Round 1

Explosives – The compound 2-amino-4,6-dinitrotoluene in sample 13SW1101 and picramic acid in samples 16SS150002 and 16SS210002 were rejected for the explosive analyses for Round 1. The picramic acid results were non-detected and were rejected because of low matrix spike recoveries. The low matrix spike recoveries are likely due to a difficult sample matrix and they indicate that picramic acid results are generally biased low. The bias is moderate to severe.

A slight to moderate low bias (average percent recovery = 59.2 for MS and MSD, and 88.4 for LCS) was detected in aqueous RDX concentrations. The low bias indicates that reported RDX concentrations are, on average, less than actual site concentrations. Results for other explosive compounds in aqueous and solid sample matrices were not biased significantly low and may be biased slightly high in some cases, though not significantly.

Herbicides – Hexachloropentadiene and pentachlorophenol are not herbicides but were analyzed by the herbicide method to obtain low detection limits. Results are very uncertain at levels near the detection limits and exhibit a negative bias. The bias is moderate to severe.

Metals - The metals, overall, exhibit no bias to a slightly high bias, with a moderate high bias for calcium, chromium, titanium, and zinc (See Table H-9).

Miscellaneous Parameters (Ammonia, AVS, SEM, Cation Exchange Capacity, Nitrite/Nitrate and TOC) – The data are generally of acceptable quality although the ammonia nitrogen results occasionally exhibit an uncertainty that is greater than expected.

PCBs – These data are of acceptable quality without qualification.

SVOCs – The compounds 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol , 2,4-dichlorophenol, 2,6-dichlorophenol, 2,4-dinitrophenol, 2,4-dimethylphenol, 2-chlorophenol, 2-methylphenol, 2-nitrophenol, 3&4-methylphenol, 3,3'-dichlorobenzidine, 4,6-dinitro-2-methylphenol, 4-chloro-3-methylphenol, 4-nitroquinoline-1-oxide, 4-nitrophenol, aramite, hexachlorocyclopentadiene, kepone, and phenol constitute all of the results rejected for the semivolatile analyses for Round 1. The majority (64 percent) of the results were rejected because several compounds (4-nitroquinoline-1-oxide, aramite, kepone, and 1,4-phenylenediamine) yield poor analytical responses. The remaining semivolatile results were rejected due to one of the following reasons: low acid surrogate recovery representative of phenolic compound recoveries, low matrix spike recovery, gross holding time excedance, or low laboratory control sample recovery. The gross holding time excedance and low laboratory control sample recovery are attributed to laboratory performance and the remaining reasons for data rejection can be attributed to difficult sample matrices. The semivolatile data points rejected are from compounds that are not expected to be detected at Mine Fill B; therefore the impact on overall data quality is minimal. However, the rejected constitute data voids and must be viewed as such when making decisions.

VOCs – Acrolein results were rejected in four soil and two ground water samples, otherwise no other VOC results were rejected. These data were rejected because these compounds yield poor analytical responses. Because acrolein is not expected to be related to site operations these rejected have little negative impact on the project. In general, VOC results exhibited a slightly low bias with 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and chloromethane exhibiting a moderately low bias for Round 1 soil and sediment samples. Round 2 soil sample VOC results were biased slightly less negative. The volatile compounds overall show no significant bias, with the exceptions of bromomethane, chloromethane, and vinyl chloride which exhibit a moderately low bias for Round 1.

Round 2

Explosives – explosives data were generally acceptable. 2,2',6,6'-tetranitro-4,4'-azoxytoluene results, however, exhibit a moderately low bias. In addition, 2,4-diamino-6-nitrotoluene and RDX exhibit a slight high bias in aqueous samples. The potential high RDX bias in Round 2 and the moderately low bias in Round 1 may cause Round 2 concentrations to appear greater than Round 1 concentrations when there is actually no difference.

Metals – These results exhibited no significant bias. Several soil and sediment RPD results exceeded the reference point of 50 percent, however, the laboratory precision was equal to or better than field duplicate precision, as expected. This indicates that the greater proportion of uncertainty is associated with natural

sample heterogeneity. Nevertheless, several metals exhibited some high RPD values (e.g., greater than 100 percent) that indicate a relatively large degree of heterogeneity in the solid samples.

Miscellaneous Parameters (Ammonia, Chloride, Nitrite/Nitrate, Sulfate and TOC) – The data are generally of acceptable quality although the ammonia nitrogen results occasionally exhibit a slight low bias.

PAHs – There was a slight low bias for PAHs. The average percent recovery across all PAHs was approximately 70 percent. The minimum recoveries were MS and MSD results of 38.3 and 34.1 percent, respectively for anthracene, however, most recoveries (99 out of 105) were greater than 50 percent.

VOCs (Methods 8015B and 8260B) – Round 2 soil sample VOC results were biased slightly less negative than the Round 1 results. Three ketones (2-butanone, 2-hexanone, and 4-methyl-2-pentanone) had slightly low mean MS and MSD recoveries ranging from 55 percent to 63 percent. In general, the aqueous samples had yet less bias than the soil samples. Overall, the biases are slight, with the exceptions of bromomethane, which had a moderate low bias in ground water samples.

Round 3

Explosives – Seventeen tetryl results, one 2,4-diamino-6-nitrotoluene result, and one DNX result were rejected in vegetation samples, otherwise no other explosives results were rejected. The data for DNX, 2,4-diamino-6-nitrotoluene and one tetryl result (13VG007020001) were rejected for poor MS/MSD recovery. The remaining tetryl data were rejected because they yielded poor analytical recovery in blank spike samples. Explosives data in vegetation were accompanied by a high degree of uncertainty due to the vegetation matrix causing difficulties with the analyses. The results for 2,2',6,6'-tetranitro-4,4'-azoxytoluene and TNX showed a moderately low bias in aqueous samples. Explosives data in aqueous samples were generally acceptable with the exception of the low bias mentioned above. It is expected that some detectable concentrations of explosives went undetected because of the matrix interferences.

Metals data appeared to be free of any significant data quality deficiencies.

Sample collection deviated from the proposed sampling strategy in Rounds 1 and 2 for solid and aqueous samples. Uncollected samples were generally not collected because surface water was not available at all planned locations or refusal was encountered during soil boring advancement. Accordingly, the percent completeness for samples collected is less than 90 percent in several cases (compare sample collection ratios in Table H-1). There were no data rejections in these cases but the lack of data from the

planned locations as well as locations where data have been rejected for quality reasons should be considered when interpreting the results of the investigation.

Representativeness and Completeness for All Sampling Rounds

All samples appear to be representative of the intended environmental matrix. And were c Lack of data where samples could not be collected or where data have been rejected, however, should be considered when evaluating representativeness of the areas or volumes of environmental media that were characterized. Inability to achieve target detection limits or RBTLs in several cases should also be considered (See Section H.4.2)

H.4 DETAILED DATA QUALITY REVIEW

The various DQIs are discussed in detail below. In addition to the DQIs discussed below, temperature blanks that accompanied each cooler containing samples were used to assess whether the samples had been stored at the appropriate temperature during shipping. All temperature blanks were less than or equal to 4°C, indicating no deficiencies with regard to shipping temperature.

Each section below addresses data quality for a particular DQI for samples of a given matrix (solid or aqueous) and analytical fraction (e.g., metals or VOCs).

H.4.1 Completeness

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on three different bases: samples collected, field measurements, and laboratory measurements.

- Sample collection completeness was a measure of the usable samples collected as compared to those intended to be collected.

- Field measurement completeness was a measure of the usable field measurements made relative to those intended to be made.

- Laboratory measurement completeness was a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte.

Usable, valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. The total number of samples planned for collection are listed in different documents for different sampling rounds. The matrix below shows which document pertains to each round.

Sampling Round	Applicable Document
1	Original QAPP (TtNUS, 2003a)
2	QAPP Addendum No. 1 (TtNUS, 2003b)
3	QAPP Addendum No. 2 (TtNUS, 2004a)

Completeness was determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

H.4.1.1 Sample Collection Completeness

Composting Data

As stated above, details of the initial characterization, excavation, composting, and soil replacement operations are provided in TolTest (2002). All samples necessary to support those operations were collected. One aqueous sample was analyzed in association with Grid 255, otherwise all other samples were soils. The aqueous sample was analyzed for nine metals (aluminum, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and the SW-846 Method 8330 explosives plus pentaerythritol tetranitrate and butyl ether. All 24 results for this sample were less than the laboratory detection limit. No data were rejected from this aqueous sample nor from any soil samples. Therefore, sample collection goals were satisfied for the composting data.

All QC appeared to be normal for the single aqueous sample. In addition, the focus of the composting operation was remediation of explosives in soil. Because of this and the fact that all results were less than detection limits for the aqueous sample with no rejections, the aqueous sample is not discussed further in this section.

Round 1, Round 2, and Round 3

Table H-1 compares the samples collected to the samples proposed. Although not immediately apparent, sample completeness goals were met for all sample matrices in Rounds 1, 2, and Round 3. Three subsurface soil samples were not collected due to encountering refusal in some soil borings and dry conditions prevented the collection of some aqueous samples (See Table 2-2 for details). Failing to collect those samples is not considered to be a deficiency in field performance although failure to have obtained the desired samples must be considered when interpreting the data. Unscheduled sample collections and samples that could not be collected are discussed in the field report (2.0 of the RFI report text) with explanations for the observed deviations from the QAPP.

H.4.1.2 Field Measurement Completeness

Composting Data

At the time that Rounds 1 through 3 sampling was conducted the composting data were being compiled. The number of results obtained from the field analyses during the remediation effort were sufficient to support the composting effort and composting data completeness is not discussed further in this section. Details are provided in TolTest (2002).

Rounds 1, 2, and 3

The percent completeness for field measurements, including natural attenuation parameter measurements, and well stabilization measurements was 100.

H.4.1.3 Laboratory Measurement Completeness

Under ideal conditions, the laboratory completeness objective would be 100 percent. However, samples can be rendered unusable during shipping and preparation (e.g., bottles broken or extracts accidentally destroyed) or analysis (e.g., loss of instrument sensitivity, strong matrix effects). Laboratory completeness objectives were 90 percent for each critical target analyte per sample matrix. It is possible for individual analytes to exhibit very low completeness values while achieving the overall completeness goals on the basis of analytical fraction. This occurred in a few cases and is discussed in more detail below for the affected analytes and fractions.

Composting Data

Composting data were compiled prior to Round 1 sampling. The number of results obtained from the laboratory analyses during the composting effort were sufficient to support the composting effort. Details are provided in TolTest (2002). No data were rejected during data validation. This is consistent with the fact that most of the analyses were explosives and metals analyses and results from those fractions are not commonly rejected. Thus, completeness requirements for the composting operation were satisfied.

Rounds 1, 2, and 3

Table H-2 presents the percent completeness among analytical fractions for solid samples and aqueous samples by Round. With one exception, percent completeness for laboratory analytical data collected during the Round 1 field investigation was greater than the 90 percent completeness required by the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a). The exception is a completeness of 87.5 percent for SVOCs in ground water during Round 1. Nearly all of the rejected ground water data for Round 1 were rejected because of poor surrogate compound recoveries or laboratory control sample non-compliances. During Round 2, these deficiencies did not occur and no data were rejected. Nearly all of the results that were rejected for soil in Round 1 were a result of poor analytical sensitivities (i.e., low response factors). During Round 3, 19 data points were rejected for explosives in vegetation. The percent completeness for explosives was greater than 90% (94.3%). No other data were rejected during Round 3. All of the rejections were a result of poor recovery of target analytes (i.e., LCS/MS/MSD recoveries). Table H-3 lists all the rejected data and the reasons for the rejections for each round of data collection.

Immediately evident in Table H-3 is that all but three of the rejected values represent a small list of analytes in the explosives, SVOC, and VOC fractions. Twelve different phenolic compounds are included as are 2,4-diamino-6-dinitrotouene, 3,3'-dichlorobenzidine, 4-nitroquinoline-1-oxide, acrolein, aramite, DNX, hexachlorocyclopentadiene, kepone, and tetryl. Also pertinent is that the low ground water recoveries that resulted in data rejections were limited primarily to two samples: 13GWT0901 and 13GWT2001, and that all of the explosives rejections were limited to the vegetation matrix. The poor analytical sensitivities in the soil samples for the few compounds shown in Table H-3 are an indication of the state of chemical analyses today using the selected analytical methods. The VOC and SVOC analytes that were rejected because of poor analytical sensitivities are not particularly important to this investigation because they have low potential for being present or they are not very toxic or both. If they were more important to the investigation, a recommendation might be made to seek other chemical analysis methods for those compounds. For this investigation no such additional work is necessary.

The more significant rejections are those that were caused by poor surrogate recoveries (Code = R) or LCS/LCSD noncompliances (Code = E). These compounds (See Table H-3) are more commonly encountered environmental contaminants than the compounds with poor response factors described above. Twelve of these compounds are phenols and one is hexachlorocyclopentadiene. The rejections are limited primarily to two samples at groundwater samples (13GWT0901 and 13GWT2001) and the vegetation samples, so the problem is limited. In addition, because there were no rejections in Round 2, any negative effect of the rejections shown in Table H-3 are minimal to the project. There is no need to recollect or re-analyze samples although the rejected values must be viewed as data voids when using the data. The EXP rejections in Round 3 for poor analytical recovery in vegetation were likely due to the unusual matrix being tested. These rejections represent significant data gaps for the rejected parameters. There were evidently some significant problems encountered during chemical; analyses of vegetation for the explosives compounds and the number of rejections is one indication of this. For the energetic compounds (2,4,6-TNT, RDX, and HMX) that are most important to the project, however, there were no rejections.

The 2-amino-4,6-dinitrotoluene rejection was due to a gross exceedance of the percent difference between detectors during HPLC analyses. This result was at a concentration between the laboratory threshold value and the laboratory reporting limit on one detector used during HPLC analyses; the other detector did not have a positive detection. Results reported at such low levels and lacking confirmation between detectors are too low to be quantifiable and this apparent QC deficiency is not a valid QC measure, therefore it should not impact overall data quality

Several energetic compound results were rejected in the vegetation samples. The rejections were limited to tetryl, 2,4-diamino-6-nitrotoluene and DNX and details are provided in Sections H.4.3. and H.4.4 (Explosives in Vegetation, Round 3).

H.4.2 Sensitivity

Tables H-4, H-5, H-6, H-7, and H-8 compare the observed minimum and maximum non-detect values during laboratory analyses to the target laboratory reporting limits contained in Table 1-4 of the Mine Fill B QAPP (TtNUS, 2003a) and corresponding tables of TtNUS 2003b and 2004a for soils, sediments, ground water, and surface water, respectively. The data in Tables H-4, through H-7 represent data for SWMU 13 and SWMU 16 for Rounds 1, 2, and 3. The reason data were consolidated for SWMUs 13 and 16 is that the analytical methods, laboratories, and sensitivities were similar for those rounds. Table H-8 displays only QC summaries for SWMU 13 because no vegetation samples were collected at SWMU 16.

At the outset of the project, it was known that the concentrations of several chemicals could not be measured at concentrations that were as low as the RBTLs; however, the analytical methods selected are standard methods used throughout the environmental industry. Development of methods with greater sensitivity was not feasible nor was it required for the chemicals of primary interest (e.g., explosives, PCBs, and chlorinated VOCs). Yellow (or gray when printed in black and white) highlight in the tables indicates those parameters for which at least one non-detect value exceeded the RBTL. Although many analytical fractions had at least one such exceedance, most non-detected results were less than the target limits for critical parameters. The impact of these exceedances is discussed in the risk assessments Sections 8.0 and 9.0 (the human health and ecological risk assessments, respectively).

In some cases, elevated detection limits were incurred because select samples had to be diluted to obtain measurable concentrations of VOCs. This was especially true in Round 2 for a few ground water samples at SWMU 16 that had high concentrations of TCE. The high concentrations of TCE resulted in a need to dilute the samples to prevent contamination of laboratory purge equipment. In Appendix G, results of undiluted samples are presented for concentrations that did not exceed calibration ranges and results of diluted samples are presented for concentrations that exceeded the calibration range.

To understand the impact of not having achieved RBTLs, it is important to understand the convention used for reporting non-detect values. Concentrations of organic analytes that were less than their MDLs were reported as the threshold value (not the MDL) followed by a "U" qualifier. The threshold values were generally less than typical laboratory reporting limits, but were typically greater than MDLs. This convention was used in response to the need to try to measure concentrations as low as the RBTLs. If a measured organic analyte concentration exceeded the MDL but was less than the reporting limit, the reported concentration was the measured concentration followed by a "J" qualifier. The "J" qualifier signified that the reported concentration had a high degree of uncertainty even though there was a high level of confidence that the analyte had been detected in the sample. Concentrations less than the TV for inorganics were reported as the TV with a "U" qualifier. Inorganics concentrations between the TV and RL were reported with no qualifier. Concentrations of organics and inorganics that exceeded reporting limits were not qualified unless a data quality deficiency was identified. These reporting conventions are summarized below:

Analyte Non-Detect Reporting

Measured Concentration	Reported Concentration	Qualifier*
<TV	TV (inorganics) TV (organics)	U
>TV and <RL	Measured concentration (organics)	J
>TV and <RL	Measured concentration (inorganics)	No qualifier
>RL	Measured concentration	No qualifier

Tables H-4 through H-8 show the nominal TVs and the minimum and maximum non-detect values for each analyte in particular matrices (one table per matrix). The nominal TVs represent TVs as estimated by the laboratory without any adjustments for sample-specific conditions such as moisture content or sample dilutions. Especially in cases where a dilution caused the maximum observed non-detect value to exceed the RBTL, the nominal TV may be less than the RBTL. For example, vinyl chloride had a nominal ground water TV of 0.3 µg/L, but the maximum observed TV was 30 µg/L in Round 2 (Table H-6). The significant elevation of the TV was due to the dilution of at least one ground water sample in Round 2 that had a high concentration of at least one other target analyte.

Seven metals (arsenic, aluminum, cadmium, copper, lead, mercury and thallium) in Round 3 groundwater and nine metals (arsenic, aluminum, beryllium cadmium, cobalt and lead mercury selenium and sodium) in Round 3 surface water exceeded the applicable RBTLs. Three metals in Round 3 sediment (thallium, mercury and selenium) exceeded the applicable RBTLs. The RBTL and the nominal TV for the aforementioned metals are flagged and shown in Tables H-4 through H-8.

The elevated detection limits that were incurred are viewed to be the consequence of uncontrollable, sample-specific factors and reflect normal laboratory performance. They did not prevent the use of the data for decision making. However, the failure to achieve RBTLs must be considered when using the data.

H.4.3 Laboratory Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy measurements are designed to detect biases resulting from sample handling and analysis. This parameter is assessed by measuring spiked samples (e.g., MSs) or well-characterized samples of certified analyte concentrations (e.g., LCSs) and by measuring blanks.

Accuracy requirements for field measurements are typically ensured through control over the sample collection and handling and through routine instrument calibration. Field accuracies were monitored through the use of blanks to detect cross-contamination and by monitoring adherence to procedures that prevent sample contamination or degradation. Source blanks were collected from analyte-free water and potable water sources to assess the water sources used for decontaminating sampling equipment. Equipment rinsate blanks were collected for this investigation to assess cross-contamination via sample collection equipment. These blanks were obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and before use. Rinsate blanks were obtained for each type of sampling equipment for each day that the sampling equipment was decontaminated. Where pre-cleaned, dedicated sampling equipment was used, one rinsate blank was collected as a "batch blank". Rinsate blanks were analyzed for the same chemical constituents as the associated environmental samples.

Accuracy in the laboratory is measured through the comparison of a spiked sample or LCS result to a known or calculated value and is expressed as a percent recovery (%R). It was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. MS and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. Spiking concentrations equaled or approximated the default concentrations detailed in the applicable sample preparation or analysis SOPs. LCS and MS analyses were performed at a frequency of one per 20 associated samples of like matrix as required by the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a). Laboratory accuracy was assessed by comparing calculated %R values to accuracy control limits specified in the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a).

Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where %R = percent recovery
Ss = result of spiked sample
So = result of non-spiked sample
S = in-sample concentration equivalent of spiked amount.

Absence of bias is represented as a recovery of 100 percent. Mean recovery values less than 100 percent indicate a low bias, and recovery values greater than 100 percent indicate a high bias. Because measurement uncertainty exists in all bias estimates, a bias is not considered to be significant unless it falls outside the range of 100 percent ± 25 percent. The more extreme the bias value, the more significant the bias.

Accuracy data (e.g., LCS, LCSD, MS, and MSD percent recoveries) were not available electronically for the Composting operation, thus they were tabulated here. The inability to tabulate the composting accuracy data is mitigated by a few factors. For example, the data were collected over a long time period (years). This sort of data collection over time tends to identify accuracy problems because laboratories change calibration standards, different analysts are involved, the most recently collected data is compared to previous results with an expectation of a particular relationship between the results, etc. In addition, any significant accuracy concerns should have been identified during data validation, which makes use of the available hard copy accuracy data. Also, because the analytes and methods used for the composting analyses were similar to those used in Rounds 1, 2, and 3 sampling, it is logical to assume that any biases will be the similar. That is, the biases would be associated with the same compounds, and the direction (positive or negative) and degree of bias will be similar. In addition, Southwest Laboratory of Oklahoma, which analyzed many samples from the composting operation samples, also analyzed samples for NSWC Crane SWMU 1 (Mustard Gas Burial Ground) during the same time period. No accuracy issues were identified for the Mustard Gas Burial Ground data (TtNUS, 2004 b and 2004c). It is logical to expect the performance of that laboratory to have been the same for both the composting and Mustard Gas Burial Ground data sets. Finally, because there were no significant accuracy issues identified during data validation, it is logical to assume that the only biases to be expected in the composting data are those that are commonly observed. In particular, many organic compounds routinely exhibit no bias or a slight or even moderate negative bias when analyzed by the methods used for these projects. Among other factors, the biases reflect an inability to extract from a sample under routine analytical conditions all of the organic target analytes that are in the sample. The biases from compound to compound can vary considerably. These biases are common and insofar as they are not extreme, do not typically pose data interpretation problems. That is the case for the composting data.

Accuracy data for Rounds 1, 2 and 3 are compiled in Tables H-9 and H-10. Unless otherwise specified, each percent recovery value cited in the discussions below refers to the mean or average percent R value. Only mean percent recoveries that fall outside the range of 100 percent ±25 percent are discussed below. Percent recoveries that are invalid due to concentrations greater than 4x the spike amount in the

native sample have been removed from the mean percent recovery calculation. Data qualifiers assigned during data validation because of non-compliant bias indicators are presented in Appendix G.

Polychlorinated Dibenzodioxins (PCDD) and Polychlorinated Dibenzofurans (PCDF) in Soil, Round 1

The mean LCS, LCSD, MS, and MSD target compound percent recoveries ranged from 78.1 percent to 125.7 percent for Round 1. No dioxins were measured in Rounds 2 and 3. The 2,3,7,8-TCDF mean percent recovery was slightly high but there is no significant bias for polychlorinated dibenzodioxins and polychlorinated dibenzofurans in soil.

Explosives in Soil and Sediment, Round 1

The mean LCS, MS, and MSD target compound percent recoveries ranged from 16.4 percent to 123.9 percent in Round 1. The mean LCS, MS, and MSD recoveries for picramic acid 54.1, 16.4, and 17.6 percent respectively, show a severe low bias. This appears to be a systematic problem as all picramic acid recoveries were low.

Overall the recoveries were within the expected range except for picramic acid, which showed a severe low bias.

Explosives in Soil and Sediment, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 69.0 percent to 110.0 percent. Although picramic acid exhibited low recoveries during Round 1, this compound was not viewed to be a significant contaminant and was not analyzed in Round 2. The mean LCS recovery for tetryl at 69.0 percent was the only mean less than 93 percent. Of the three LCS percent recoveries that make up the mean, only one, at 41.9 was less than 75 percent. The matrix spike and MSD recoveries were within the expected range of 75 to 125 percent, which indicates that the low recovery is specific to the LCS.

Overall the recoveries were within the expected range except for one tetryl LCS recovery. No bias is expected for the explosives in Round 2. Tetryl is generally unstable in an aqueous environment and would not be expected to persist in environmental samples unless large quantities were originally present. Therefore, poor recoveries of tetryl are not a concern.

Explosives in Vegetation, Round 3

The mean LCS, MS, and MSD target compound percent recoveries ranged from 0 percent to 195.0 percent. Although picramic acid exhibited low recoveries during Round 1, this compound was not viewed to be a significant contaminant and was not analyzed in Rounds 2 or 3. Only one LCS, one MS, and one MSD sample were analyzed for vegetation because the scheduled rate of analyses for these QC samples was one QC sample per 20 field samples. Because only one sample was analyzed the mean percent recovery is also the only percent recovery reported. The LCS/MS/MSD recovery for tetryl at 0 percent indicates that tetryl was unable to be recovered from vegetation samples. The same may be true for 2,6-diamino-4-nitrotoluene because the MS and MSD recoveries were 0% even though the LCS recovery was within the expected range of 75 to 125 percent. The laboratory also had poor MS (6%) and MSD (7%) recovery for 2,4-diamino-6-nitrotoluene in the vegetation samples although the LCS was within the expected range. This is likely caused by the laboratory using an LCS that has matrix properties different from the on-site vegetation for the LCS analysis. The LCS recovery of 19% for 1,3,5-trinitrobenzene appears to be an isolated incident because both the MS and MSD recoveries were within the expected range of 75 to 125 percent, which indicates that the low recovery is specific to the LCS. The MS recovery of 3-nitrotoluene and DNX were 0% while the LCS and MSD were within the expected range. This is likely caused by sporadic difficulties analyzing the vegetation matrix. The percent recoveries of 4-amino-2,6-dinitrotoluene exceeded the expected range in the LCS, MS, and MSD. This indicates a high bias for 4-amino-2,6-dinitrotoluene. The MS analysis has six more compounds that exceeded the expected range and one that was below the expected range while the MSD had four more compounds that were below the expected range. This indicates that there was a general high bias in the MS and a general low bias in the MSD. The opposing biases support the argument that the vegetation matrix causes analytical difficulties and these difficulties are reflected in a high degree of uncertainty in the data. A review of the chromatograms indicated that ghost peaks sporadically appeared that obscured the target analyte peaks. There was no opportunity to re-analyze the samples to try to obtain better data. The effect of the ghost peaks was to occasionally mask the target analytes and prevent their detection. Because of this masking, the ability to detect explosives in the vegetation matrix was compromised in several cases. Consequently, the frequency of reported explosives detections in vegetation is expected to be greater than the reported number of detections. In addition, the reported concentrations appear to suffer from a high degree of uncertainty.

Explosives in Ground Water and Surface Water, Round 1

The mean LCS, MS, and MSD target compound percent recoveries ranged from 58.7 percent to 129.6 percent. The mean MS and MSD recoveries for RDX 59.7 and 58.7 percent respectively, show a

moderately low bias. The mean LCS and MS recovery for picramic acid were slightly low and the mean LCS recovery for picric acid was slightly high. These recoveries are just outside the expected range and no significant bias is expected.

Except for RDX, which showed a moderately low bias, the other explosive compound recoveries were within the expected range. The RDX is a significant compound to this project because it was detected over large areas in soil prior to the composting operation, is widely detected in ground water, and is operationally related to site activities. All RDX data in surface and ground water should be viewed to be biased moderately low (e.g., perhaps by a factor of two), however, biases do change with concentration.

Explosives in Ground Water and Surface Water, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 58.8 percent to 157.7 percent. The mean MS and MSD recoveries for 2,2',6,6'-tetranitro-4,4'-azoxytoluene 58.8 and 64.6 percent respectively, show a moderately low bias. The mean MSD for 2,4-diamino-6-nitrotoluene and mean MS for RDX were above expectations and a slight high bias can be expected.

Overall the recoveries were within the expected range except for 2,2',6,6'-tetranitro-4,4'-azoxytoluene which showed a slightly low bias and 2,4-diamino-6-nitrotoluene, which showed a slightly high bias.

The potential high RDX bias in Round 2 and the moderately low bias in Round 1 may cause Round 2 concentrations to appear greater than Round 1 concentrations when there is actually no difference. This characteristic should be considered when using the data.

Explosives in Ground Water and Surface Water, Round 3

The mean LCS, MS, and MSD target compound percent recoveries ranged from 30.0 percent to 123.7 percent. The mean LCS, MS, and MSD recoveries for 2,2',6,6'-tetranitro-4,4'-azoxytoluene (38.7, 31.0, and 30.0 percent respectively) and TNX (68.3, 67.0, and 73.0 percent respectively) show a moderately low bias. The mean LCS recovery for tetryl was below expectations and a slight low bias can be expected.

Overall the recoveries were within the expected range except for 2,2',6,6'-tetranitro-4,4'-azoxytoluene and TNX, which showed a moderately low bias and for tetryl, which showed a slightly low bias.

Herbicides in Soil and Sediment, Round 1

Mean MS and MSD target compound percent recoveries for hexachlorophene and pentachlorophenol were well below the expected range. These compounds are not herbicides but were analyzed using an herbicide analytical method to achieve low detection limits. The mean LCS percent recovery for hexachlorophene was 61.8 percent, which is slightly below expectations. The low MS and MSD recoveries (19.8 and 22.2 percent) for these compounds appear to be systematic because all mean MS and MSD recoveries were less than 75 percent (See Table H-9).

The hexachlorophene recoveries exhibit a severe low bias and the pentachlorophenol recoveries exhibit a moderate to severe low bias. These compounds are not expected to be detected at Mine Fill B and Cast High Explosives Fill/B-146, so there should be minimal impact on decision making. Should these chemicals become important for decision making, however, the low bias must be considered.

Herbicides in Ground Water and Surface Water, Round 1

Mean LCS, MS, and MSD target compound percent recoveries for hexachlorophene and pentachlorophenol ranged from 30.6 to 57.7 percent and were below the reference range of 75 to 125 percent (See Table H-10). The low LCS, MS, and MSD recoveries for these compounds appear to be systematic because all recoveries were low.

These two compounds are not expected to be related to Mine Fill B activities, so there should be minimal impact on data quality. Should these chemicals become important for decision making, however, the low bias must be considered.

Semivolatile Organic Compounds in Soil and Sediment, Round 1

The majority of semivolatile compound mean LCS, MS, and MSD recoveries were within the expected range, with the exceptions of the MS and MSD recoveries for 3,3'-dichlorobenzidine, 4-chloroaniline, and hexachlorocyclopentadiene. These compounds typically exhibit poor analytical sensitivities and all MSs and MSDs exhibited moderate to low recoveries.

The semivolatile compounds generally show a slightly low bias, with the exceptions of 3,3'-dichlorobenzidene and 4-chloroaniline exhibiting moderate low bias and hexachlorocyclopentadiene exhibiting a severe low bias.

Semivolatile Organic Compounds in Ground Water and Surface Water, Round 1

The majority of semivolatile compounds exhibit a slight to moderate low bias with respect to mean LCS, MS, and MSD percent recoveries range, with the exceptions of the LCS, MS, and MSD recoveries for 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, 4-nitrophenol, and hexachlorocyclopentadiene. These compounds typically exhibit poor analytical sensitivities.

All LCS, MS, and MSDs exhibited moderate to severe low recoveries.

Polycyclic Aromatic Hydrocarbons (PAHs) in Soil and Sediment, Round 2

Mean LCS, MS, and MSD target compound percent recoveries were slightly less than expected (See Table H-9), indicating a slightly low bias for PAH data for Round 2.

Polycyclic Aromatic Hydrocarbons (PAHs) in Ground Water and Surface Water, Round 2

The mean LCS, MS, and MSD target compound percent recoveries ranged from 34.1 percent to 129.1 percent (See Table H-10). The mean LCS, MS, and MSD recoveries for several PAHs were less than expected.

Overall, a moderately low bias exists for PAHs for ground water and surface water in Round 2.

Volatile Organic Compounds in Soil and Sediment, Round 1

The majority of volatile compound recoveries were either within the mean LCS, MS, and MSD percent recovery reference range of 75 to 125 percent or they fell marginally outside this range (See Table H-9). Except for 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and chloromethane, all mean recoveries were greater than 60 percent. The mean recoveries for these for compounds were greater than 45 percent for all of these compounds.

The volatile compounds, on average, show a slightly low bias, with 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and chloromethane exhibiting a moderately low bias.

Volatile Organic Compounds in Soil and Sediment, Round 2

The majority of volatile compounds were within the expected mean LCS, MS, and MSD percent recovery range and are generally higher than the Round 1 VOC recoveries. 1,2,3-trichloropropane, 1,2dibromo-3-

chloropropane, 2-Butanone, 2-hexanone, 4-methyle-2-pentanone, acetone, acetonitrile, bromomethane, dichloirodifluoromethane, isobutanol, propionitirle, and trichlorofluoromehtane had at least one accuracy indicator (i.e., LCS, MS, or MSD) mean recovery less than 75 percent. However, all mean recoveries were greater than 55 percent. The ketones (2-butanone, 2-hexanone, and 4-methyl-2-pentanone) had slightly low mean MS and MSD recoveries ranging from 55 percent to 63 percent. Ketones have an affinity for water which reduces their purging efficiency and this is likely cause for the slightly low recoveries. Otherwise, recoveries were greater than 60 percent in MS/MSDs and were generally greater than 80 percent in LCSs.

The volatile compounds show a slightly low bias that should not impact the overall usability of the volatile compounds for Round 2 (See Table H-9).

Volatile Organic Compounds in Ground Water, Rounds 1 and 2

All volatile compounds were within the expected mean LCS, MS, and MSD percent recovery range, with the exceptions of bromomethane, chloromethane, and vinyl chloride, which had moderately low mean MS and MSD recoveries for Round 1 and bromomethane which had a slightly low mean MS for Round 2.

The volatile compounds overall show no significant bias, with the exceptions of bromomethane, chloromethane, and vinyl chloride which exhibit a moderately low bias for Round 1 (See Table H-10).

Polychlorinated Biphenyls in Soil, Round 1

Mean LCS, MS, and MSD PCB percent recoveries were within the expected range with a slightly high but insignificant bias for Aroclor-1260 (mean recovery in MS and MSD = 143 percent).

Polychlorinated Biphenyls in Soil, Round 2

Mean LCS, MS, and MSD PCB percent recoveries were within the expected range with a moderately high bias for Aroclor-1016 (mean recovery in MS and MSD = 143 percent).

Metals in Soil and Sediment, Rounds 1, 2, and 3

The mean LCS percent recoveries across all Round 1 and 2 soil and sediment spikes for metals analyses, including AVS/SEM methods, ranged from 95 to 105 percent. This exceptionally narrow recovery range centered on the theoretically perfect value of 100 percent indicates that there is no systematic laboratory bias associated with the metals analysis process.

However, the soil and sediment sample matrix recoveries show a moderate high bias for select total metals. In particular, the mean MS recoveries for calcium, chromium, and titanium in Round 1 and titanium and zinc in Round 2 were all greater than 150 percent. The metals with the highest MS recoveries are metals that typically have native sample concentrations approaching 4 times the spike amount, which falsely creates an apparent bias because of the analytical uncertainty being of the same magnitude of the spike amount.

The metals, overall, exhibit no bias to a slightly high bias, with an apparent false indication of moderate high bias for calcium, chromium, titanium, and zinc for Rounds 1 and 2 (See Table H-9). There is also an apparent false indication of high and low bias for iron, manganese, potassium, and zinc in Round 3 (Table H-9). These false high and low bias indications are caused by invalid or marginally valid QC samples that did not increase the native sample concentration sufficiently to accurately quantitate analyte recoveries. Therefore, all metals results are viewed to be acceptable for use with no significant biases.

Metals in Sediment, Round 3

Except for potassium (mean LCS recovery = 140.2%), the mean LCS percent recoveries for the Round 3 sediment spikes show a slightly high bias with all recoveries marginally above 100%; however, the bias is considered insignificant because the recoveries are generally within the reference range of 75%-125% and potassium (the sole exception) is not typically a metal of environmental concern. Furthermore, investigation indicated that one of the LCS spikes was unusually high, perhaps the result of analyst error (double spiking) during the spiking procedure. This could not, however, be confirmed with the laboratory.

The mean MS recoveries for aluminum and manganese in the Round 3 sediment show a moderately high bias with recoveries of 156.7% and 182.8%, respectively. Conversely, the mean MS recoveries for iron (49.2%) and zinc (71.6%) in the Round 3 sediment show a moderately low bias. However, the high and low biases associated with the aforementioned metals recoveries can be attributed to native sample concentrations that approach or exceed 4 times the spiking levels resulting in an apparent high and/or low bias. Removal of these invalid or marginally valid QC results for the aforementioned metals would yield acceptable recoveries in each case. Therefore, Round 3 metals exhibit no significant biases.

Metals in Ground Water and Surface Water, Rounds 2 and 3

The mean LCS percent recoveries across all Round 2 ground water and surface water spikes for metals analyses ranged from 91 to 103 percent. This exceptionally narrow recovery range centered on the

theoretically perfect value of 100 percent indicates that there is no systematic laboratory bias associated with the metals analysis process.

Mean LCS percent recoveries for total metals in Round 3 ground water and surface water spikes were generally acceptable and were within the reference range of 75% - 125%.

Except for calcium and sodium, the mean MS percent recoveries for total metals in Round 3 ground water and surface water were generally acceptable and exhibit a slightly low bias (for some metals) a slightly high bias (for some metals). The mean MS percent recovery for calcium was 9.9%. However, this low recovery is attributed to the extremely low recovery obtained for calcium in the MS analysis of sample 13GWT4801. This QC recovery is considered to be invalid because the native sample concentration approaches 4 times the spike amount which creates an apparent bias where none really exists. The mean MS percent recovery for sodium (64.5 percent) exhibited a moderately low bias. However, the low bias associated with sodium can be attributed to native sample concentrations in groundwater that approach or exceed 4 times the spiking levels, resulting in an apparent low bias. Removal of these "invalid" QC results for calcium and sodium would yield acceptable recoveries for these metals.

Mean MS percent recoveries for filtered metals in Round 3 ground water and surface water were generally acceptable (ranging from 90.1 to 124.9 percent) and exhibit a slightly low bias (for some metals) to a slightly high bias(for some metals). However, the bias (low or high) is considered insignificant because the recoveries are within the acceptable reference range of 75 to 125 percent. Table H-10- provides a summary of the mean LCS and MS recoveries for metals in Round 3 aqueous matrices.

However, the filtered ground water and surface water sample matrix shows a slightly low bias for all metals except calcium and sodium. The total ground water and surface water sample matrix had one slightly high mean MS for sodium.

The filtered metals exhibit an overall slightly low bias and the total metals do not exhibit significant bias (See Table H-9).

Miscellaneous Parameters, Round 2

Mean LCS, MS, and MSD percent recoveries were within the expected range for all analysis except for a slightly low bias for ammonia nitrogen (mean recovery approximately = 67 percent in MS and MSD).

H.4.4 Laboratory Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs, typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, subsampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Field duplicates for Mine Fill B soils and sediments were collected as a single sample that was sampled in duplicate for VOCs, then homogenized, split into two portions, and placed into separate sample bottles for the non-VOC analyses. Each sample bottle was assigned a unique nomenclature so as to be "blind" to the laboratory. Field duplicates were collected during a single act of sampling and were analyzed for chemical constituents to measure the precision of the sampling and analysis program, as well as the natural sample heterogeneity.

Field duplicates were to be collected at a rate of one per 10 environmental samples for Round 1 and 1 per 20 environmental samples for Rounds 2 and 3. The number of duplicates collected was greater than these frequencies because the analytical suite is not identical for all samples. The number of duplicates collected corresponds to the number of samples collected for a particular analytical fraction. The number of duplicates per samples collected for all analytical fractions met the 10 percent frequency criterion specified in the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a).

Laboratory precision QC samples [i.e., laboratory duplicates for inorganic chemicals and LCS/LCSD and matrix spike (MS) / matrix spike duplicate (MSD) samples for organic chemicals] were scheduled to be analyzed at a rate of one QC sample per 20 environmental samples. This 5 percent rate as specified in the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a) was achieved for aqueous, soil, sediment, and seep samples.

During the soil composting operation at least 110 different LCS/LCSD sample pairs were analyzed for metals, 190 were analyzed for explosives, 64 for VOCs, and one pair was analyzed for PCBs. 175 soil MS/MSD pairs were analyzed for explosives analyses, 66 for metals analyses, 51 for VOC analyses, and 10 for miscellaneous analyses. Five Tetryl LCS/LCSD RPD values exceeded 50% and were all less then 88 %. Tetryl is a difficult compound to analyze because it is unstable in aqueous solution, therefore, this kind of performance is common. Furthermore, tetryl is not a compound of interest for this project so these exceedances are of no consequence. Two silver LCS/LCSD RPD values (671.7 and 66.7) exceeded 50% but these exceedances are minor and infrequent. Silver is an analyte of no consequence for this site. One methylene chloride LCS/LCSD RPD value was 115% but this was also infrequent. Aside from these exceedances of the 50% limit, there were no apparent QC problems associated with LCS or LCSD target compounds.

Laboratory duplicates are usually analyzed during the metals and miscellaneous analyses as a check on the precision of the analyses. For organic compounds analyzed by chromatography, laboratory duplicates are commonly supplanted with MSDs because the organic compounds do not occur naturally in samples and precision can not be estimated from non-detect values. For the composting operation, MSDs were reported electronically for organic analyses but no laboratory duplicate data were available electronically for the metals and miscellaneous analyses. Hence, laboratory precision could not be estimated for those fractions. This is discussed further below under Metals, Composting Operation.

During Rounds 1, 2, and 3, 13 aqueous laboratory duplicates were analyzed and 8 soil laboratory duplicates were analyzed. Laboratory precision was assessed by comparing calculated RPD values to precision control limits specified in the Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a).

RPD values greater than 50 percent for solid matrices and 30 percent for aqueous matrices are occasionally observed. In addition, values of this magnitude are often small compared to the concentration variability observed across site samples. This characteristic is important because it indicates that the uncertainty associated with decision making is often most affected by the overall site

data variability and not as much by the local variability at any one location. Nevertheless, Table H-11 and H-12 represent all exceedances of these reference points (aqueous 30% and solid 50%) for laboratory duplicates, field duplicates, LCS/LCSD, and MS/MSD RPDs. Field and laboratory precision values that did not exceed the reference points are not included in the discussions below. Unless otherwise specified, RPD values cited in the discussions below refer to individual RPDs of a single pair of original and duplicate samples.

Explosives in Soil, Composting Operation

Out of 175 samples and 401 pairs of analytes with detectable results for both the original and field duplicate samples, 117 pairs exhibited an RPD value exceeding 50% for at least one analyte. The analytes that exhibit exceedances comprise eight of the explosives analytes (See Table H-12). The rate for exceeding 50 percent RPD is 117/401*100 = 29 percent. This rate appears to be high but is within a factor of two of theoretical expectations that do not take into account any uncertainties that are added to analytical uncertainty as a result of sampling error. To estimate the expected rate of exceedances, theoretical RPD values were computed for random pairs of samples drawn from the same normally distributed population. Doing this for a mean concentration of 200 µg/kg and standard deviation of 40 µg/kg (i.e., 20% relative standard deviation), yielded an expected exceedance rate of 8 percent (calculations not shown). Changing the relative standard deviation to 25 percent yielded an exceedance rate of 16 percent (calculations not shown). Thus a 5% increase in the standard deviation effectively doubled the rate of RPD values that would be expected to exceed 50 percent. These theoretical expectations suggest that the observed rates of exceedance are high, however, the theoretical calculations do not account for sampling errors, which would further increase the expected rates of exceeding 50 percent.

By contrast, the laboratory precision was much better than the field precision. This is evident by very few laboratory RPD exceedances of the 50 percent reference point for MS/MSD pairs. When laboratory RPD values did exceed 50 percent the exceedances were typically in the range of 50 to 70 percent. These data indicate that the sample homogenization of the laboratory yielded a more homogeneous sample than was received by the laboratory. This is typical of the type of performance expected when comparing field and laboratory duplicates.

In summary, field duplicate precision was worse than laboratory duplicate precision and this is expected. The precision measures indicate that the precision is typical of analytical measurements in soils, with the precision for field duplicates being worse than is usually observed. Nevertheless, there do not appear to be any analytical deficiencies associated with replicate measurements.

Explosives in Ground Water, Composting Operation

There were no ground water samples analyzed for the composting operation.

Explosives in Ground Water and Surface Water, Round 1 and Round 2

RPDs for nine different target compounds in four out of six MS/MSDs exceeded the 30 percent reference point (Table H-11). The RPDs ranged from 31.4 percent to 179.5 percent. The most severe exceedances are for 3,5-dinitroaniline and 4-nitrotoluene (in different samples, 13GWT3601 and 13SW1302). Most of the exceedances are associated with these two samples, which indicates that the large RPDs are specific to those samples. Otherwise, the data indicate few RPD values in excess of the 30 percent reference point.

One ground water and one surface water field duplicate RPD exceeded 50 percent for TNX (Table H-12). MNX exceeded the 30 percent reference point four times.

Given the number of results generated for aqueous duplicate samples (insert number here), there are relatively few exceedances of the 30 percent reference point for explosives, and the data should be considered useful as reported, however, some uncertainty beyond the usual level of uncertainty has been indicated for the nine chemicals identified in Tables H-11 and H-12.

Explosives in Ground Water and Surface Water, Round 3

The RPD for one target compound in one out of six MS/MSDs exceeded the 30 percent reference point (Table H-11). The RPD was 36.4 percent for RDX. The exceedance is associated with one sample (16GWT1002), which indicates that the large RPD is specific to this sample and occurs relatively infrequently.

Given the number of results generated for aqueous duplicate samples (98), there are relatively few exceedances of the 30 percent reference point for explosives, and the data should be considered useful as reported, however, some uncertainty beyond the usual level of uncertainty has been indicated for the chemicals identified in Table H-11.

Explosives in Vegetation, Round 3

Five of the twenty-one explosive compounds analyzed in the vegetation matrix exceeded the 50% RPD criterion. This translates to 23.8% of compounds in exceedance of the 50% RPD criterion. Two compounds (3-nitrotoluene and DNX) exceeded 200% RPD. This further illustrates the difficulty encountered when analyzing for explosives in the vegetation matrix. This difficulty was identified in Section H.4.4. The precision data presented here support the expectation that explosives data for vegetation are highly uncertain. There is also some expectation that detectable concentrations of some explosives were not reported because of matrix interferences.

Semivolatile Organic Compounds in Ground Water and Surface Water, Round 1 and Round 2

RPDs for 12 different surrogate and target compounds in two out of five MS/MSDs exceeded the 30 percent reference point (Table H-11). All of the high RPDs in Round 1, except for hexachlorocyclopentidiene, are associated with phenolic compounds. The loss of phenols indicates that the laboratory may be occasionally reducing the volume of the sample extracts too aggressively. This does not appear to be a systemic problem as it only occurred in two sets of MS/MSDs. The existence of this problem indicates a moderate possibility for a greater than normal uncertainty with phenolic compounds in samples associated with Round 1. An RPD for pyrene (30.5) in a single surface water MS/MSD during Round 2 was in excess of the 30 percent reference point (Table H-12). The RPD of 30.5 barely exceeds the reference point and this exceedance is considered to be insignificant. In general, precision for SVOCs in aqueous samples for Rounds 1 and 2 was acceptable with an apparent degraded precision when analyzing phenolic compounds.

Semivolatile Organic Compounds in Soil and Sediment, Round 1 and Round 2

RPDs for 24 different target compounds in four out of seventeen MS/MSDs exceeded the 50 percent reference point (Table H-11). Several PAHs from sample 13SD050004 had RPDs of 200. Most of the exceedances of 50% RPD occurred in this sample and two other samples (13SB040204 and 13SS260002). These exceedances were therefore evidently not widespread and do not indicate the existence of widespread precision problems. Instead, they indicate that precision is generally acceptable for soil sample SVOC analyses. The 3,3'-dichlorobenzidine RPD for sample 13SS040002 had an RPD of 200. This compound has a poor analytical response and only had a 12% recovery in the MS and a zero percent recovery in the MSD (See Section H.4.4). This compound is not likely to be detected at Mine Fill B and Cast High Explosives Fill/B-146 and should not affect data usability. The possibility for moderate uncertainty exists for the SVOC compounds listed on Table H-11.

Several PAHs and safrole had field duplicate RPDs in excess of the 50 percent reference point for sediment and surface soil samples in Round 1 and Round 2 (Table H-12). These RPDs indicate sample heterogeneity among sediment and surface soils. The possibility for moderate uncertainty exists for PAHs and safrole in sediments and surface soils.

Volatile Organic Compounds in Soil, Round 1

One VOC compound had a field duplicate RPD in excess of the 50 percent reference point for one soil sample. The few exceedances of the 50% reference point for soils indicate that VOC data are generally useful as reported with no unusual uncertainties.

Dioxins and Furans in Soil, Round 1

An RPD for 2,3,7,8-TCDF in one MS/MSD exceeded the 50 percent reference point (Table H-11). Several dioxins had field duplicate RPDs in excess of the 50 percent reference point (Table H-12).

The absence of MS/MSD exceedances indicates that the RPD reference value exceedances are associated with field rather than with laboratory duplicates. This may be a consequence of having very low dioxin concentrations or it could reflect the better mixing associated with laboratory rather than field duplicates. Thus, the exceedances are attributed either to the low observed dioxin concentrations or to greater heterogeneity in the field duplicates than the laboratory duplicates. Neither of these situations indicates a sampling or analytical deficiency. The level of uncertainty described here should be considered when using the dioxin data.

Metals in Soil and Sediment, Composting Operation

As described at the beginning of this subsection, laboratory precision was not estimated for metals analyses because no laboratory duplicate results were available electronically. Laboratory precision, however, is typically equal to or better (i.e., lower RPD values) than sampling precision. Field duplicates were available and thus enabled the estimation of sampling precision. Insofar as laboratory precision is no worse than sampling precision, the sampling precision estimated from field duplicates can be viewed as a worst case for the laboratory precision.

The field duplicate RPD values were generally less than 50 percent RPD. Twenty out of 66 field duplicate pairs (i.e., 30 percent) exceeded 50 percent RPD for one or more analytes. Out of 235 pairs of results for which both the original and duplicate sample had detectable concentrations of metal, 28 (or 12 percent) of the RPD values exceeded 50 percent. Some exceedances are expected (the theoretical maximum RPD

value is 200 percent). To estimate the expected rate of exceedances, theoretical RPD values were computed for random pairs of samples drawn from the same normally distributed population. Doing this for a mean concentration of 200 µg/kg and standard deviation of 40 µg/kg (i.e., 20% relative standard deviation), yielded an expected exceedance rate of 8 percent (calculations not shown). Changing the relative standard deviation to 25 percent yielded an exceedance rate of 16 percent (calculations not shown). These theoretical expectations are consistent with the observed rate of exceedances.

Based on these calculations, the RPD values for field duplicates indicate that the performance is typical of environmental analyses. By inference, the laboratory uncertainty, which is a component of the sampling uncertainty, appears to be within expectations.

Metals in Soil and Sediment, Rounds 1, 2 and 3

Several metals in multiple field duplicates and laboratory duplicates out of a total of 23 field and laboratory duplicates exceeded the 50 percent reference point (Table H-12). This indicates sample heterogeneity in sediment and soil samples. In general, the RPDs for the laboratory duplicates, performed on the same samples as field duplicates, are less than the RPDs for the field duplicates, this is to be expected. Based on these QC data the possibility for moderate uncertainty exists for metals in sediment and soil. Whether the uncertainty is significant depends on how the uncertainty affects decisions associated with, for example, evaluating the nature and extent of contamination and the evaluation of risks.

RPDs for 4 metals in one field duplicate and 2 metals in one laboratory duplicate exceeded the 50 percent reference point. RPDs for metals in the field duplicate ranged from 51 percent to 154 percent and RPDs for metals in the laboratory duplicate were 66.7 percent and 104.6 percent.

Metals in Ground Water and Surface Water, Rounds 1, 2 and 3

Nine metal RPD values for five metals (aluminum, chromium, iron, titanium, and zinc) in 12 out of 27 field duplicates exceeded the 50 percent reference point (Table H-12). The range of RPDs is 35.2 to 126.3. This is higher than would be expected for aqueous samples because water samples are relatively homogenous. The possibility for high uncertainty exists occasionally for metals in surface water and ground water, although most metals analyses yielded precision within the normally expected range and there is no particular metal or type of sample that can be said to exhibit unacceptable precision.

Seven metals (beryllium, cadmium, lead, selenium, silver, thallium, and tin) in a total of 14 laboratory duplicates were detected in only one of the samples in a duplicate pair. This yielded RPDs of 200% but these values are not indicative of analytical performance because a valid RPD can not be computed with a single sample result. The 200 %RPD values are not shown in Table H-12. RPDs (ranging from 31.2 percent to 141.9 percent) for ten metals in 6 field or laboratory duplicates exceeded the 50 percent reference point. Therefore, the relative uncertainty for these metals is not accurately represented by the tabulated RPDs and is not discussed further.

Polychlorinated biphenyls in Soil, Round 1

An RPD for Aroclor-1248 in one out of six field duplicates exceeded the 50 percent reference point (Table H-12). This indicates sample heterogeneity in soil samples. Otherwise, RPD values were within expectations and there do not appear to be any unusual uncertainties associated with the PCB data.

Miscellaneous Parameters in Ground Water and Surface Water, Round 2

RPDs for ammonia nitrogen in three out of eleven MS/MSDs exceeded the 50 percent reference point (Table H-11). The RPDs ranged from 34 to 48 indicating that moderate uncertainty occasionally exists for ammonia nitrogen in water samples collected during Round 2.

An RPD for ammonia nitrogen in one of eight field duplicates exceeded the 50 percent reference point (Table H-12). The RPD (120.0) was higher than expected for an aqueous matrix and the possibility for occasionally high uncertainty exists for ammonia in surface waters.

Dissolved Gases in Ground Water, Round 2

RPDs for ethene and ethane in one field duplicate exceeded the 50 percent reference point (Table H-12). The RPDs (83, ethene and 96, ethane) were higher than expected for an aqueous matrix and the possibility for high uncertainty exists for ethene and ethane in ground water. Other dissolved organic gas concentrations may suffer from a relatively high degree of uncertainty that did not manifest itself because only one field duplicate sample was analyzed. In the absence of additional data, the results for ethane and ethene, and possibly other dissolved organic gases, should be viewed as having a relatively high degree of uncertainty, (e.g., and RPD of at least 50).

H.4.5 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and among sampling events). Comparability was achieved by using standardized sampling and analysis methods, as well as standardized data reporting formats. Comparability of field data was ensured by following the Mine Fill B Mine Fill B QAPP and subsequent addenda (TtNUS, 2003a, 2003b, and 2004a). Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the QA plan. No comparability problems were detected.

The laboratory analyzed various QC samples along with the environmental samples to allow data users to assess the quality of the data. Tables H-13, H-14 and H-15 show the rates of data qualification that resulted from application of the data validation process for aqueous, abiotic solid (soil and sediment), and vegetation samples, respectively. The numerical qualification rates presented in the table represents the percentage of data qualified as indicated for the indicated reason. An example will illustrate how to interpret the Tables H-13 through H-15. The following is an excerpt from Table H-13 (first entry in the table):

			Validation Qualifier					
Fraction	**Parameter**	**Code**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
ROUND 1								
EXP	2,4,6-TRINITROTOLUENE	P	0.0	20.0	0.0	0.0	0.0	0.0
		U	0.0	80.0	0.0	0.0	0.0	0.0

The 20.0 in the "J" Validation Qualifier column indicates that 20.0 percent of the J-qualified 2,4,6-trinitrotoluene data were qualified that way because of reason "P" (Code = P). The definition for "P" at the bottom of the table indicates that the result(s) was near the detection limit and this proximity to the detection limit introduced additional uncertainty into the measured result(s). Similarly, the 80.0 in the "J" column indicates that 80.0 percent of the J-qualified data were qualified that way because of reason "U". Reason "U" is defined at the bottom of the table to represent a Percent Difference between columns or detectors that exceeds 25 percent for positive results determined via gas or liquid chromatographic methods.

All other values in the table are to be interpreted in a similar manner. Quantitative summaries of accuracy and precision are provided in Sections H.4.3 and H.4.4. Inability to achieve target detection limits or RBTLs in several cases should also be considered (See Section H.4.2).

H.4.6 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point and is contingent on a good design for the sampling program. For each environmental medium investigated, there were two general populations - site and background. The site population(s) is the portion of a medium potentially contaminated as a result of site operations. Sampling of the site population was designed to directly support the project objectives of determining the nature and extent of contamination and evaluating human and ecological risks. The background population is that portion of a medium that is similar to the site population but expected or known not to be contaminated through site operations. A background population is a point of reference for understanding whether or not site chemical concentrations represent site-related contamination. For mobile media (sediment, surface water and ground water) the term upgradient, rather than background, is generally used to refer to locations unaffected by site operations.

Data were collected from the locations specified in the Mine Fill B 6 QAPP with only minor modifications that reflect uncertainty in marking the locations in the field. The Mine Fill B QAPP and subsequent addenda and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would be accurate representations of actual site conditions. It is believed that all reported data are adequately representative of site conditions.

Appendix H References

TolTest, 2002. Interim Measures Report, Removal and Bioremediation of Contaminated Soil from Mine Fill B, SWMU 13/14, Full Scale Bioremediation, NSWC Crane, Crane, Indiana, Revision 0, July 2002, Prepared for Southern Division Naval Facilities Engineering Command by TolTest Inc. Toledo, Ohio

TtNUS, 2003a. Quality Assurance Project Plan for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, February.

TtNUS, 2003b. Quality Assurance Project Plan Addendum No. 1 for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, October.

TtNUS, 2004a. Quality Assurance Project Plan Addendum No. 2 for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/ B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19), RCRA Facility Investigation, Naval Surface Warfare Center Crane, Crane, Indiana, June.

TtNUS, 2004b. Resource Conservation and Recovery Act Facility Investigation Report for SWMU 01 - Mustard Gas Burial Ground, Naval Surface Warfare Center, Crane Division, Crane, Indiana, October.

TtNUS, 2004c. Resource Conservation and Recovery Act Corrective Measures Study Report for SWMU 01 – Mustard Gas Burial Ground (Draft) Naval Surface Warfare Center, Crane Division, Crane, Indiana, August.

TABLE H-1

SAMPLES COLLECTED VERSUS SAMPLES PROPOSED IN THE QAPP, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

Analytical Fraction	SOIL (collected/ proposed)[2]	SD (collected/ proposed)	GW (collected/ proposed)	SW (collected/ proposed)	SP (collected/ proposed)
SWMU 13 Round 1					
8015 Volatile Organic Compounds	4/2 (200%)	NA	2/1 (200%)	NA	NA
Acid Volatile Sulfides	NA	7/7 (100%)	NA	NA	NA
Simultanheously Extracted Metals	NA	7/7 (100%)	NA	NA	NA
Cation Exchange Capacity	4/4 (100%)	7/7 (100%)	NA	NA	NA
Dioxin	23/28 (82%)	NA	NA	NA	NA
Explosives	NA	23/22 (105%)	26/26 (100%)	13/13 (100%)	NA
Herbicides	23/28 (82%)	3/3 (100%)	4/1 (400%)	3/3 (100%)	NA
Total Metals	NA	23/22 (105%)	26/26 (100%)	13/13 (100%)	NA
Filtered Metals[3]	NA	NA	7/7 (100%)	13/13 (100%)	NA
Ammonia	0/4 (0%)	NA	26/26 (100%)	13/13 (100%)	NA
Nitrate/Nitrate	NA	NA	26/26 (100%)	13/13 (100%)	NA
Semivolatiles except PAHs	23/28 (82%)	3/3 (100%)	4/1 (400%)	3/3 (100%)	NA
8260 Volatile Organic Compounds	4/2 (200%)	NA	2/1 (200%)	NA	NA
Polycyclic Aromatic Hydrocarbons	23/28 (82%)	3/3 (100%)	2/1 (200%)	3/3 (100%)	NA
Polychlorinated Biphenyls	23/28 (82%)	NA	NA	NA	NA
Picrates	NA	NA	1/0 (N/A)	NA	NA
Total Organic Carbon	4/4 (100%)	7/7 (100%)	NA	NA	NA

Analytical Fraction	SOIL[2] (collected/ proposed)	SD (collected/ proposed)	GW (collected/ proposed)	SW (collected/ proposed)	SP (collected/ proposed)
SWMU 13 Round 2					
Explosives	NA	8/8 (100%)	47/47 (100%)	21/22 (95%)	4/5 (80%)
Total Metals	NA	8/8 (100%)	47/47 (100%)	21/22 (95%)	4/5 (80%)
Filtered Metals[3]	NA	NA	15/15 (100%)	21/22 (95%)	4/5 (80%)
Ammonia	NA	NA	47/47 (100%)	21/22 (95%)	4/5 (80%)
Nitrate/Nitrate	NA	NA	47/47 (100%)	21/22 (95%)	4/5 (80%)
Volatile Organic Compounds	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons	NA	2/2 (100%)	NA	2/2 (100%)	NA
Polychlorinated Biphenyls	19/20 (95%)	NA	NA	NA	NA
Methane, Ethane, Ethene	NA	NA	1/0 (N/A)	NA	NA
Sulfate and Chloride	NA	NA	NA	NA	NA
Total Organic Carbon	NA	NA	3/3 (100%)	NA	NA

TABLE H-1

SAMPLES COLLECTED VERSUS SAMPLES PROPOSED IN THE QAPP, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

Analytical Fraction	SOIL[2] (collected/ proposed)	SD (collected/ proposed)	GW (collected/ proposed)	SW (collected/ proposed)	VEG (collected/ proposed)
SWMU 13 Round 3 [4]					
Explosives	NA	NA	51/51 (100%)	7/7 (100%)	17/16 (106%)
Total Metals	NA	8/8 (100%)	13/13 (100%)	10/10 (100%)	NA
Filtered Metals[3]	NA	NA	4/4 (100%)	5/5 (100%)	NA
Nitrate/Nitrate	NA	NA	NA	7/7 (100%)	NA
Polycyclic Aromatic Hydrocarbons	NA	2/2 (100%)	NA	NA	NA
Polychlorinated Biphenyls	39/39 (100%)	NA	NA	NA	NA

SD - Sediment samples
GW - Ground water samples
SW - Surface water samples
SP - Seep samples
NA - Not applicable
Tallies exclude field duplicates, rinsate blanks, source water blanks, and trip blanks.

1 The completeness estimate for the composting operation was 100 percent for each fraction. Yellow or gray (if printed in black and white) highlight indicates that the number of samples collected is less than proposed; heavy outline indicates that the number of samples collected exceeds the number proposed. Reasons for not
2 Includes both surface and subsurface soil samples.
3 Some aqueous samples were filtered to allow for determining whether or not the observed metals concentrations were associated with turbidity.
4 No seep samples were anlayzed in Round 3

TABLE H-2

PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 13 (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 3

Analytical Fraction ROUND 1	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
AVS	NA	NA	NA	7	0	100.0
SEM	NA	NA	NA	42	0	100.0
AVS/SEM	NA	NA	NA	7	0	100.0
CEC	4	0	100.0	7	0	100.0
M	NA	NA	NA	621	0	100.0
DIOX	575	0	100.0	NA	NA	NA
EXP	NA	NA	NA	322	0	100.0
HERB	46	2	95.7	6	0	100.0
SVOC	2024	48	97.6	264	7	97.3
VOC	204	4	98.0	NA	NA	NA
PAH	391	0	100.0	51	0	100.0
PCB	161	0	100.0	NA	NA	NA
PH	4	0	100.0	7	0	100.0
TOC	4	0	100.0	7	0	100.0

Analytical Fraction ROUND 1	Ground Water			Surface Water		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
M	891	0	100.0	702	0	100.0
EXP	366	0	100.0	182	1	99.5
HERB	4	0	100.0	6	0	100.0
SVOC	352	44	87.5	264	9	96.6
VOC	102	2	98.0	NA	NA	NA
PAH	34	0	100.0	51	0	100.0
NH3	26	0	100.0	13	0	100.0
NITA	26	0	100.0	13	0	100.0
PH	28	0	100.0	13	0	100.0

TABLE H-2

PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 13 (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

Analytical Fraction ROUND 2	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	NA	NA	NA	112	0	100.0
M	NA	NA	NA	200	0	100.0
VOC	NA	NA	NA	NA	NA	NA
PAH	NA	NA	NA	34	0	100.0
PCB	133	0	100.0	NA	NA	NA

Analytical Fraction ROUND 2	Ground Water			Surface Water		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	1071	0	100.0	441	0	100.0
M	1750	0	100.0	1050	0	100.0
NH_3	51	0	100.0	21	0	100.0
NTIA	51	0	100.0	21	0	100.0
TOC	3	0	100.0	NA	NA	NA
VOC	NA	NA	NA	NA	NA	NA
PAH	NA	NA	NA	34	0	100.0

Analytical Fraction ROUND 3	Soil			Sediment		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	NA	NA	NA	NA	NA	NA
M	NA	NA	NA	216	0	100.0
MISC	NA	NA	NA	NA	NA	NA
PEST/PCB	273	0	100.0	NA	NA	NA

TABLE H-2

PERCENT COMPLETENESS FOR ANALYTICAL FRACTIONS, ROUNDS 1, 2, AND 3
SWMU 13 (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

Analytical Fraction ROUND 3	Ground Water			Surface Water		
	Total Data Points	Rejected Data Points	% Completeness	Total Data Points	Rejected Data Points	% Completeness
EXP	714	0	100.0	168	0	100.0
M	312	0	100.0	240	0	100.0
MISC	NA	NA	NA	8	0	100.0
PEST/PCB	NA	NA	NA	NA	NA	NA

Analytical Fraction ROUND 3	Vegetation		
	Total Data Points	Rejected Data Points	% Completeness
EXP	336	19	94.3
M	NA	NA	NA
MISC	NA	NA	NA
PEST/PCB	NA	NA	NA

1. The completeness estimate for the composting operation was 100 percent for each fraction.

CEC - Cation Exchange Capacity
EXP - Explosives
HERB - Herbicides
M - Metals
SVOC - Semivolatile organic compounds, except PAHs
NH_3 - Ammonia
NITA - Nitrate/Nitrite
SEM - AVS/SEM
CL - Chloride
SO_4 - Sulfate
VOC - Volatile organic compounds
PCB - Polychlorinated biphenyls
PEST - Pesticides
PAH - Polynuclear aromatic hydrocarbons
TOC - Total organic carbon
AVS - AVS/SEM
OVG - Dissolved organic gases

TABLE H-3

REJECTED DATA
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SNWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
Composting Operation			
No data were rejected			
ROUND 1			
13SW1101	EXP	2-AMINO-4,6-DINITROTOLUENE	U
13SS010002	HERB	PENTACHLOROPHENOL	U
13SS020002	HERB	PENTACHLOROPHENOL	U
13GWT0901	SVOC	2,3,4,6-TETRACHLOROPHENOL	R
13GWT2001	SVOC	2,3,4,6-TETRACHLOROPHENOL	R
13GWT0901	SVOC	2,4,5-TRICHLOROPHENOL	R
13GWT2001	SVOC	2,4,5-TRICHLOROPHENOL	R
13GWT0901	SVOC	2,4,6-TRICHLOROPHENOL	R
13GWT2001	SVOC	2,4,6-TRICHLOROPHENOL	R
13GWT0901	SVOC	2,4-DICHLOROPHENOL	R
13GWT2001	SVOC	2,4-DICHLOROPHENOL	R
13GWT0901	SVOC	2,4-DIMETHYLPHENOL	R
13GWT2001	SVOC	2,4-DIMETHYLPHENOL	R
13GWT0901	SVOC	2,4-DINITROPHENOL	ER
13GWT2001	SVOC	2,4-DINITROPHENOL	ER
13GWT0901	SVOC	2,6-DICHLOROPHENOL	R
13GWT2001	SVOC	2,6-DICHLOROPHENOL	R
13GWT0901	SVOC	2-CHLOROPHENOL	R
13GWT2001	SVOC	2-CHLOROPHENOL	R
13GWT0901	SVOC	2-METHYLPHENOL	R
13GWT2001	SVOC	2-METHYLPHENOL	R
13GWT0901	SVOC	2-NITROPHENOL	R
13GWT2001	SVOC	2-NITROPHENOL	R
13GWT0901	SVOC	3&4-METHYLPHENOL	R
13GWT2001	SVOC	3&4-METHYLPHENOL	R
13SS040002	SVOC	3,3'-DICHLOROBENZIDINE	D
13GWT0901	SVOC	4,6-DINITRO-2-METHYLPHENOL	R
13GWT2001	SVOC	4,6-DINITRO-2-METHYLPHENOL	R
13GWT0901	SVOC	4-CHLORO-3-METHYLPHENOL	R
13GWT2001	SVOC	4-CHLORO-3-METHYLPHENOL	R
13GWT0901	SVOC	4-NITROPHENOL	ER
13GWT2001	SVOC	4-NITROPHENOL	ER
13GWT0901	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13GWT0902	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13GWT2001	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13GWT2002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB010204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB020204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB030204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB040204	SVOC	4-NITROQUINOLINE-1-OXIDE	C

TABLE H-3

REJECTED DATA
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SNWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
13SB050204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB060204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB090204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB100204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB110204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB120204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SB130204	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SD040004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SD050004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SD060004	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS010002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS020002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS030002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS040002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS050002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS060002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS090002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS100002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS110002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS120002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS130002	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SS140001	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SW0401	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SW0501	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13SW0601	SVOC	4-NITROQUINOLINE-1-OXIDE	C
13GWT0901	SVOC	ARAMITE	C
13GWT0902	SVOC	ARAMITE	C
13GWT2001	SVOC	ARAMITE	C
13GWT2002	SVOC	ARAMITE	C
13SB010204	SVOC	ARAMITE	C
13SB020204	SVOC	ARAMITE	C
13SB030204	SVOC	ARAMITE	C
13SB040204	SVOC	ARAMITE	C
13SB050204	SVOC	ARAMITE	C
13SB060204	SVOC	ARAMITE	C
13SB090204	SVOC	ARAMITE	C
13SB100204	SVOC	ARAMITE	C
13SB110204	SVOC	ARAMITE	C
13SB120204	SVOC	ARAMITE	C
13SB130204	SVOC	ARAMITE	C
13SD040004	SVOC	ARAMITE	C
13SD050004	SVOC	ARAMITE	C
13SD060004	SVOC	ARAMITE	C

TABLE H-3

REJECTED DATA
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SNWC CRANE,
CRANE INDIANA

Sample	Fraction	Parameter	Reason for Rejection
13SS010002	SVOC	ARAMITE	C
13SS020002	SVOC	ARAMITE	C
13SS030002	SVOC	ARAMITE	C
13SS040002	SVOC	ARAMITE	C
13SS050002	SVOC	ARAMITE	C
13SS060002	SVOC	ARAMITE	C
13SS090002	SVOC	ARAMITE	C
13SS100002	SVOC	ARAMITE	C
13SS110002	SVOC	ARAMITE	C
13SS120002	SVOC	ARAMITE	C
13SS130002	SVOC	ARAMITE	C
13SS140001	SVOC	ARAMITE	C
13SW0401	SVOC	ARAMITE	C
13SW0501	SVOC	ARAMITE	C
13SW0601	SVOC	ARAMITE	C
13GWT0901	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13GWT0902	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13GWT2001	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13GWT2002	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13SD050004	SVOC	HEXACHLOROCYCLOPENTADIENE	D
13SW0401	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13SW0501	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13SW0601	SVOC	HEXACHLOROCYCLOPENTADIENE	E
13GWT0902	SVOC	KEPONE	C
13GWT2002	SVOC	KEPONE	C
13SS140001	SVOC	KEPONE	C
13GWT0901	SVOC	PHENOL	R
13GWT2001	SVOC	PHENOL	R
13GWT0901	VOC	ACROLEIN	C
13GWT2001	VOC	ACROLEIN	C
13SB060204	VOC	ACROLEIN	C
13SB150204	VOC	ACROLEIN	C
13SS060002	VOC	ACROLEIN	C
13SS150002	VOC	ACROLEIN	C
ROUND 2			
No data were rejected			
ROUND 3			
13VG006010001	EXP	2,4-DIAMINO-6-NITROTOLUENE	D
13VG006010001	EXP	2,6-DIAMINO-4-NITROTOLUENE	D
13VG006010001	EXP	DNX	D
13VG001010001	EXP	TETRYL	E
13VG002020001	EXP	TETRYL	E
13VG003010001	EXP	TETRYL	E

TABLE H-3

REJECTED DATA
ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SNWC CRANE,
CRANE INDIANA
PAGE 4 OF 4

Sample	Fraction	Parameter	Reason for Rejection
13VG004020001	EXP	TETRYL	E
13VG005030001	EXP	TETRYL	E
13VG006010001	EXP	TETRYL	E
13VG007020001	EXP	TETRYL	DE
13VG008030001	EXP	TETRYL	E
13VG009010001	EXP	TETRYL	E
13VG010030001	EXP	TETRYL	E
13VG011020001	EXP	TETRYL	E
13VG012010001	EXP	TETRYL	E
13VG013020001	EXP	TETRYL	E
13VG014030001	EXP	TETRYL	E
13VG015040001	EXP	TETRYL	E
13VG016030001	EXP	TETRYL	E

C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.) Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
H = Holding Time Exceedance
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
EXP = Explosives
HERB = Herbicides
SVOC = Semivolatile organic compounds
VOC = Volatile organice compounds

* Rejection table is based on "normal" samples only which excludes field duplicates

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
Composting Operations		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EXP	1,3,5-TRINITROBENZENE	0.1	5	--	--	3.3
	1,3-DINITROBENZENE	0.0	7	--	--	6.5
	2,4,6-TRINITROTOLUENE	0.0	2.5	--	--	15
	2,4-DINITROTOLUENE	0.1	10	--	--	130
	2,6-DINITROTOLUENE	0.2	10	--	--	65
	2-AMINO-4,6-DINITROTOLUENE	0.0	10	--	--	1400
	2-NITROTOLUENE	0.1	5	--	--	650
	3-NITROTOLUENE	0.2	5	--	--	650
	4-AMINO-2,6-DINITROTOLUENE	0.0	54.3	--	--	65
	4-NITROTOLUENE	0.1	5	--	--	650
	BUTYL ETHER	0.0	5	--	--	--
	HMX	0.0	5	--	--	3300
	PETN	0.2	3.08	--	--	0.25
	RDX	0.0	5	--	--	4.0
	TETRYL	0.3	7	--	--	650
M	ARSENIC	10.3	25.9	--	--	0.32
	BARIUM	69.4	69.4	--	--	5300
	CADMIUM	0.0	1.3	--	--	38
	MERCURY	0.0	1	--	--	23
	SELENIUM	0.4	51.8	--	--	380
	SILVER	0.1	2.6	--	--	380
VOC		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	2-BUTANONE	0	616	--	--	7100000
	4-METHYL-2-PENTANONE	0	308	--	--	770000
	ACETONE	0	1230	--	--	2000000
	METHYLENE CHLORIDE	0	308	--	--	7800
	TOLUENE	0	308	--	--	790000
	TOTAL XYLENES	0	308	--	--	320000
PEST/PCB	AROCLOR-1242	39	7400	--	--	--
	AROCLOR-1254	39	7400	--	--	--
	AROCLOR-1260	39	7400	--	--	--
Round 1		ng/kg	ng/kg	ng/kg	ng/kg	ng/kg
DIOX	1,2,3,4,6,7,8,9-OCDD	46.4	49.4	0.25	0.5	2800
	1,2,3,4,6,7,8,9-OCDF	0.1	3.4	0.25	0.5	2800
	1,2,3,4,6,7,8-HPCDD	1.5	1.5	0.25	0.5	28
	1,2,3,4,6,7,8-HPCDF	0.07	6.2	0.25	0.5	28
	1,2,3,4,7,8,9-HPCDF	0.08	1.5	0.25	0.5	28
	1,2,3,4,7,8-HXCDD	0.09	1.5	0.25	0.5	2.8

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	1,2,3,4,7,8-HXCDF	0.05	1.2	0.25	0.5	2.8
	1,2,3,6,7,8-HXCDD	0.09	1.4	0.25	0.5	2.8
	1,2,3,6,7,8-HXCDF	0.04	0.8	0.25	0.5	2.8
	1,2,3,7,8,9-HXCDD	0.1	2	0.25	0.5	2.8
	1,2,3,7,8,9-HXCDF	0.06	0.9	0.25	0.5	2.8
	1,2,3,7,8-PECDD	0.1	1.1	0.25	0.5	0.28
	1,2,3,7,8-PECDF	0.06	0.7	0.25	0.5	5.6
	2,3,4,6,7,8-HXCDF	0.05	0.8	0.25	0.5	2.8
	2,3,4,7,8-PECDF	0.07	0.66	0.25	0.5	0.56
	2,3,7,8-TCDD	0.07	1.2	0.25	0.5	0.28
	2,3,7,8-TCDF	0.05	0.5	0.25	0.5	2.8
	TOTAL HPCDD	3.3	3.3	--	--	--
	TOTAL HPCDF	0.08	1.9	--	--	--
	TOTAL HXCDD	0.1	2	--	--	--
	TOTAL HXCDF	0.05	0.51	--	--	--
	TOTAL PECDD	0.1	2.8	--	--	--
	TOTAL PECDF	0.07	0.87	--	--	--
	TOTAL TCDD	0.07	5.2	--	--	--
	TOTAL TCDF	0.05	7.9	--	--	--
EXP		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	1800
	1,3-DINITROBENZENE	0.25	0.25	0.25	0.5	0.6547
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	16
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.78
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	HMX	0.25	0.25	0.25	0.5	3100
	NITROBENZENE	0.25	0.25	0.25	0.5	0.007
	PICRAMIC ACID	0.017	0.021	17	33	--
	PICRIC ACID	0.017	0.021	17	33	C
	RDX	0.25	0.25	0.25	0.5	4.4
EXP	TETRYL	0.25	0.25	0.25	0.5	780
HERB		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	HEXACHLOROPHENE	0.62	1.3	0.0067	0.017	0.19878
	PENTACHLOROPHENOL	0.46	0.66	0.00034	0.00068	0.001

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
M		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	ALUMINUM	3610	3610	3.4	25	76000
	ANTIMONY	0.14	3.6	0.01	0.5	0.1423
	BERYLLIUM	0.06	0.64	0.015	0.5	0.1
	CADMIUM	0.09	0.66	0.02	0.5	0.00222
	CALCIUM	58.7	380	1.98	100	--
	LEAD	7.9	15.7	0.01	0.5	0.05373
	LITHIUM	2	6.3	0.055	2.5	1600
	MERCURY	0.002	0.021	0.002	0.02	0.073
	SELENIUM	0.02	0.54	0.02	0.5	0.02765
	SILVER	0.02	0.26	0.015	0.5	2
	SODIUM	12.7	84.9	2.32	50	--
	THALLIUM	0.03	0.26	0.02	0.5	0.04
	TIN	0.22	2.4	0.045	5	7.62
	ZINC	4.5	2510	0.16	5	6.62
MISC	TOTAL ORGANIC CARBON	1000	1000	--	--	--
		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SVOC	1,2,4,5-TETRACHLOROBENZENE	69	150	67	333	2020
	1,2,4-TRICHLOROBENZENE	69	150	67	333	300
	1,2-DICHLOROBENZENE	69	150	67	333	900
	1,3-DICHLOROBENZENE	69	150	67	333	130
	1,4-DICHLOROBENZENE	69	150	67	130	100
	1,4-'--PHTHOQUINONE	69	150	67	333	44
	1,4-PHENYLENEDIAMINE	69	150	67	333	12000000
	1-'--PHTHYLAMINE	69	150	67	333	670
	2,2'-OXYBIS(1-CHLOROPROPANE)	69	150	67	200	--
	2,3,4,6-TETRACHLOROPHENOL	69	150	67	333	198.78
	2,4,5-TRICHLOROPHENOL	69	150	67	333	14000
	2,4,6-TRICHLOROPHENOL	69	150	67	200	8
	2,4-DICHLOROPHENOL	69	150	67	333	50
	2,4-DIMETHYLPHENOL	69	150	67	333	10
	2,4-DINITROPHENOL	69	150	67	670	10
	2,6-DICHLOROPHENOL	69	150	67	333	1170
	2-ACETYLAMINOFLUORENE	69	150	67	333	596.34
	2-CHLORO'--PHTHALENE	69	150	67	130	12.18
	2-CHLOROPHENOL	69	150	67	200	200
	2-METHYL'--PHTHALENE	3.4	4.9	3.3	6.7	700
	2-METHYLPHENOL	69	150	67	333	800
	2-'--PHTHYLAMINE	69	150	67	333	--

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	2-NITROANILINE	69	150	67	130	3500
	2-NITROPHENOL	69	150	67	333	1600
	2-PICOLINE	69	150	67	333	9900
	3&4-METHYLPHENOL	69	150	67	333	310000
	3,3'-DICHLOROBENZIDINE	69	150	67	333	0.3
	3,3'-DIMETHYLBENZIDINE	69	150	67	333	53
SVOC	3-METHYLCHOLANTHRENE	69	150	67	333	77.94
	3-NITROANILINE	69	150	67	333	3500
	4,6-DINITRO-2-METHYLPHENOL	69	150	67	333	144.08
	4-AMINOBIPHENYL	69	150	67	333	--
	4-BROMOPHENYL PHENYL ETHER	69	150	67	130	1500
	4-CHLORO-3-METHYLPHENOL	69	150	67	333	7950
	4-CHLOROANILINE	69	150	67	333	30
	4-CHLOROPHENYL PHENYL ETHER	69	150	67	333	--
	4-NITROANILINE	69	150	67	333	3500
	4-NITROPHENOL	69	150	67	333	5120
	4-NITROQUINOLINE-1-OXIDE	69	150	67	333	--
	5-NITRO-O-TOLUIDINE	69	150	67	333	15000
	7,12-DIMETHYLBENZ(A)ANTHRACENE	69	150	67	333	16300
	A,A-DIMETHYLPHENETHYLAMINE	69	150	67	670	61000
	ACE'--PHTHENE	3.5	4.9	3.3	6.7	29000
	ACE'--PHTHYLENE	3.5	4.9	3.3	6.7	130000
	ACETOPHENONE	69	150	67	333	490
	ANILINE	69	150	67	333	56.78
	ANTHRACENE	3.5	4.9	3.3	6.7	51000
	ARAMITE	69	150	67	333	19000
	BENZO(A)ANTHRACENE	3.5	4.9	3.3	6.7	80
	BENZO(A)PYRENE	3.5	4.9	3.3	6.7	62
	BENZO(B)FLUORANTHENE	3.5	4.3	3.3	6.7	200
	BENZO(G,H,I)PERYLENE	3.5	4.9	3.3	6.7	119000
	BENZO(K)FLUORANTHENE	3.5	4.3	3.3	6.7	2000
	BENZYL ALCOHOL	69	150	67	333	65800
	BIS(2-CHLOROETHOXY)METHANE	69	150	67	333	302.09
	BIS(2-CHLOROETHYL)ETHER	69	150	67	130	0.02
	BIS(2-ETHYLHEXYL)PHTHALATE	69	1000	67	130	925.94
	BUTYL BENZYL PHTHALATE	69	150	67	333	238.89
	CHLOROBENZILATE	69	150	67	333	1800
	CHRYSENE	3.5	4.3	3.3	6.7	4730
	DIALLATE	69	150	67	333	452.14

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	DIBENZO(A,H)ANTHRACENE	3.5	4.9	3.3	6.7	62
	DIBENZOFURAN	69	99	67	333	290000
	DIETHYL PHTHALATE	69	150	67	130	23000
	DIMETHYL PHTHALATE	69	150	67	333	734000
	DI-N-BUTYL PHTHALATE	69	150	67	333	149.79
	DI-N-OCTYL PHTHALATE	69	150	67	333	709000
	DIPHENYLAMINE	69	150	67	333	1010
	ETHYL METHANE SULFO'--TE	69	150	67	333	--
	FLUORANTHENE	3.5	4.3	3.3	6.7	122000
	FLUORENE	3.5	4.9	3.3	6.7	28000
	HEXACHLOROBENZENE	69	150	67	130	100
	HEXACHLOROBUTADIENE	69	150	67	67	39.76
	HEXACHLOROCYCLOPENTADIENE	69	150	67	130	755.37
	HEXACHLOROETHANE	69	150	67	130	20
	HEXACHLOROPROPENE	69	150	67	333	20000
	INDENO(1,2,3-CD)PYRENE	3.5	4.9	3.3	6.7	620
SVOC	ISODRIN	69	150	67	333	3.32
	ISOPHORONE	69	150	67	333	30
	ISOSAFROLE	69	150	67	333	9940
	KEPONE	69	150	67	333	27
	METHAPYRILENE	69	150	67	333	2780
	METHYL METHANE SULFO'--TE	69	150	67	333	315.49
	--PHTHALENE	3.4	4.9	3.3	6.7	99.39
	N-NITROSODIETHYLAMINE	69	150	67	333	3.2
	N-NITROSODIMETHYLAMINE	69	150	67	333	0.0321
	N-NITROSO-DI-N-BUTYLAMINE	69	150	67	333	24
	N-NITROSO-DI-N-PROPYLAMINE	69	150	67	130	0.002
	N-NITROSOMETHYLETHYLAMINE	69	150	67	333	1.66
	N-NITROSOMORPHOLINE	69	150	67	333	70.57
	N-NITROSOPIPERIDINE	69	150	67	333	6.65
	N-NITROSOPYRROLIDINE	69	150	67	333	12.58
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	69	150	67	333	58250
	O-TOLUIDINE	69	150	67	333	2000
	P-(DIMETHYLAMINO)AZOBENZENE	69	150	67	333	--
	PENTACHLOROBENZENE	69	150	67	333	496.95
	PENTACHLOROETHANE	69	150	67	333	10700
	PENTACHLORONITROBENZENE	69	150	67	333	1900
	PHE'--CETIN	69	150	67	333	11700
	PHE'--NTHRENE	3.5	4.3	3.3	6.7	45700

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	PHENOL	69	150	67	333	5000
	PRO'--MIDE	69	150	67	333	13.6
	PYRENE	3.5	4.3	3.3	6.7	78500
	PYRIDINE	69	150	67	333	1030
	SAFROLE	69	150	67	333	403.98
VOC	1,1,1,2-TETRACHLOROETHANE	1	1.4	1	3	50
	1,1,1-TRICHLOROETHANE	1	1.4	1	3	100
	1,1,2,2-TETRACHLOROETHANE	1	1.4	1	3	0.2
	1,1,2-TRICHLOROETHANE	1	1.4	1	3	0.9
	1,1-DICHLOROETHANE	1	1.4	1	3	1000
	1,1-DICHLOROETHENE	1	1.4	1	3	3
	1,2,3-TRICHLOROPROPANE	1	1.4	1	3	1.4
	1,2-DIBROMO-3-CHLOROPROPANE	1	1.4	1	3	35.18
	1,2-DIBROMOETHANE	1	1.4	1	3	6.9
	1,2-DICHLOROETHANE	1	1.4	1	3	1
	1,2-DICHLOROPROPANE	1	1.4	1	3	1
	1,4-DIOXANE	100	140	100	200	2050
	2-BUTANONE	1	1.4	1	15	10000
	2-HEXANONE	1	1.4	1	15	12600
	3-CHLOROPROPENE	1	1.4	1	10	3000000
	4-METHYL-2-PENTANONE	1	1.4	1	15	443000
	ACETONE	1	8	1	15	800
	ACETONITRILE	41	56	40	80	1370
	ACROLEIN	1	1.4	1	50	0.23
	ACRYLONITRILE	1	1.4	1	10	210
	BENZENE	1	1.4	1	3	2
VOC	BROMODICHLOROMETHANE	1	1.4	1	3	30
	BROMOFORM	1	1.4	1	3	40
	BROMOMETHANE	1	1.4	1	3	10
	CARBON DISULFIDE	1	1.4	1	3	94.12
	CARBON TETRACHLORIDE	1	1.4	1	3	3
	CHLOROBENZENE	1	1.4	1	3	70
	CHLORODIBROMOMETHANE	1	1.4	1	3	20
	CHLOROETHANE	1	1.4	1	3	3000
	CHLOROFORM	1	1.4	1	3	30
	CHLOROMETHANE	1	1.4	1	3	1200
	CHLOROPRENE	1	1.4	1	3	3600
	CIS-1,2-DICHLOROETHENE	1	1.4	1	3	20
	CIS-1,3-DICHLOROPROPENE	1	1.4	1	3	0.2

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	DIBROMOMETHANE	1	1.4	1	3	67000
	DICHLORODIFLUOROMETHANE	1	1.4	1	3	39500
	ETHYL METHACRYLATE	1	1.4	1	3	30000
	ETHYLBENZENE	1	1.4	1	3	700
	ISOBUTANOL	41	56	40	80	20800
	METHACRYLONITRILE	1	1.4	1	3	57.05
	METHYL IODIDE	1	1.4	1	3	--
	METHYL METHACRYLATE	1	1.4	1	30	984000
	METHYLENE CHLORIDE	1	13	1	3	1
	PROPIONITRILE	41	56	40	80	49.83
	STYRENE	1	1.4	1	3	200
	TETRACHLOROETHENE	1	1.4	1	3	3
	TOLUENE	1	1.4	1	3	600
	TOTAL XYLENES	1	1.4	1	10	9000
	TRANS-1,2-DICHLOROETHENE	1	1.4	1	3	30
	TRANS-1,3-DICHLOROPROPENE	1	1.4	1	3	0.2
	TRANS-1,4-DICHLORO-2-BUTENE	1	1.4	1	10	7.9
	TRICHLOROETHENE	1	1.4	1	3	3
	TRICHLOROFLUOROMETHANE	1	1.3	1	3	16400
	VINYL ACETATE	1	1.4	1	30	2300
	VINYL CHLORIDE	1	1.4	1	3	0.7
PEST/PCB	AROCLOR-1016	18	25	17	33	679.71
	AROCLOR-1221	35	50	34	67	220
	AROCLOR-1232	18	25	17	33	220
	AROCLOR-1242	18	25	17	33	220
	AROCLOR-1248	18	22	17	33	220
	AROCLOR-1254	18	25	17	33	220
	AROCLOR-1260	18	25	17	33	220
Round 2						
M	BERYLLIUM	0.63	0.87	0.015	0.5	32
	CADMIUM	0.47	1	0.02	0.5	0.38
	SELENIUM	0.37	0.82	0.02	0.5	0.26
	SILVER	0.06	0.16	0.015	0.5	1.6
	SODIUM	30.5	53	2.3185	50	--
	THALLIUM	0.24	0.32	0.02	0.5	0.04
	TIN	0.82	0.92	0.045	5	47000
VOC	1,1,1,2-TETRACHLOROETHANE	0.814	1.18	1	3	7.1
	1,1,1-TRICHLOROETHANE	0.814	1.18	1	3	97
	1,1,2,2-TETRACHLOROETHANE	0.814	1.18	1	3	0.17

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	1,1,2-TRICHLOROETHANE	0.814	1.18	1	3	0.91
	1,1-DICHLOROETHANE	0.814	1.18	1	3	1000
	1,1-DICHLOROETHENE	0.814	1.18	1	3	2.9
	1,2,3-TRICHLOROPROPANE	0.814	1.18	1	3	0.0037
	1,2-DIBROMO-3-CHLOROPROPANE	0.814	1.18	1	3	0.092
	1,2-DIBROMOETHANE	0.814	1.18	1	3	0.029
	1,2-DICHLOROETHANE	0.814	1.18	1	3	1.2
	1,2-DICHLOROPROPANE	0.814	1.18	1	3	1.5
	1,4-DIOXANE	106	145	0.1	200	1.7
	2-BUTANONE	0.814	1.18	1	10	4400
	2-HEXANONE	0.814	1.18	1	10	--
	3-CHLOROPROPENE	0.814	1.18	1	10	1800
	4-METHYL-2-PENTANONE	0.814	1.18	1	10	620
	ACETONE	0.978	1.18	1	10	730
	ACETONITRILE	42.4	58	40	80	420000
	ACROLEIN	0.814	1.18	1	10	0.23
	ACRYLONITRILE	0.814	101	1	10	0.032
	BENZENE	0.814	1.18	1	3	1.7
	BROMODICHLOROMETHANE	0.814	1.18	1	3	32
	BROMOFORM	0.814	1.18	1	3	38
	BROMOMETHANE	0.814	1.18	1	3	12
	CARBON DISULFIDE	0.814	1.18	1	3	1500
	CARBON TETRACHLORIDE	0.814	1.18	1	3	3.3
	CHLOROBENZENE	0.814	1.18	1	3	65
	CHLORODIBROMOMETHANE	0.814	1.18	1	3	32
	CHLOROETHANE	0.814	1.18	1	3	330
	CHLOROFORM	0.814	1.18	1	3	29
	CHLOROMETHANE	0.814	1.18	1	3	2
	CHLOROPRENE	0.814	1.18	1	10	560
	CIS-1,2-DICHLOROETHENE	0.814	1.12	1	3	20
	CIS-1,3-DICHLOROPROPENE	0.814	1.18	1	3	0.3
	DIBROMOMETHANE	0.814	1.18	1	3	77
	ETHYL METHACRYLATE	0.814	1.18	1	10	810
	ETHYLBENZENE	0.814	1.18	1	3	670
	ISOBUTANOL	42.4	58	40	80	2300
	METHACRYLONITRILE	0.814	1.18	1	10	1
	METHYL IODIDE	0.814	1.18	1	10	--
	METHYL METHACRYLATE	0.814	1.18	1	10	12000
	METHYLENE CHLORIDE	14	28	1	3	1.2

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	PROPIONITRILE	42.4	58	40	80	--
	STYRENE	0.814	1.18	1	3	180
	TETRACHLOROETHENE	0.814	1.18	1	3	2.9
	TOLUENE	0.814	1.18	1	3	590
	TRANS-1,2-DICHLOROETHENE	0.814	1.18	1	3	34
	TRANS-1,3-DICHLOROPROPENE	0.814	1.18	1	3	0.3
	TRANS-1,4-DICHLORO-2-BUTENE	0.814	1.18	1	10	--
VOC	TRICHLOROFLUOROMETHANE	0.814	1.18	1	3	8000
	VINYL ACETATE	0.814	1.18	1	10	2300
	VINYL CHLORIDE	0.814	1.18	1	3	0.67
PEST/PCB	AROCLOR-1016	17	21	17	33	2.8
	AROCLOR-1221	17	21	17	33	220
	AROCLOR-1232	17	21	17	33	220
	AROCLOR-1242	17	21	17	33	2.8
	AROCLOR-1248	17	17	17	33	220
	AROCLOR-1254	17	21	17	33	17
	AROCLOR-1260	17	21	17	33	25
Round 3						
PEST/PCB		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	AROCLOR-1016	8.8	11	17	33	2.8
	AROCLOR-1221	8.8	11	17	33	220
	AROCLOR-1232	8.8	11	17	33	220
	AROCLOR-1242	8.8	11	17	33	2.8
	AROCLOR-1248	8.8	10	17	33	220
	AROCLOR-1254	8.8	11	17	33	17
	AROCLOR-1260	8.8	11	17	33	25

DIOX - Dioxins and furans
EXP - Explosives
HERB - Herbicides
M - Metals
MISC - Miscellanous
-- - Not available for the composting operation.
SVOC - Semivolatile organic compounds
VOC - Volatile organic compounds
PEST - Pesticides
PCB- Polychlori'--ted biphenyls

TABLE H-4

SOIL MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, COMPOSTING DATA, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B 146) [1]
NSWC CRANE
CRANE, INDIANA
PAGE 10 OF 10

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]

RL - Reporting limit (comparable to quantitation limit)
TV - A'--lytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
-- - Not applicable

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. A'--lytes that did not exhibit any concentrations less than detection limits are not shown.
2 Some non-detect values were reported as "0". The zero-values were replaced with the next lowest nondetect value.
3 RBTL is the lowest of all risk-based target levels except for composting data. Composting data RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference). Dioxin RBTLs were incorrect in the QAPP; correct values are provided above.

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 7

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
Composting Operations						
NA	NA	NA	NA	NA	NA	NA
Round 1						
		mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
AVS/SEM	CADMIUM	0.001	0.002	0.02	0.5	0.4
	LEAD	0.006	0.006	0.01	0.5	31
	MERCURY	0.00003	0.00004	0.002	0.02	0.1
	ZINC	0.031	0.426	0.16	5	120
EXP	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	1800
	1,3-DINITROBENZENE	0.25	0.25	0.25	0.5	0.000924
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	16
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	4.7
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	370
	HMX	0.25	0.25	0.25	0.5	3100
	NITROBENZENE	0.25	0.25	0.25	0.5	0.007
	PICRAMIC ACID	0.019	0.029	17	33	--
	PICRIC ACID	0.019	0.029	17	33	--
	RDX	0.25	0.25	0.25	0.5	4.4
	TETRYL	0.25	0.25	0.25	0.5	780
		ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
HERB	HEXACHLOROPHENE	0.00071	0.0011	0.0067	0.017	18
	PENTACHLOROPHENOL	0.00055	0.0006	0.00034	0.00068	0.001
		mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
M	ANTIMONY	0.13	0.74	0.01	0.5	0.3
	ARSENIC	0.53	0.53	0.015	0.5	5.9
	BERYLLIUM	0.18	0.52	0.015	0.5	0.1
	CADMIUM	0.17	0.45	0.02	0.5	0.4
	MERCURY	0.01	0.044	0.002	0.02	0.1
	SELENIUM	0.02	0.33	0.02	0.5	0.3
	SILVER	0.02	0.54	0.015	0.5	0.5
	SODIUM	11.7	126	2.32	50	--
	THALLIUM	0.05	0.34	0.02	0.5	0.04
	TIN	0.31	0.64	0.045	5	47000
	ZINC	33.4	386	0.16	5	120

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
MISC	TOTAL ORGANIC CARBON	1000	1000	--	--	--
SVOC		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	1,2,4,5-TETRACHLOROBENZENE	79	120	67	333	18000
	1,2,4-TRICHLOROBENZENE	79	120	67	333	300
	1,2-DICHLOROBENZENE	79	120	67	333	231.32
	1,3-DICHLOROBENZENE	79	120	67	333	130
SVOC	1,4-DICHLOROBENZENE	79	120	67	130	100
	1,4-NAPHTHOQUINONE	79	120	67	333	44
	1,4-PHENYLENEDIAMINE	79	120	67	333	12000000
	1-NAPHTHYLAMINE	79	120	67	333	670
	2,2'-OXYBIS(1-CHLOROPROPANE)	79	120	67	200	--
	2,3,4,6-TETRACHLOROPHENOL	79	120	67	333	1510
	2,4,5-TRICHLOROPHENOL	79	120	67	333	85.56
	2,4,6-TRICHLOROPHENOL	79	120	67	200	8
	2,4-DICHLOROPHENOL	79	120	67	333	50
	2,4-DIMETHYLPHENOL	79	120	67	333	304.53
	2,4-DINITROPHENOL	79	120	67	670	1.33
	2,6-DICHLOROPHENOL	79	120	67	333	3.94
	2-ACETYLAMINOFLUORENE	79	120	67	333	15.32
	2-CHLORONAPHTHALENE	79	120	67	130	417.23
	2-CHLOROPHENOL	79	120	67	200	11.7
	2-METHYLNAPHTHALENE	3.9	5.8	3.3	6.7	20.2
	2-METHYLPHENOL	79	120	67	333	0.826
	2-NAPHTHYLAMINE	79	120	67	333	--
	2-NITROANILINE	79	120	67	130	0.222
	2-NITROPHENOL	79	120	67	333	7.77
	2-PICOLINE	79	120	67	333	753.05
	3&4-METHYLPHENOL	79	120	67	333	28220
	3,3'-DICHLOROBENZIDINE	79	120	67	333	0.3
	3,3'-DIMETHYLBENZIDINE	79	120	67	333	53
	3-METHYLCHOLANTHRENE	79	120	67	333	8190000
	3-NITROANILINE	79	120	67	333	3500
	4,6-DINITRO-2-METHYLPHENOL	79	120	67	333	10.38
	4-AMINOBIPHENYL	79	120	67	333	--
	4-BROMOPHENYL PHENYL ETHER	79	120	67	130	1550
	4-CHLORO-3-METHYLPHENOL	79	120	67	333	388.18
	4-CHLOROANILINE	79	120	67	333	30
	4-CHLOROPHENYL PHENYL ETHER	79	120	67	333	--
	4-NITROANILINE	79	120	67	333	3500

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	4-NITROPHENOL	79	120	67	333	7.78
	4-NITROQUINOLINE-1-OXIDE	79	120	67	333	--
	5-NITRO-O-TOLUIDINE	79	120	67	333	15000
	7,12-DIMETHYLBENZ(A)ANTHRACENE	79	120	67	333	66400
	A,A-DIMETHYLPHENETHYLAMINE	79	120	67	670	61000
	ACENAPHTHENE	3.9	5.9	3.3	6.7	6.71
	ACENAPHTHYLENE	3.9	5.8	3.3	6.7	5.87
	ACETOPHENONE	79	120	67	333	246
	ANILINE	79	120	67	333	0.0338
	ANTHRACENE	3.9	4.4	3.3	6.7	46.9
	ARAMITE	79	120	67	333	0.00111
	BENZO(A)ANTHRACENE	4.3	4.4	3.3	6.7	31.7
	BENZO(A)PYRENE	3.9	4.4	3.3	6.7	31.9
	BENZO(B)FLUORANTHENE	3.9	4.4	3.3	6.7	200
	BENZO(G,H,I)PERYLENE	4.3	4.4	3.3	6.7	170
	BENZO(K)FLUORANTHENE	3.9	4.4	3.3	6.7	240
SVOC	BENZYL ALCOHOL	79	120	67	333	33.94
	BIS(2-CHLOROETHOXY)METHANE	79	120	67	333	349.71
	BIS(2-CHLOROETHYL)ETHER	79	120	67	130	0.02
	BIS(2-ETHYLHEXYL)PHTHALATE	83	1000	67	130	182
	BUTYL BENZYL PHTHALATE	79	120	67	333	4190
	CHLOROBENZILATE	79	120	67	333	860.29
	CHRYSENE	4.4	4.4	3.3	6.7	57.1
	DIALLATE	79	120	67	333	1.51
	DIBENZO(A,H)ANTHRACENE	3.9	5.9	3.3	6.7	6.22
	DIBENZOFURAN	79	120	67	333	1520
	DIETHYL PHTHALATE	79	120	67	130	8.04
	DIMETHYL PHTHALATE	79	120	67	333	24.95
	DI-N-BUTYL PHTHALATE	79	120	67	333	110.5
	DI-N-OCTYL PHTHALATE	79	120	67	333	40600
	DIPHENYLAMINE	79	120	67	333	34.6
	ETHYL METHANE SULFONATE	79	120	67	333	--
	FLUORENE	3.9	5.9	3.3	6.7	21.2
	HEXACHLOROBENZENE	79	120	67	130	20
	HEXACHLOROBUTADIENE	79	120	67	67	100
	HEXACHLOROCYCLOPENTADIENE	79	120	67	130	900.74
	HEXACHLOROETHANE	79	120	67	130	20
	HEXACHLOROPROPENE	79	120	67	333	0.2
	INDENO(1,2,3-CD)PYRENE	4.1	4.4	3.3	6.7	200

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	ISODRIN	79	120	67	333	55.16
	ISOPHORONE	79	120	67	333	30
	ISOSAFROLE	79	120	67	333	4.12
	KEPONE	79	120	67	333	3.31
	METHAPYRILENE	79	120	67	333	0.0144
	METHYL METHANE SULFONATE	79	120	67	333	0.00474
	NAPHTHALENE	4.1	5.9	3.3	6.7	34.6
	N-NITROSODIETHYLAMINE	79	120	67	333	3.2
	N-NITROSODIMETHYLAMINE	79	120	67	333	0.00275
	N-NITROSO-DI-N-BUTYLAMINE	79	120	67	333	24
	N-NITROSO-DI-N-PROPYLAMINE	79	120	67	130	0.002
	N-NITROSOMETHYLETHYLAMINE	79	120	67	333	0.00485
	N-NITROSOMORPHOLINE	79	120	67	333	0.0037
	N-NITROSOPIPERIDINE	79	120	67	333	0.0226
	N-NITROSOPYRROLIDINE	79	120	67	333	0.000908
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	79	120	67	333	58250
	O-TOLUIDINE	79	120	67	333	2000
	P-(DIMETHYLAMINO)AZOBENZENE	79	120	67	333	--
	PENTACHLOROBENZENE	79	120	67	333	1260
	PENTACHLOROETHANE	79	120	67	333	689.18
	PENTACHLORONITROBENZENE	79	120	67	333	1900
	PHENACETIN	79	120	67	333	2.25
	PHENANTHRENE	4.3	4.3	3.3	6.7	41.9
	PHENOL	79	120	67	333	27.26
	PRONAMIDE	79	120	67	333	1.6
	PYRIDINE	79	120	67	333	106.17
SVOC	SAFROLE	79	120	67	333	164.86
Round 2						
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EXP	1,3,5-TRINITROBENZENE	0.25	0.25	0.25	0.5	0.000121
	1,3-DINITROBENZENE	0.25	0.25	0.25	0.5	0.000924
	2,4,6-TRINITROTOLUENE	0.25	0.25	0.25	0.5	--
	2,4-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.07513
	2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	0.02062
	2-AMINO-4,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	--
	2-NITROTOLUENE	0.25	0.25	0.25	0.5	--
	3-NITROTOLUENE	0.25	0.25	0.25	0.5	--
	4-AMINO-2,6-DINITROTOLUENE	0.25	0.25	0.25	0.5	--
	4-NITROTOLUENE	0.25	0.25	0.25	0.5	--

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	HMX	0.25	0.25	0.25	0.5	--
	NITROBENZENE	0.25	0.25	0.25	0.5	0.4876
	RDX	0.25	0.25	0.25	0.5	--
	TETRYL	0.25	0.25	0.25	0.5	--
M	SILVER	0.01	0.8	0.015	0.5	0.5
	SODIUM	9.8	34.1	2.3185	50	--
	THALLIUM	0.08	0.28	0.02	0.5	0.05692
	TIN	0.17	1.8	0.045	5	7.62
		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
VOC	1,1,1,2-TETRACHLOROETHANE	1	1.58	1	3	10.89
	1,1,1-TRICHLOROETHANE	1	1.58	1	3	246.85
	1,1,2,2-TETRACHLOROETHANE	1	1.58	1	3	29.08
	1,1,2-TRICHLOROETHANE	1	1.58	1	3	673.51
	1,1-DICHLOROETHANE	1	1.58	1	3	0.575
	1,1-DICHLOROETHENE	1	1.58	1	3	23.27
	1,2,3-TRICHLOROPROPANE	1	1.58	1	3	8.35
	1,2-DIBROMO-3-CHLOROPROPANE	1	1.58	1	3	19.98
	1,2-DIBROMOETHANE	1	1.58	1	3	12.37
	1,2-DICHLOROETHANE	1	1.58	1	3	54.18
	1,2-DICHLOROPROPANE	1	1.58	1	3	351.61
	1,4-DIOXANE	0.158	137	0.1	200	0.00543
	2-BUTANONE	1	1.58	1	10	136.96
	2-HEXANONE	1	1.58	1	10	1010
	3-CHLOROPROPENE	1	1.58	1	10	0.266
	4-METHYL-2-PENTANONE	1	1.58	1	10	544.37
	ACETONE	1.1	1.3	1	10	453.37
	ACETONITRILE	45.1	63.1	40	80	139.05
	ACROLEIN	1	1.58	1	10	0.0144
	ACRYLONITRILE	1	1.58	1	10	0.0157
	BENZENE	1	1.58	1	3	141.57
	BROMODICHLOROMETHANE	1	1.58	1	3	1.13
	BROMOFORM	1	1.58	1	3	996.27
	BROMOMETHANE	1	1.58	1	3	235.16
	CARBON DISULFIDE	1	1.58	1	3	94.12
	CARBON TETRACHLORIDE	1	1.58	1	3	35.73
	CHLOROBENZENE	1	1.58	1	3	61.94
VOC	CHLORODIBROMOMETHANE	1	1.58	1	3	1.13
	CHLOROETHANE	1	1.58	1	3	58600
	CHLOROFORM	1	1.58	1	3	27

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	CHLOROMETHANE	1	1.58	1	3	0.0785
	CHLOROPRENE	1	1.58	1	10	1.06
	CIS-1,2-DICHLOROETHENE	1	1.58	1	3	208.94
	CIS-1,3-DICHLOROPROPENE	1	1.58	1	3	2.96
	DIBROMOMETHANE	1	1.58	1	3	0.0859
	DICHLORODIFLUOROMETHANE	1.1	1.58	1	3	1.33
	ETHYL METHACRYLATE	1	1.58	1	10	0.602
	ETHYLBENZENE	1	1.58	1	3	0.1
	ISOBUTANOL	45.1	63.1	40	80	3350
	METHACRYLONITRILE	1	1.58	1	10	0.0297
	METHYL IODIDE	1	1.58	1	10	0.305
	METHYL METHACRYLATE	1	1.58	1	10	167.56
	METHYLENE CHLORIDE	1	6	1	3	1260
	PROPIONITRILE	45.1	63.1	40	80	49.83
	STYRENE	1	1.58	1	3	444.96
	TETRACHLOROETHENE	1	1.58	1	3	195.83
	TOLUENE	1	1.58	1	3	5450
	TOTAL XYLENES	1	1.58	1	3	1880
	TRANS-1,2-DICHLOROETHENE	1	1.58	1	3	208.94
	TRANS-1,3-DICHLOROPROPENE	1	1.58	1	3	2.96
	TRANS-1,4-DICHLORO-2-BUTENE	1	1.58	1	10	1.82
	TRICHLOROETHENE	1	1.58	1	3	179.56
	TRICHLOROFLUOROMETHANE	1	1.58	1	3	3.07
	VINYL ACETATE	1	1.58	1	10	12.95
	VINYL CHLORIDE	1	1.58	1	3	2
PAH	2-METHYLNAPHTHALENE	4.4	4.6	3.3	6.7	20.2
	ACENAPHTHENE	4.3	4.6	3.3	6.7	6.71
	ACENAPHTHYLENE	4.3	4.6	3.3	6.7	5.87
	ANTHRACENE	4.3	4.6	3.3	6.7	46.9
	BENZO(A)PYRENE	4.6	4.6	3.3	6.7	31.9
	BENZO(B)FLUORANTHENE	4.6	4.6	3.3	6.7	10400
	BENZO(G,H,I)PERYLENE	4.6	4.6	3.3	6.7	170
	BENZO(K)FLUORANTHENE	4.6	4.6	3.3	6.7	240
	CHRYSENE	4.6	4.6	3.3	6.7	57.1
	DIBENZO(A,H)ANTHRACENE	4.3	4.6	3.3	6.7	6.22
	FLUORANTHENE	4.6	4.6	3.3	6.7	111.3
	FLUORENE	4.3	4.6	3.3	6.7	21.2
	INDENO(1,2,3-CD)PYRENE	4.6	4.6	3.3	6.7	200
	NAPHTHALENE	4.3	4.6	3.3	6.7	34.6

TABLE H-5

SEDIMENT MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	PHENANTHRENE	4.6	4.6	3.3	6.7	41.9
	PYRENE	4.6	4.6	3.3	6.7	53
Round 3		**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
M	BERYLLIUM	0.65	0.65	0.015	0.5	32
	MERCURY	0.026	0.076	0.002	0.02	0.073
	SELENIUM	0.37	0.37	0.02	0.5	0.26
	SILVER	0.044	0.08	0.015	0.5	1.6
	SODIUM	43.5	79.6	2.3185	50	NA
	THALLIUM	0.09	0.22	0.02	0.5	0.04
	TIN	0.39	1.1	0.045	5	47000

EXP - Explosives
HERB - Herbicides
M - Metals
MISC - Miscellanous
PAH - Polycyclic aromatic hydrocarbons
SVOA - Semivolatile organic compounds
RL - Reporting limit (comparable to quantitation limit)
TV - Analytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
VOC - Volatile organic compounds
-- Not applicable
concentrations less than detection limits are not shown.
2 Some non-detect values were reported as "0". The zero-values were replaced with the next lowest nondetect value.
3 RBTL is the lowest of all risk-based target levels except for composting data. Composting data
RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
Composting Operations						
NA	NA	NA	NA	NA	NA	NA
Round 1						
EXP		ug/L	ug/L	ug/L	ug/L	ug/L
	1,3,5-TRINITROBENZENE	0.08	0.65	0.35	0.65	1100
	1,3-DINITROBENZENE	0.08	0.65	0.35	0.65	2.36
	2,4,6-TRINITROTOLUENE	0.08	0.65	0.35	0.65	2.2
	2,4-DINITROTOLUENE	0.08	0.65	0.35	0.65	1.3
	2,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	1.3
	2-AMINO-4,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	2.2
	2-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	3-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	4-AMINO-2,6-DINITROTOLUENE	0.08	0.65	0.35	0.65	--
	4-NITROTOLUENE	0.08	0.65	0.35	0.65	61
	HMX	0.135	0.65	0.35	0.65	1800
	NITROBENZENE	0.08	0.65	0.35	0.65	3.4
	PICRAMIC ACID	0.39	0.39	0.5	1	--
	PICRIC ACID	0.39	0.39	0.5	1	--
	RDX	0.13	0.6	0.35	0.61	0.61
	TETRYL	0.08	0.65	0.35	0.65	360
HERB	HEXACHLOROPHENE	0.025	0.025	0.01	0.02	0.228
	PENTACHLOROPHENOL	0.013	0.013	0.01	0.02	0.56
M	ALUMINUM	47.3	60.6	6.8	50	50
	ANTIMONY	0.03	2.4	0.02	1	6
	ARSENIC	0.07	0.66	0.03	1	0.045
	BERYLLIUM	0.03	1.6	0.03	1	4
	CADMIUM	0.05	1.9	0.04	1	0.66
	CALCIUM	2580	2580	3.96	200	--
	CHROMIUM	0.02	0.82	0.02	1	11
	COPPER	0.06	1.1	0.06	2	5
	IRON	24.7	117	2.22	50	300
	LEAD	0.03	2	0.02	1	1.3
	LITHIUM	0.72	0.72	0.11	5	730
	MANGANESE	56.3	57.6	0.04	5	50
	MERCURY	0.02	0.2	0.02	0.2	0.0013
	POTASSIUM	3390	3390	4.33	100	--
	SELENIUM	0.05	1.1	0.04	1	5
	SILVER	0.04	1.2	0.03	1	1
	THALLIUM	0.04	1.3	0.04	1	0.56
	TIN	0.03	1.3	0.09	10	73
	TITANIUM	1.9	2.1	0.06	5	--
	VANADIUM	0.05	0.72	0.05	2	19

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
MF	ANTIMONY	0.03	0.36	0.02	1	6
	ARSENIC	0.36	0.51	0.03	1	0.045
	BERYLLIUM	0.05	1.1	0.03	1	4
	CADMIUM	0.13	1	0.04	1	0.66
MF	CHROMIUM	0.2	0.81	0.02	1	11
	COPPER	0.63	0.63	0.06	2	5
	LEAD	0.21	0.91	0.02	1	1.3
	MERCURY	0.02	0.2	0.02	0.2	0.0013
	SELENIUM	0.19	0.33	0.04	1	5
	SILVER	0.04	0.53	0.03	1	1
	THALLIUM	0.04	1.2	0.04	1	0.56
	TIN	0.03	0.34	0.09	10	73
	TITANIUM	2.8	2.8	0.06	5	--
	VANADIUM	0.05	0.8	0.05	2	19
		mg/L	**mg/L**	**mg/L**	**mg/L**	**mg/L**
MISC	AMMONIA-N	0.01	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.02	0.02	0.025	0.05	--
		ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**
SVOC	1,2,4,5-TETRACHLOROBENZENE	1	1	1	5	11
	1,2,4-TRICHLOROBENZENE	1	1	1	5	69.2
	1,2-DICHLOROBENZENE	1	1	1	5	11
	1,3-DICHLOROBENZENE	1	1	1	5	5.5
	1,4-DICHLOROBENZENE	1	1	1	2	0.5
	1,4-NAPHTHOQUINONE	1	1	1	5	0.044
	1,4-PHENYLENEDIAMINE	1	1	1	5	6900
	1-NAPHTHYLAMINE	1	1	1	5	0.67
	2,2'-OXYBIS(1-CHLOROPROPANE)	1	1	1	3	--
	2,3,4,6-TETRACHLOROPHENOL	1	1	1	5	14.06
	2,4,5-TRICHLOROPHENOL	1	1	1	5	3600
	2,4,6-TRICHLOROPHENOL	1	1	1	3	2
	2,4-DICHLOROPHENOL	1	1	1	5	18
	2,4-DIMETHYLPHENOL	1	1	1	5	100.17
	2,4-DINITROPHENOL	1	1	1	10	4.07
	2,6-DICHLOROPHENOL	1	1	1	5	--
	2-ACETYLAMINOFLUORENE	1	1	1	5	534.97
	2-CHLORONAPHTHALENE	1	1	1	2	0.396
	2-CHLOROPHENOL	1	1	1	3	8.8
	2-METHYLNAPHTHALENE	0.05	0.05	0.05	0.1	6.2
	2-METHYLPHENOL	1	1	1	5	1800
	2-NAPHTHYLAMINE	1	1	1	10	--
	2-NITROANILINE	1	1	1	2	2.1
	2-NITROPHENOL	1	1	1	5	13.5
	2-PICOLINE	1	1	1	5	3790
	3&4-METHYLPHENOL	1	1	1	5	180
	3,3'-DICHLOROBENZIDINE	1	1	1	5	0.15
	3,3'-DIMETHYLBENZIDINE	1	1	1	5	0.0073
	3-METHYLCHOLANTHRENE	1	1	1	5	0.0891

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	3-NITROANILINE	1	1	1	5	2.1
	4,6-DINITRO-2-METHYLPHENOL	1	1	1	5	2.3
	4-AMINOBIPHENYL	1	1	1	5	--
	4-BROMOPHENYL PHENYL ETHER	1	1	1	2	1.5
	4-CHLORO-3-METHYLPHENOL	1	1	1	5	34.79
	4-CHLOROANILINE	1	1	1	5	150
SVOA	4-CHLOROPHENYL PHENYL ETHER	1	1	1	5	--
	4-NITROANILINE	1	1	1	5	2.1
	4-NITROPHENOL	1	1	1	5	35
	4-NITROQUINOLINE-1-OXIDE	1	1	1	5	--
	5-NITRO-O-TOLUIDINE	1	1	1	5	2
	7,12-DIMETHYLBENZ(A)ANTHRACENE	1	1	1	5	0.548
	A,A-DIMETHYLPHENETHYLAMINE	1	1	1	10	36
	ACENAPHTHENE	0.05	0.05	0.05	0.1	9.9
	ACENAPHTHYLENE	0.05	0.05	0.05	0.1	370
	ACETOPHENONE	1	1	1	5	0.042
	ANILINE	1	1	1	5	0.44
	ANTHRACENE	0.05	0.05	0.05	0.1	0.029
	ARAMITE	1	1	1	5	2.7
	BENZO(A)ANTHRACENE	0.05	0.05	0.05	0.1	0.092
	BENZO(A)PYRENE	0.05	0.05	0.05	0.1	0.0092
	BENZO(B)FLUORANTHENE	0.05	0.05	0.05	0.1	0.092
	BENZO(G,H,I)PERYLENE	0.05	0.05	0.05	0.1	7.64
	BENZO(K)FLUORANTHENE	0.05	0.05	0.05	0.1	0.0056
	BENZYL ALCOHOL	1	1	1	5	281.24
	BIS(2-CHLOROETHOXY)METHANE	1	1	1	5	6400
	BIS(2-CHLOROETHYL)ETHER	1	1	1	2	0.0098
	BIS(2-ETHYLHEXYL)PHTHALATE	1	1	1	1	2.1
	BUTYL BENZYL PHTHALATE	1	1	1	5	49
	CHLOROBENZILATE	1	1	1	5	0.25
	CHRYSENE	0.05	0.05	0.05	0.1	0.033
	DIALLATE	1	1	1	5	1.1
	DIBENZO(A,H)ANTHRACENE	0.05	0.05	0.05	0.1	0.0016
	DIBENZOFURAN	1	1	1	5	20
	DIETHYL PHTHALATE	1	1	1	2	3
	DIMETHYL PHTHALATE	1	1	1	5	73
	DI-N-BUTYL PHTHALATE	1	1	1	2	3
	DI-N-OCTYL PHTHALATE	1	1	1	5	20
	DIPHENYLAMINE	1	1	1	5	412.51
	ETHYL METHANE SULFONATE	1	1	1	5	--
	FLUORANTHENE	0.05	0.05	0.05	0.1	8.1
	FLUORENE	0.05	0.05	0.05	0.1	3.9
	HEXACHLOROBENZENE	1	1	1	2	0.00024
	HEXACHLOROBUTADIENE	1	1	1	1	0.223
	HEXACHLOROCYCLOPENTADIENE	1	1	1	2	50
	HEXACHLOROETHANE	1	1	1	2	4.8
	HEXACHLOROPROPENE	1	1	1	5	20

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	INDENO(1,2,3-CD)PYRENE	0.05	0.05	0.05	0.1	0.022
	ISODRIN	1	1	1	5	0.0309
	ISOPHORONE	1	1	1	5	71
	ISOSAFROLE	1	1	1	5	--
	KEPONE	1	1	1	5	0.0037
	METHAPYRILENE	1	1	1	5	--
	METHYL METHANE SULFONATE	1	1	1	5	--
	NAPHTHALENE	0.05	0.05	0.05	0.1	6.2
SVOA	N-NITROSODIETHYLAMINE	1	1	1	5	0.00045
	N-NITROSODIMETHYLAMINE	1	1	1	5	0.0013
	N-NITROSO-DI-N-BUTYLAMINE	1	1	1	5	0.002
	N-NITROSO-DI-N-PROPYLAMINE	1	1	1	2	0.0096
	N-NITROSOMETHYLETHYLAMINE	1	1	1	5	0.0031
	N-NITROSOMORPHOLINE	1	1	1	5	--
	N-NITROSOPIPERIDINE	1	1	1	5	--
	N-NITROSOPYRROLIDINE	1	1	1	5	0.032
	O,O,O-TRIETHYL PHOSPHOROTHIOATE	1	1	1	5	58.25
	O-TOLUIDINE	1	1	1	5	0.28
	P-(DIMETHYLAMINO)AZOBENZENE	1	1	1	5	--
	PENTACHLOROBENZENE	1	1	1	5	0.47
	PENTACHLOROETHANE	1	1	1	5	56.42
	PENTACHLORONITROBENZENE	1	1	1	5	0.26
	PHENACETIN	1	1	1	5	6.3
	PHENANTHRENE	0.05	0.05	0.05	0.1	2.1
	PHENOL	1	1	1	5	100
	PRONAMIDE	1	1	1	5	160
	PYRENE	0.05	0.05	0.05	0.1	0.3
	PYRIDINE	1	1	1	5	36
	SAFROLE	1	1	1	5	40
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	0.3	0.3	0.5	0.43
	1,1,1-TRICHLOROETHANE	0.3	0.3	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	0.3	0.3	0.5	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	0.5	0.2
	1,1-DICHLOROETHANE	0.3	0.3	0.3	1	47
	1,1-DICHLOROETHENE	0.3	0.3	0.3	0.5	0.046
	1,2,3-TRICHLOROPROPANE	0.3	0.3	0.3	1	0.0016
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	0.3	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	0.3	0.3	0.5	0.00076
	1,2-DICHLOROETHANE	0.3	0.3	0.3	0.5	0.12
	1,2-DICHLOROPROPANE	0.3	0.3	0.3	0.5	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	0.5	0.5	5	1900
	2-HEXANONE	0.5	0.5	0.5	5	1500
	3-CHLOROPROPENE	0.5	0.5	0.5	10	1800
	4-METHYL-2-PENTANONE	0.5	0.5	0.5	5	160
	ACETONE	0.5	10	0.5	5	610
	ACETONITRILE	20	20	20	40	79

TABLE H-6

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SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	ACROLEIN	0.5	0.5	0.5	10	0.042
	ACRYLONITRILE	0.5	0.5	0.5	5	0.039
	BENZENE	0.3	0.3	0.3	0.5	0.35
	BROMODICHLOROMETHANE	0.3	0.3	0.3	0.5	0.18
	BROMOFORM	0.3	0.3	0.3	1	8.5
	BROMOMETHANE	0.3	0.3	0.3	1	8.7
	CARBON DISULFIDE	0.3	0.3	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	0.3	0.3	0.3	0.17
	CHLOROBENZENE	0.3	0.3	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	0.3	0.3	1	0.13
VOC	CHLOROETHANE	0.5	0.5	0.5	1	4.6
	CHLOROFORM	0.3	0.3	0.3	0.3	0.16
	CHLOROMETHANE	0.3	0.3	0.3	1	1.5
	CHLOROPRENE	0.5	0.5	0.5	10	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	0.3	--
	DIBROMOMETHANE	0.3	0.3	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	0.3	0.3	1	390
	ETHYL METHACRYLATE	0.5	0.5	0.5	10	550
	ETHYLBENZENE	0.3	0.3	0.3	1	17.2
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	0.3	0.3	1	1
	METHYL IODIDE	0.5	0.5	0.5	10	--
	METHYL METHACRYLATE	0.5	0.5	0.5	10	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	0.3	0.3	1	56
	TETRACHLOROETHENE	0.3	0.3	0.3	1	1.1
	TOLUENE	0.3	0.3	0.3	1	253
	TOTAL XYLENES	0.3	0.3	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	0.5	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	0.5	0.5	10	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	1.6
	TRICHLOROFLUOROMETHANE	0.3	0.3	0.3	1	1300
	VINYL ACETATE	0.5	0.5	0.5	10	248.03
	VINYL CHLORIDE	0.3	0.3	0.3	0.5	0.02

Round 2

		ug/L	ug/L	ug/L	ug/L	ug/L
EXP	1,3,5-TRINITROBENZENE	0.039	0.301	0.25	0.5	1100
	1,3-DINITROBENZENE	0.039	0.301	0.25	0.5	2.36
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUE	0.47	0.602	0.65	1	--
	2,4,6-TRINITROTOLUENE	0.039	0.301	0.25	0.5	2.2
	2,4-DIAMINO-6-NITROTOLUENE	0.236	0.301	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.039	0.301	0.25	0.5	73
	2,6-DIAMINO-4-NITROTOLUENE	0.236	0.301	0.25	0.5	2.2
	2,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	36

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	2-AMINO-4,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	--
	2-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	3,5-DINITROANILINE	0.236	0.301	0.25	0.5	--
	3-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.039	0.301	0.25	0.5	--
	4-NITROTOLUENE	0.039	0.301	0.25	0.5	61
	DNX	0.236	0.301	0.25	0.5	--
	HMX	0.236	0.278	0.25	0.5	1800
	MNX	0.236	0.291	0.25	0.5	--
	NITROBENZENE	0.039	0.301	0.25	0.5	3.4
	RDX	0.236	0.278	0.25	0.5	0.61
	TETRYL	0.039	0.301	0.25	0.5	360
EXP	TNX	0.236	0.301	0.25	0.5	--
		mg/L	mg/L	mg/L	mg/L	mg/L
M	ALUMINUM	8.3	332	6.8	50	50
	ANTIMONY	0.02	1.8	0.02	1	6
	ARSENIC	0.07	1.9	0.03	1	0.045
	BERYLLIUM	0.03	2.7	0.03	1	4
	CADMIUM	0.04	1.5	0.04	1	0.66
	CALCIUM	19700	106000	3.96	100	--
	CHROMIUM	0.17	1.4	0.02	1	42
	COBALT	0.36	14.8	0.02	1	5
	COPPER	0.07	1.6	0.06	2	5
	IRON	38.2	440	2.22	50	300
	LEAD	0.04	2.5	0.02	1	1.3
	MANGANESE	48.3	566	0.04	5	50
	MERCURY	0.007	0.03	0.02	0.2	0.0013
	NICKEL	1.4	1.4	0.06	1	29
	SELENIUM	0.04	2.2	0.04	1	5
	SILVER	0.03	1.3	0.03	1	1
	THALLIUM	0.04	2.3	0.04	1	0.56
	TIN	0.1	2.6	0.09	10	73
	TITANIUM	0.07	4.5	0.06	5	--
	VANADIUM	0.06	1.7	0.05	2	19
	ZINC	2.8	6.8	0.32	10	58.9
MF	ALUMINUM	18.3	164	6.8	50	50
	ANTIMONY	0.02	1.5	0.02	1	6
	ARSENIC	0.12	1.5	0.03	1	0.045
	BERYLLIUM	0.03	1.5	0.03	1	4
	CADMIUM	0.04	0.78	0.04	1	0.66
	CHROMIUM	0.13	0.98	0.02	1	42
	COBALT	0.11	1.5	0.02	1	5
	COPPER	0.35	1.8	0.06	2	5
	IRON	25.4	1140	2.22	50	300
	LEAD	0.04	1.4	0.02	1	1.3
	MAGNESIUM	140	140	2	100	--
	MANGANESE	3.7	30.9	0.04	5	50

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	MERCURY	0.007	0.03	0.02	0.2	0.0013
	NICKEL	0.48	1.6	0.06	1	29
	POTASSIUM	151	151	4.325	100	--
	SELENIUM	0.04	2.4	0.04	1	5
	SILVER	0.03	0.27	0.03	1	1
	THALLIUM	0.04	0.84	0.04	1	0.56
	TIN	0.1	0.69	0.09	10	73
	TITANIUM	0.42	3.8	0.06	5	--
	VANADIUM	0.06	0.68	0.05	2	19
	ZINC	1.7	1.7	0.32	10	58.9
MISC	AMMONIA-N	0.005	0.01	0.01	0.02	--
	CHLORIDE	2	17	0.5	1	--
	NITRITE/NITRATE-N	0.025	0.05	0.025	0.05	--
	SULFATE	180	210	0.5	1	--
MISC	TOTAL ORGANIC CARBON	0.5	0.5	--	--	--
		ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	30	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	30	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	30	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	30	0.3	1	47
	1,1-DICHLOROETHENE	0.3	30	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	30	0.3	1	0.0056
	1,2-DIBROMO-3-CHLOROPROPANE	0.3	30	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	30	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	30	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	30	0.3	1	0.16
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	50	0.5	5	1900
	2-HEXANONE	0.5	50	0.5	5	1710
	3-CHLOROPROPENE	0.5	50	0.5	5	1800
	4-METHYL-2-PENTANONE	0.5	50	0.5	5	160
	ACETONE	0.5	50	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	50	0.5	5	0.042
	ACRYLONITRILE	0.5	50	0.5	5	0.039
	BENZENE	0.3	30	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	30	0.3	1	0.18
	BROMOFORM	0.3	30	0.3	1	8.5
	BROMOMETHANE	0.3	30	0.3	1	8.7
	CARBON DISULFIDE	0.3	30	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	30	0.3	1	0.17
	CHLOROBENZENE	0.3	30	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	30	0.3	1	0.18
	CHLOROETHANE	0.5	50	0.5	1	4.6
	CHLOROFORM	0.3	30	0.3	1	6.2
	CHLOROMETHANE	0.3	30	0.3	1	1.5

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	CHLOROPRENE	0.3	50	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	30	0.3	1	0.4
	DIBROMOMETHANE	0.3	30	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	30	0.3	1	390
	ETHYL METHACRYLATE	0.5	50	0.5	5	550
	ETHYLBENZENE	0.3	30	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	30	0.3	5	1
	METHYL IODIDE	0.5	50	0.5	5	--
	METHYL METHACRYLATE	0.5	50	0.5	5	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	30	0.3	1	56
	TETRACHLOROETHENE	0.3	30	0.3	1	0.66
	TOLUENE	0.3	30	0.3	1	253
VOC	TOTAL XYLENES	0.3	30	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	30	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	30	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	50	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028
	TRICHLOROFLUOROMETHANE	0.3	30	0.3	1	1300
	VINYL ACETATE	0.5	50	0.5	5	248.03
	VINYL CHLORIDE	0.3	30	0.3	1	0.02
Round 3						
EXP	1,3,5-TRINITROBENZENE	0.24	0.29	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	0.29	0.25	0.5	2.36
	2,4,6-TRINITROTOLUENE	0.24	0.29	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	0.29	0.25	0.5	73
	2,6-DINITROTOLUENE	0.24	0.29	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.24	0.29	0.25	0.5	--
	2-NITROTOLUENE	0.24	0.29	0.25	0.5	61
	3-NITROTOLUENE	0.24	0.29	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.24	0.29	0.25	0.5	--
	4-NITROTOLUENE	0.24	0.29	0.25	0.5	61
	HMX	0.24	0.27	0.25	0.5	1800
	NITROBENZENE	0.24	0.29	0.25	0.5	3.4
	RDX	0.24	0.27	0.25	0.5	0.61
	TETRYL	0.24	0.29	0.25	0.5	360
M	ALUMINUM	8.35	39.4	6.8	50	50
	ANTIMONY	0.03	1.5	0.02	1	6
	ARSENIC	0.21	0.8	0.03	1	0.045
	BERYLLIUM	0.02	1.4	0.03	1	4
	CADMIUM	0.039	1.4	0.04	1	0.66
	CHROMIUM	0.81	2.2	0.02	1	42
	COBALT	0.97	0.97	0.02	1	5
	COPPER	0.46	6.9	0.06	2	5

TABLE H-6

GROUND WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV	Laboratory RL	Risk-Based Target Level[3]
	IRON	26.9	29.6	2.22	50	300
	LEAD	0.069	1.5	0.02	1	1.3
	MERCURY	0.03	0.03	0.02	0.2	0.0013
	SELENIUM	0.07	1.4	0.04	1	5
	SILVER	0.02	0.55	0.03	1	1
	THALLIUM	0.043	1	0.04	1	0.56
	TIN	0.04	0.67	0.09	10	73
	VANADIUM	0.16	1.14	0.05	2	19
	ZINC	1.8	12.4	0.32	10	58.9
MF	ALUMINUM	6.4	66.5	6.8	50	50
	ANTIMONY	0.07	0.65	0.02	1	6
	ARSENIC	0.11	0.55	0.03	1	0.045
	BERYLLIUM	0.08	0.93	0.03	1	4
	CADMIUM	0.13	0.35	0.04	1	0.66
	CHROMIUM	0.83	1.4	0.02	1	42
	COPPER	1.2	5.2	0.06	2	5
	IRON	17.2	55.3	2.22	50	300
	LEAD	0.11	1.3	0.02	1	1.3
	MERCURY	0.03	0.03	0.02	0.2	0.0013
	SELENIUM	0.1	1.4	0.04	1	5
	SILVER	0.02	0.48	0.03	1	1
	THALLIUM	0.02	0.33	0.04	1	0.56
	TIN	0.06	0.48	0.09	10	73
	VANADIUM	0.06	0.3	0.05	2	19
	ZINC	3.5	3.5	0.32	10	58.9

EXP - Explosives
HERB - Herbicides
M - Metals
MF - Metals filtered
MISC - Miscellanous
SVOC - Semivolatile organic compounds
RL - Reporting limit (comparable to quantitation limit)
TV - Analytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
VOC - Volatile organic compounds
-- Not applicable

1 Yellow or gray highlight indicates that the value exceeds the risk-based target level. Analytes that did not exhibit any
2 Some non-detect values were reported as "0". The zero-values were replaced with the next lowest nondetect value.
3 RBTL is the lowest of all risk-based target levels except for composting data. Composting data
RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
Composting Operations						
NA	NA	NA	NA	NA	NA	NA
Round 1						
EXP	1,3,5-TRINITROBENZENE	0.21	0.8	0.25	0.5	1800
	1,3-DINITROBENZENE	0.21	0.8	0.25	0.5	0.6547
	2,4,6-TRINITROTOLUENE	0.21	0.8	0.25	0.5	16
	2,4-DINITROTOLUENE	0.21	0.8	0.25	0.5	0.00004
	2,6-DINITROTOLUENE	0.21	0.8	0.25	0.5	0.00003
	2-AMINO-4,6-DINITROTOLUENE	0.21	0.8	0.25	0.5	4.7
	2-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	3-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	4-AMINO-2,6-DINITROTOLUENE	0.265	0.8	0.25	0.5	4.78
	4-NITROTOLUENE	0.21	0.8	0.25	0.5	370
	HMX	0.265	0.65	0.25	0.5	3100
	NITROBENZENE	0.21	0.8	0.25	0.5	0.007
	PICRAMIC ACID	0.39	0.39	17	33	--
	PICRIC ACID	0.39	0.39	17	33	--
	RDX	0.25	0.6	0.25	0.5	4.4
	TETRYL	0.21	0.8	0.25	0.5	610
HERB	HEXACHLOROPHENE	0.025	0.025	0.85	1.7	0.19878
	PENTACHLOROPHENOL	0.013	0.013	0.45	0.9	0.001
M	ALUMINUM	7.6	82.4	3.4	25	76000
	ANTIMONY	0.04	2.9	0.01	0.5	0.1423
	ARSENIC	0.38	0.98	0.015	0.5	0.39
	BERYLLIUM	0.03	0.49	0.015	0.5	0.1
	CADMIUM	0.05	0.56	0.02	0.5	0.00222
	CHROMIUM	0.25	1	0.01	0.5	0.4
	COBALT	0.05	0.78	0.01	0.5	0.14033
	IRON	77.1	194	1.11	25	23000
	LEAD	0.15	1.2	0.01	0.5	0.05373
	LITHIUM	0.91	2.2	0.02	0.1	1600
	MERCURY	0.02	0.2	0.002	0.1	0.073
	NICKEL	0.61	0.61	0.03	0.5	7
	SELENIUM	0.1	1.4	0.02	0.5	0.02765
	SILVER	0.04	1	0.015	0.5	2
	THALLIUM	0.04	0.35	0.02	0.5	0.04
	TIN	0.03	0.67	0.045	5	7.62
	TITANIUM	0.24	0.24	0.03	2.5	--
	VANADIUM	0.05	0.39	0.025	1	1.59
	ZINC	3.2	3.2	0.16	5	6.62

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
MF	ALUMINUM	22.3	49.4	3.4	25	--
	ANTIMONY	0.13	2.8	0.01	0.5	--
	ARSENIC	0.15	0.73	0.015	0.5	--
	BERYLLIUM	0.03	0.28	0.015	0.5	0.1
	CADMIUM	0.05	0.41	0.02	0.5	0.00222
MF	CHROMIUM	0.21	0.89	0.01	0.5	--
	COBALT	0.15	0.71	0.01	0.5	0.14033
	COPPER	1	1.3	0.03	1	2.96
	IRON	14.9	42.5	1.11	25	23000
	LEAD	0.08	1.9	0.01	0.5	0.05373
	LITHIUM	0.37	1.8	0.02	0.1	1600
	MANGANESE	2.8	2.9	0.02	2.5	1800
	MERCURY	0.02	0.2	0.002	0.1	0.073
	NICKEL	0.5	0.85	0.03	0.5	7
	SELENIUM	0.08	1.4	0.02	0.5	0.02765
	SILVER	0.04	0.71	0.015	0.5	2
	THALLIUM	0.04	0.33	0.02	0.5	--
	TIN	0.03	0.38	0.045	5	7.62
	TITANIUM	1.1	1.3	0.03	2.5	--
	VANADIUM	0.23	0.76	0.025	1	1.59
	ZINC	3.8	5.7	0.16	5	6.62
MISC	AMMONIA-N	0.01	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.02	0.02	0.025	0.05	--
SVOC	1,2,4,5-TETRACHLOROBENZENE	1	1	1	5	2.02
	1,2,4-TRICHLOROBENZENE	1	1	1	5	0.3
	1,2-DICHLOROBENZENE	1	1	1	5	0.9
	1,3-DICHLOROBENZENE	1	1	1	5	0.13
	1,4-DICHLOROBENZENE	1	1	1	2	0.1
	1,4-NAPHTHOQUINONE	1	1	1	5	--
	1,4-PHENYLENEDIAMINE	1	1	1	5	12000
	1-NAPHTHYLAMINE	1	1	1	5	--
	2,2'-OXYBIS(1-CHLOROPROPANE)	1	1	1	3	--
	2,3,4,6-TETRACHLOROPHENOL	1	1	1	5	0.19878
	2,4,5-TRICHLOROPHENOL	1	1	1	5	14
	2,4,6-TRICHLOROPHENOL	1	1	1	3	0.008
	2,4-DICHLOROPHENOL	1	1	1	5	0.05
	2,4-DIMETHYLPHENOL	1	1	1	5	0.01
	2,4-DINITROPHENOL	1	1	1	10	0.01
	2,6-DICHLOROPHENOL	1	1	1	5	1.17
	2-ACETYLAMINOFLUORENE	1	1	1	5	0.59634
	2-CHLORONAPHTHALENE	1	1	1	2	0.01218

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	2-CHLOROPHENOL	1	1	1	3	0.2
	2-METHYLNAPHTHALENE	0.05	0.05	0.05	0.1	--
	2-METHYLPHENOL	1	1	1	5	0.8
	2-NAPHTHYLAMINE	1	1	1	10	--
	2-NITROANILINE	1	1	1	2	3.5
	2-NITROPHENOL	1	1	1	5	1.6
	2-PICOLINE	1	1	1	5	9.9
	3&4-METHYLPHENOL	1	1	1	5	--
	3,3'-DICHLOROBENZIDINE	1	1	1	5	0.0003
	3,3'-DIMETHYLBENZIDINE	1	1	1	5	0.053
	3-METHYLCHOLANTHRENE	1	1	1	5	0.07794
	3-NITROANILINE	1	1	1	5	3.5
	4,6-DINITRO-2-METHYLPHENOL	1	1	1	5	0.14408
SVOC	4-AMINOBIPHENYL	1	1	1	5	--
	4-BROMOPHENYL PHENYL ETHER	1	1	1	2	--
	4-CHLORO-3-METHYLPHENOL	1	1	1	5	7.95
	4-CHLOROANILINE	1	1	1	5	0.03
	4-CHLOROPHENYL PHENYL ETHER	1	1	1	5	--
	4-NITROANILINE	1	1	1	5	3.5
	4-NITROPHENOL	1	1	1	5	5.12
	4-NITROQUINOLINE-1-OXIDE	1	1	1	5	--
	5-NITRO-O-TOLUIDINE	1	1	1	5	15
	7,12-DIMETHYLBENZ(A)ANTHRACENE	1	1	1	5	16.3
	A,A-DIMETHYLPHENETHYLAMINE	1	1	1	10	--
	ACENAPHTHENE	0.05	0.05	0.05	0.1	--
	ACENAPHTHYLENE	0.05	0.2	0.05	0.1	130
	ACETOPHENONE	1	1	1	5	0.49
	ANILINE	1	1	1	5	0.05678
	ANTHRACENE	0.05	0.05	0.05	0.1	--
	ARAMITE	1	1	1	5	19
	BENZO(A)ANTHRACENE	0.05	0.05	0.05	0.1	--
	BENZO(A)PYRENE	0.05	0.2	0.05	0.1	--
	BENZO(B)FLUORANTHENE	0.05	0.2	0.05	0.1	0.2
	BENZO(G,H,I)PERYLENE	0.05	0.2	0.05	0.1	--
	BENZO(K)FLUORANTHENE	0.05	0.2	0.05	0.1	--
	BENZYL ALCOHOL	1	1	1	5	65.8
	BIS(2-CHLOROETHOXY)METHANE	1	1	1	5	0.30209
	BIS(2-CHLOROETHYL)ETHER	1	1	1	2	0.00002
	BIS(2-ETHYLHEXYL)PHTHALATE	1	14	1	1	0.92594
	BUTYL BENZYL PHTHALATE	1	1	1	5	0.23889
	CHLOROBENZILATE	1	1	1	5	1.8

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	CHRYSENE	0.05	0.05	0.05	0.1	4.73
	DIALLATE	1	1	1	5	0.45214
	DIBENZO(A,H)ANTHRACENE	0.05	0.2	0.05	0.1	--
	DIBENZOFURAN	1	1	1	5	290
	DIETHYL PHTHALATE	1	1	1	2	23
	DIMETHYL PHTHALATE	1	1	1	5	734
	DI-N-BUTYL PHTHALATE	1	1	1	2	0.14979
	DI-N-OCTYL PHTHALATE	1	1	1	5	709
	DIPHENYLAMINE	1	1	1	5	--
	ETHYL METHANE SULFONATE	1	1	1	5	--
	FLUORANTHENE	0.05	0.05	0.05	0.1	--
	FLUORENE	0.05	0.05	0.05	0.1	--
	HEXACHLOROBENZENE	1	1	1	2	0.1
	HEXACHLOROBUTADIENE	1	1	1	1	0.03976
	HEXACHLOROCYCLOPENTADIENE	1	1	1	2	0.75537
	HEXACHLOROETHANE	1	1	1	2	0.02
	HEXACHLOROPROPENE	1	1	1	5	--
	INDENO(1,2,3-CD)PYRENE	0.05	0.2	0.05	0.1	--
	ISODRIN	1	1	1	5	0.00332
	ISOPHORONE	1	1	1	5	0.03
	ISOSAFROLE	1	1	1	5	9.94
SVOC	KEPONE	1	1	1	5	0.027
	METHAPYRILENE	1	1	1	5	2.78
	METHYL METHANE SULFONATE	1	1	1	5	0.31549
	NAPHTHALENE	0.05	0.05	0.05	0.1	--
	N-NITROSODIETHYLAMINE	1	1	1	5	0.0032
	N-NITROSODIMETHYLAMINE	1	1	1	5	0.0000321
	N-NITROSO-DI-N-BUTYLAMINE	1	1	1	5	--
	N-NITROSO-DI-N-PROPYLAMINE	1	1	1	2	--
	N-NITROSOMETHYLETHYLAMINE	1	1	1	5	0.00166
	N-NITROSOMORPHOLINE	1	1	1	5	0.07057
	N-NITROSOPIPERIDINE	1	1	1	5	0.00665
	N-NITROSOPYRROLIDINE	1	1	1	5	0.01258
	O,O,O-TRIETHYL PHOSPHOROTHIOAT	1	1	1	5	--
	O-TOLUIDINE	1	1	1	5	2
	P-(DIMETHYLAMINO)AZOBENZENE	1	1	1	5	--
	PENTACHLOROBENZENE	1	1	1	5	0.49695
	PENTACHLOROETHANE	1	1	1	5	10.7
	PENTACHLORONITROBENZENE	1	1	1	5	1.9
	PHENACETIN	1	1	1	5	11.7
	PHENANTHRENE	0.05	0.05	0.05	0.1	45.7

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	PHENOL	1	1	1	5	5
	PRONAMIDE	1	1	1	5	0.0136
	PYRENE	0.05	0.05	0.05	0.1	--
	PYRIDINE	1	1	1	5	1.03
	SAFROLE	1	1	1	5	0.40398
Round 2						
EXP	1,3,5-TRINITROBENZENE	0.24	0.287	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	0.287	0.25	0.5	2.36
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLU	0.47	0.575	0.65	1	--
	2,4,6-TRINITROTOLUENE	0.24	0.287	0.25	0.5	2.2
	2,4-DIAMINO-6-NITROTOLUENE	0.24	0.287	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	0.287	0.25	0.5	73
	2,6-DIAMINO-4-NITROTOLUENE	0.24	0.287	0.25	0.5	NA
	2,6-DINITROTOLUENE	0.24	0.287	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.24	0.27	0.25	0.5	--
	2-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	3,5-DINITROANILINE	0.24	0.287	0.25	0.5	NA
	3-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	4-AMINO-2,6-DINITROTOLUENE	0.24	0.27	0.25	0.5	--
	4-NITROTOLUENE	0.24	0.287	0.25	0.5	61
	DNX	0.24	0.27	0.25	0.5	NA
	HMX	0.24	0.27	0.25	0.5	1800
	MNX	0.24	0.27	0.25	0.5	--
	NITROBENZENE	0.24	0.287	0.25	0.5	3.4
	RDX	0.24	0.27	0.25	0.5	0.61
	TETRYL	0.24	0.287	0.25	0.5	360
	TNX	0.24	0.27	0.25	0.5	--
M	ALUMINUM	30.6	106	6.8	50	50
	ANTIMONY	0.02	0.63	0.02	1	6
M	ARSENIC	0.11	0.57	0.03	1	0.045
	BERYLLIUM	0.03	0.72	0.03	1	4
	CADMIUM	0.04	0.4	0.04	1	0.66
	CHROMIUM	0.19	1.6	0.02	1	42
	COBALT	0.07	0.52	0.02	1	5
	COPPER	0.38	1.7	0.06	2	5
	IRON	15	162	2.22	50	300
	LEAD	0.07	1.6	0.02	1	1.3
	MAGNESIUM	8750	14200	2	100	--
	MANGANESE	2	10	0.04	5	50
	MERCURY	0.007	0.02	0.02	0.2	0.0013
	NICKEL	0.61	1.3	0.06	1	29

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	SELENIUM	0.04	0.62	0.04	1	5
	SILVER	0.03	0.33	0.03	1	1
	THALLIUM	0.04	0.41	0.04	1	0.56
	TIN	0.1	0.4	0.09	10	73
	TITANIUM	0.52	0.73	0.06	5	--
	VANADIUM	0.11	1.6	0.05	2	19
	ZINC	2.1	14	0.32	10	58.9
MF	ALUMINUM	7.6	54.4	6.8	50	50
	ANTIMONY	0.06	0.71	0.02	1	6
	ARSENIC	0.07	0.42	0.03	1	0.045
	BERYLLIUM	0.03	0.22	0.03	1	4
	CADMIUM	0.04	0.3	0.04	1	0.66
	CHROMIUM	0.13	1.5	0.02	1	42
	COBALT	0.11	0.52	0.02	1	5
	COPPER	0.26	0.93	0.06	2	5
	IRON	5.7	123	2.22	50	300
	LEAD	0.02	0.38	0.02	1	1.3
	MAGNESIUM	13700	13700	2	100	--
	MANGANESE	2.1	10.7	0.04	5	50
	MERCURY	0.007	0.02	0.02	0.2	0.0013
	NICKEL	0.55	1.4	0.06	1	29
	SELENIUM	0.04	0.46	0.04	1	5
	SILVER	0.03	0.07	0.03	1	1
	THALLIUM	0.04	0.1	0.04	1	0.56
	TIN	0.1	0.59	0.09	10	73
	TITANIUM	0.1	1.1	0.06	5	--
	VANADIUM	0.06	0.4	0.05	2	19
	ZINC	1.7	16	0.32	10	58.9
MISC	AMMONIA-N	0.005	0.01	0.01	0.02	--
	NITRITE/NITRATE-N	0.025	0.13	0.025	0.05	--
VOC	1,1,1,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.43
	1,1,1-TRICHLOROETHANE	0.3	0.3	0.3	1	88
	1,1,2,2-TETRACHLOROETHANE	0.3	0.3	0.3	1	0.055
	1,1,2-TRICHLOROETHANE	0.3	0.3	0.3	1	0.2
	1,1-DICHLOROETHANE	0.3	0.3	0.3	1	47
	1,1-DICHLOROETHENE	0.3	0.3	0.3	1	7
	1,2,3-TRICHLOROPROPANE	0.3	0.3	0.3	1	0.0056
VOC	1,2-DIBROMO-3-CHLOROPROPANE	0.3	0.3	0.3	1	0.048
	1,2-DIBROMOETHANE	0.3	0.3	0.3	1	0.00076
	1,2-DICHLOROETHANE	0.3	0.3	0.3	1	0.12
	1,2-DICHLOROPROPANE	0.3	0.3	0.3	1	0.16

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	1,4-DIOXANE	50	50	50	100	6.1
	2-BUTANONE	0.5	0.5	0.5	5	1900
	2-HEXANONE	0.5	0.5	0.5	5	1710
	3-CHLOROPROPENE	0.5	0.5	0.5	5	14
	4-METHYL-2-PENTANONE	0.5	0.5	0.5	5	160
	ACETONE	0.5	0.5	0.5	5	610
	ACETONITRILE	20	20	20	40	100
	ACROLEIN	0.5	0.5	0.5	5	0.042
	ACRYLONITRILE	0.5	0.5	0.5	5	0.039
	BENZENE	0.3	0.3	0.3	1	0.34
	BROMODICHLOROMETHANE	0.3	0.3	0.3	1	0.18
	BROMOFORM	0.3	0.3	0.3	1	8.5
	BROMOMETHANE	0.3	0.3	0.3	1	8.7
	CARBON DISULFIDE	0.3	0.3	0.3	1	84.1
	CARBON TETRACHLORIDE	0.3	0.3	0.3	1	0.17
	CHLOROBENZENE	0.3	0.3	0.3	1	10
	CHLORODIBROMOMETHANE	0.3	0.3	0.3	1	0.18
	CHLOROETHANE	0.5	0.5	0.5	1	4.6
	CHLOROFORM	0.3	0.3	0.3	1	6.2
	CHLOROMETHANE	0.3	0.3	0.3	1	1.5
	CHLOROPRENE	0.5	0.5	0.5	5	14
	CIS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	61
	CIS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4
	DIBROMOMETHANE	0.3	0.3	0.3	1	61
	DICHLORODIFLUOROMETHANE	0.3	0.3	0.3	1	390
	ETHYL METHACRYLATE	0.5	0.5	0.5	5	550
	ETHYLBENZENE	0.3	0.3	0.3	1	2.9
	ISOBUTANOL	20	20	20	40	1800
	METHACRYLONITRILE	0.3	0.3	0.3	5	1
	METHYL IODIDE	0.5	0.5	0.5	5	--
	METHYL METHACRYLATE	0.5	0.5	0.5	5	1400
	METHYLENE CHLORIDE	0.3	0.3	0.3	1	4.3
	PROPIONITRILE	20	20	20	40	6080
	STYRENE	0.3	0.3	0.3	1	56
	TETRACHLOROETHENE	0.3	0.3	0.3	1	0.66
	TOLUENE	0.3	0.3	0.3	1	253
	TOTAL XYLENES	0.3	0.3	0.3	1	117
	TRANS-1,2-DICHLOROETHENE	0.3	0.3	0.3	1	100
	TRANS-1,3-DICHLOROPROPENE	0.3	0.3	0.3	1	0.4
	TRANS-1,4-DICHLORO-2-BUTENE	0.5	0.5	0.5	5	--
	TRICHLOROETHENE	0.3	0.3	0.3	1	0.028

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	TRICHLOROFLUOROMETHANE	0.3	0.3	0.3	1	1300
	VINYL ACETATE	0.5	0.5	0.5	5	248.03
	VINYL CHLORIDE	0.3	0.3	0.3	1	0.02
PAH	2-METHYLNAPHTHALENE	0.048	0.049	0.05	0.1	6.2
PAH	ACENAPHTHENE	0.048	0.049	0.05	0.1	9.9
	ACENAPHTHYLENE	0.048	0.049	0.05	0.1	370
	ANTHRACENE	0.048	0.049	0.05	0.1	0.029
	BENZO(A)ANTHRACENE	0.049	0.049	0.05	0.1	0.092
	BENZO(A)PYRENE	0.049	0.049	0.05	0.1	0.0092
	BENZO(B)FLUORANTHENE	0.049	0.049	0.05	0.1	0.092
	BENZO(G,H,I)PERYLENE	0.049	0.049	0.05	0.1	7.64
	BENZO(K)FLUORANTHENE	0.049	0.049	0.05	0.1	0.0056
	CHRYSENE	0.049	0.049	0.05	0.1	0.033
	DIBENZO(A,H)ANTHRACENE	0.048	0.049	0.05	0.1	0.0016
	FLUORANTHENE	0.049	0.049	0.05	0.1	8.1
	FLUORENE	0.048	0.049	0.05	0.1	3.9
	INDENO(1,2,3-CD)PYRENE	0.049	0.049	0.05	0.1	0.022
	NAPHTHALENE	0.048	0.049	0.05	0.1	6.2
	PHENANTHRENE	0.049	0.049	0.05	0.1	2.1
	PYRENE	0.049	0.049	0.05	0.1	0.3
Round 3						
EXP	1,3,5-TRINITROBENZENE	0.24	0.264	0.25	0.5	1100
	1,3-DINITROBENZENE	0.24	0.264	0.25	0.5	2.36
	2,4,6-TRINITROTOLUENE	0.24	0.264	0.25	0.5	2.2
	2,4-DIAMINO-6-NITROTOLUENE	0.24	0.264	0.25	0.5	2.2
	2,4-DINITROTOLUENE	0.24	0.264	0.25	0.5	73
	2,6-DIAMINO-4-NITROTOLUENE	0.24	0.264	0.25	0.5	NA
	2,6-DINITROTOLUENE	0.24	0.264	0.25	0.5	36
	2-AMINO-4,6-DINITROTOLUENE	0.24	0.264	0.25	0.5	--
	2-NITROTOLUENE	0.24	0.264	0.25	0.5	61
	3,5-DINITROANILINE	0.24	0.264	0.25	0.5	NA
	3-NITROTOLUENE	0.24	0.264	0.25	0.5	61
	4,4'-TN-AZOXY	0.48	0.528	0.65	1	--
	4-AMINO-2,6-DINITROTOLUENE	0.24	0.264	0.25	0.5	--
	4-NITROTOLUENE	0.24	0.264	0.25	0.5	61
	DNX	0.24	0.264	0.25	0.5	NA
	HMX	0.264	0.264	0.25	0.5	1800
	MNX	0.25	0.264	0.25	0.5	--
	NITROBENZENE	0.24	0.264	0.25	0.5	3.4
	RDX	0.264	0.264	0.25	0.5	0.61

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)
	TETRYL	0.24	0.264	0.25	0.5	360
	TNX	0.24	0.264	0.25	0.5	--
M	ALUMINUM	68.7	68.7	6.8	50	50
	ANTIMONY	0.085	1.4	0.02	1	6
	ARSENIC	0.31	0.45	0.03	1	0.045
	BERYLLIUM	0.02	0.37	0.03	1	4
	CADMIUM	0.039	0.29	0.04	1	0.66
	COBALT	0.16	0.67	0.02	1	5
	IRON	70.1	70.1	2.22	50	300
	LEAD	0.11	1.1	0.02	1	1.3
	MANGANESE	5.3	9.4	0.04	5	50
	MERCURY	0.03	0.042	0.02	0.2	0.0013
	NICKEL	0.93	4.3	0.06	1	29
	SELENIUM	0.094	0.36	0.04	1	5
	SILVER	0.028	0.06	0.03	1	1
	SODIUM	1360	1380			--
	THALLIUM	0.043	0.08	0.04	1	0.56
	TIN	0.048	0.77	0.09	10	73
	VANADIUM	1.14	1.14	0.05	2	19
	ZINC	2.9	8.2	0.32	10	58.9
MF	ALUMINUM	26.4	29.2	3.4	25	--
	ANTIMONY	0.085	1.3	0.01	0.5	--
	ARSENIC	0.23	0.44	0.015	0.5	--
	BERYLLIUM	0.02	0.33	0.015	0.5	0.1
	CADMIUM	0.039	0.15	0.02	0.5	0.00222
	CHROMIUM	0.46	0.67	0.01	0.5	--
	COBALT	0.088	0.3	0.01	0.5	0.14033
	IRON	6.15	43	1.11	25	23000
	LEAD	0.08	0.48	0.01	0.5	0.05373
	MANGANESE	3	39.4	0.02	2.5	1800
	MERCURY	0.03	0.095	0.002	0.1	0.073
	NICKEL	0.84	3.1	0.03	0.5	7
	SELENIUM	0.094	0.26	0.02	0.5	0.02765
	SILVER	0.028	0.06	0.015	0.5	2
	SODIUM	1440	1450			--
	THALLIUM	0.043	0.043	0.02	0.5	--
	TIN	0.048	0.06	0.045	5	7.62
	VANADIUM	1.14	1.14	0.025	1	1.59
	ZINC	2.1	5.1	0.16	5	6.62
MISC		mg/L	mg/L	mg/L	mg/L	mg/L
	NITRITE/NITRATE-N	0.025	0.025	0.025	0.05	--

TABLE H-7

SURFACE WATER MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL B146)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 10 OF 10

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration[2]	Maximum Non-detect Concentration[2]	Laboratory TV, (ug/L)	Laboratory RL, (ug/L)	Risk-Based Target Level[3], (ug/L)

EXP - Explosives
HERB - Herbicides
M - Metals
MF - Metals filtered
MISC - Miscellanous
PAH - Polynuclear aromatic hydrocarbons
SVOC - Semivolatile organic compounds
RL - Reporting limit (comparable to quantitation limit)
TV - Analytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
VOC - Volatile organic compounds
-- Not applicable

concentrations less than detection limits are not shown.
2 Some non-detect values were reported as "0". The zero-values were replaced with the next lowest nondetect value.
3 RBTL is the lowest of all risk-based target levels except for composting data. Composting data
RBTLs are the residential clenup levels as presented in the Interim Measures Report (insert reference).

TABLE H-8

VEGETATION MAXIMUM AND MINIMUM DETECTION LIMITS VERSUS RBTLs, ROUND 3
SWMU 13 - (MINE FILL B)
NSWC CRANE
CRANE, INDIANA

		Data		Reference Values		
Fraction	Parameter	Minimum Non-detect Concentration	Maximum Non-detect Concentration	Laboratory TV [1]	Laboratory RL [2]	Risk-Based Target Level [3]
Round 3		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EXP	1,3,5-TRINITROBENZENE	0.5	0.5	0.5	1	NA
	1,3-DINITROBENZENE	0.5	0.5	0.5	1	NA
	2,4,6-TRINITROTOLUENE	0.5	0.5	0.5	1	NA
	2,4-DIAMINO-6-NITROTOLUENE	0.5	0.5	0.5	1	NA
	2,4-DINITROTOLUENE	0.5	0.5	0.5	1	NA
	2,6-DIAMINO-4-NITROTOLUENE	0.5	0.5	0.5	1	NA
	2,6-DINITROTOLUENE	0.5	0.5	0.5	1	NA
	2-AMINO-4,6-DINITROTOLUENE	0.5	0.5	0.5	1	NA
	2-NITROTOLUENE	0.5	0.5	0.5	1	NA
	3,5-DINITROANILINE	0.5	0.5	0.5	1	NA
	3-NITROTOLUENE	0.5	0.5	0.5	1	NA
	4,4'-TN-AZOXY	1	1	1	2	NA
	4-AMINO-2,6-DINITROTOLUENE	0.5	0.5	0.5	1	NA
	4-NITROTOLUENE	0.5	0.5	0.5	1	NA
	DNX	0.5	0.5	0.5	1	NA
	HMX	0.5	0.5	0.5	1	NA
	MNX	0.5	0.5	0.5	1	NA
	NITROBENZENE	0.5	0.5	0.5	1	NA
	RDX	0.5	0.5	0.5	1	NA
	TETRYL	0.5	0.5	0.5	1	NA
	TNX	0.5	0.5	0.5	1	NA

EXP - Explosives
RL - Reporting limit (comparable to quantitation limit)
TV - Analytical Threshold value (method detection limit adjusted for estimated sample matrix effects)
NA - Not applicable

concentrations less than detection limits are not shown.
2 Some non-detect values were reported as "0". The zero-values were replaced with the next lowest nondetect value.
3 RBTL is the lowest of all risk-based target levels except for composting data.

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	Parameter	LCS	LCSD	MS	MSD
Composting operation[1]					
NA	NA	NA	NA	NA	NA
Round 1					
DIOX	1,2,3,4,6,7,8,9-OCDD	101.7	103.1	78.1	103.0
	1,2,3,4,6,7,8,9-OCDF	98.5	100.6	100.2	98.7
	1,2,3,4,6,7,8-HpCDD	93.1	94.0	92.9	97.3
	1,2,3,4,6,7,8-HpCDF	98.7	100.8	102.7	106.3
	1,2,3,4,7,8,9-HpCDF	90.8	85.6	88.5	107.4
	1,2,3,4,7,8-HxCDD	101.4	102.4	103.4	104.5
	1,2,3,4,7,8-HxCDF	99.0	98.5	105.7	99.5
	1,2,3,6,7,8-HxCDD	95.3	95.8	98.3	96.5
	1,2,3,6,7,8-HxCDF	97.9	98.8	101.7	102.5
	1,2,3,7,8,9-HxCDD	104.9	101.1	106.5	108.0
	1,2,3,7,8,9-HxCDF	96.4	94.7	113.5	110.7
	1,2,3,7,8-PeCDD	94.1	96.6	97.6	100.8
	1,2,3,7,8-PeCDF	81.9	84.0	86.0	84.6
	2,3,4,6,7,8-HxCDF	90.0	95.4	105.0	97.3
	2,3,4,7,8-PeCDF	107.8	112.6	108.0	110.0
	2,3,7,8-TCDD	99.5	101.5	99.6	99.9
	2,3,7,8-TCDF	97.7	97.4	125.7	86.1
EXP	1,3,5-TRINITROBENZENE	114.3	--	113.8	114.5
	1,3-DINITROBENZENE	119.0	--	117.2	118.8
	2,4,6-TRINITROTOLUENE	115.8	--	114.7	115.8
	2,4-DINITROTOLUENE	114.7	--	113.5	115.2
	2,6-DINITROTOLUENE	116.8	--	115.0	117.0
	2-AMINO-4,6-DINITROTOLUENE	116.8	--	115.0	116.3
	2-NITROTOLUENE	118.3	--	117.5	118.0
	3-NITROTOLUENE	116.9	--	116.2	116.8
	4-AMINO-2,6-DINITROTOLUENE	116.1	--	112.5	114.7
	4-NITROTOLUENE	117.6	--	116.7	117.7
	HMX	116.8	--	114.7	117.0
	NITROBENZENE	123.9	--	122.3	123.2
	PICRAMIC ACID	54.1	--	16.4	17.6
	PICRIC ACID	116.6	--	87.2	87.6
	RDX	114.4	--	106.8	109.5
	TETRYL	97.7	--	100.0	99.8
HERB	HEXACHLOROPHENE	61.8	--	19.8	22.2
	PENTACHLOROPHENOL	83.3	--	37.5	37.0
M	ALUMINUM	94.9	--	--	--
	ANTIMONY	101.5	--	93.2	--
	ARSENIC	95.7	--	89.5	--

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	BARIUM	100.0	--	--	--
	BERYLLIUM	100.3	--	91.3	--
M	CADMIUM	96.3	--	119.3	--
	CALCIUM	96.6	--	339.3	--
	CHROMIUM	96.0	--	157.7	--
	COBALT	97.0	--	82.5	--
	COPPER	99.3	--	63.4	--
	IRON	101.9	--	--	--
	LEAD	94.7	--	--	--
	LITHIUM	100.1	--	143.2	--
	MAGNESIUM	96.6	--	118.9	--
	MANGANESE	99.9	--	--	--
	MERCURY	99.2	--	105.6	--
	NICKEL	99.0	--	121.0	--
	POTASSIUM	93.9	--	137.8	--
	SELENIUM	104.6	--	82.4	--
	SILVER	97.4	--	92.3	--
	SODIUM	96.3	--	85.2	--
	STRONTIUM	96.9	--	130.0	--
	THALLIUM	96.3	--	91.5	--
	TIN	99.8	--	94.1	--
	TITANIUM	97.7	--	172.2	--
	VANADIUM	95.9	--	149.7	--
	ZINC	101.1	--	124.7	--
SVOC	1,2,4-TRICHLOROBENZENE	83.5	--	74.3	73.1
	1,2-DICHLOROBENZENE	79.3	--	66.8	64.8
	1,3-DICHLOROBENZENE	78.0	--	63.1	59.9
	1,4-DICHLOROBENZENE	80.3	--	63.5	60.3
	2,4,5-TRICHLOROPHENOL	93.0	--	89.1	86.5
	2,4,6-TRICHLOROPHENOL	84.3	--	83.4	81.4
	2,4-DICHLOROPHENOL	90.2	--	89.6	84.5
	2,4-DIMETHYLPHENOL	76.4	--	64.6	60.9
	2,4-DINITROPHENOL	46.4	--	70.8	65.8
(PAH)	2-CHLORONAPHTHALENE	72.8	--	69.6	67.6
	2-CHLOROPHENOL	88.1	--	84.3	80.1
(PAH)	2-METHYLNAPHTHALENE	71.2	--	64.7	57.6
	2-METHYLPHENOL	86.5	--	81.1	76.8
	2-NITROANILINE	86.9	--	90.6	88.9
	2-NITROPHENOL	93.0	--	90.5	86.5
	3,3'-DICHLOROBENZIDINE	60.0	--	29.4	28.5
	3,4-METHYLPHENOL	87.5	--	81.0	74.0
	3-NITROANILINE	78.0	--	63.4	59.3

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	4,6-DINITRO-2-METHYLPHENOL	73.0	--	74.9	73.9
	4-BROMOPHENYL-PHENYLETHER	86.1	--	82.8	80.3
	4-CHLORO-3-METHYLPHENOL	82.3	--	85.0	82.9
	4-CHLOROANILINE	64.5	--	44.6	40.3
	4-CHLOROPHENYL-PHENYLETHER	90.3	--	89.0	86.4
	4-NITROANILINE	86.3	--	74.3	69.1
SVOC	4-NITROPHENOL	80.2	--	82.4	80.8
(PAH)	ACENAPHTHENE	70.8	--	64.7	57.9
(PAH)	ACENAPHTHYLENE	67.7	--	65.4	58.7
(PAH)	ANTHRACENE	68.7	--	65.6	55.6
(PAH)	BENZO[A]ANTHRACENE	77.7	--	72.9	58.1
(PAH)	BENZO[A]PYRENE	72.3	--	66.1	55.3
(PAH)	BENZO[B]FLUORANTHENE	80.5	--	75.0	58.9
(PAH)	BENZO[G,H,I]PERYLENE	69.0	--	63.6	49.1
(PAH)	BENZO[K]FLUORANTHENE	70.9	--	72.0	58.9
	BENZYL ALCOHOL	88.3	--	90.3	86.8
	BIS(2-CHLOROETHOXY)METHANE	70.3	--	69.3	65.6
	BIS(2-CHLOROETHYL)ETHER	77.8	--	71.4	67.9
	BIS(2-CHLOROISOPROPYL)ETHER	89.9	--	86.0	84.0
	BIS(2-ETHYLHEXYL)PHTHALATE	89.2	--	94.6	89.0
	BUTYLBENZYLPHTHALATE	76.1	--	87.4	84.1
(PAH)	CHRYSENE	79.1	--	71.6	59.1
	DIBENZO[A,H]ANTHRACENE	65.4	--	60.7	58.1
	DIBENZOFURAN	92.9	--	89.8	86.5
	DIETHYLPHTHALATE	90.9	--	89.0	86.6
	DIMETHYLPHTHALATE	85.3	--	85.0	82.6
	DI-N-BUTYLPHTHALATE	84.9	--	85.8	81.5
	DI-N-OCTYLPHTHALATE	77.9	--	92.1	92.0
	DIPHENYLAMINE	77.7	--	70.0	66.0
(PAH)	FLUORANTHENE	77.9	--	69.9	59.7
(PAH)	FLUORENE	70.8	--	67.0	61.0
	HEXACHLOROBENZENE	86.8	--	82.6	80.5
	HEXACHLOROBUTADIENE	86.0	--	73.4	68.8
	HEXACHLOROCYCLOPENTADIENE	59.3	--	19.0	15.0
	HEXACHLOROETHANE	73.9	--	59.0	55.8
	INDENO[1,2,3-CD]PYRENE	69.2	--	65.7	51.1
	ISOPHORONE	81.6	--	81.3	77.9
(PAH)	NAPHTHALENE	64.8	--	51.7	46.4
	N-NITROSODIMETHYLAMINE	75.1	--	64.0	65.3
	N-NITROSO-DI-N-PROPYLAMINE	84.8	--	85.9	81.6
(PAH)	PHENANTHRENE	77.5	--	73.3	65.3
	PHENOL	85.0	--	79.5	77.9

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	Parameter	LCS	LCSD	MS	MSD
(PAH)	PYRENE	82.6	--	115.0	77.7
VOC	1,1,1-TRICHLOROETHANE	--	--	75.0	75.0
	1,1,2,2-TETRACHLOROETHANE	--	--	61.5	57.5
	1,1,2-TRICHLOROETHANE	--	--	72.5	67.5
	1,1-DICHLOROETHANE	--	--	71.5	69.5
	1,1-DICHLOROETHENE	85.9	--	81.5	83.5
	1,2-DICHLOROETHANE	--	--	75.5	70.5
	1,2-DICHLOROPROPANE	--	--	71.5	69.5
	1,4-DIOXANE	89.0	--	83.5	84.0
	2-BUTANONE	--	--	56.0	51.0
VOC	2-HEXANONE	--	--	48.0	53.5
	4-METHYL-2-PENTANONE	--	--	53.5	54.0
	ACETONE	--	--	66.0	56.5
	ACETONITRILE	91.0	--	79.0	85.0
	BENZENE	90.5	--	74.0	70.5
	BROMODICHLOROMETHANE	--	--	74.5	71.5
	BROMOFORM	--	--	72.0	66.5
	BROMOMETHANE	--	--	60.5	66.5
	CARBON DISULFIDE	--	--	129.0	130.0
	CARBON TETRACHLORIDE	--	--	73.0	74.5
	CHLOROBENZENE	85.5	--	68.0	66.5
	CHLOROETHANE	--	--	89.5	89.0
	CHLOROFORM	--	--	73.5	70.5
	CHLOROMETHANE	--	--	55.0	56.5
	CIS-1,2-DICHLOROETHENE	--	--	73.5	73.5
	CIS-1,3-DICHLOROPROPENE	--	--	67.0	64.0
	DIBROMOCHLOROMETHANE	--	--	73.5	69.5
	ETHYLBENZENE	--	--	69.5	70.5
	ISOBUTYL ALCOHOL	100.0	--	75.0	88.5
	METHYLENE CHLORIDE	--	--	69.0	71.0
	PROPIONITRILE	104.3	--	83.5	93.5
	STYRENE	--	--	64.0	64.0
	TETRACHLOROETHENE	--	--	67.5	66.5
	TOLUENE	87.1	--	71.5	67.5
	TRANS-1,2-DICHLOROETHENE	--	--	75.0	77.0
	TRANS-1,3-DICHLOROPROPENE	--	--	62.5	59.5
	TRICHLOROETHENE	82.4	--	74.0	70.5
	VINYL CHLORIDE	--	--	61.5	62.0
PCB	AROCLOR-1016	97.2	--	113.5	117.0
	AROCLOR-1260	101.0	--	150.0	153.0
WET	CADMIUM	101.0	--	--	--
	COPPER	105.0	--	--	--

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	Parameter	LCS	LCSD	MS	MSD
	LEAD	99.5	--	--	--
	MERCURY	85.0	--	--	--
	NICKEL	103.0	--	--	--
	SULFIDE	87.5	--	--	--
	TOTAL ORGANIC CARBON	109.6	--	124.7	113.3
	ZINC	125.0	--	--	--
Round 2					
EXP	1,3,5-TRINITROBENZENE	98.3	--	107.5	105.0
	1,3-DINITROBENZENE	101.7	--	110.0	105.0
	2,4,6-TRINITROTOLUENE	101.7	--	107.5	102.5
	2,4-DINITROTOLUENE	96.7	--	102.5	100.0
	2,6-DINITROTOLUENE	96.7	--	105.0	100.0
	2-AMINO-4,6-DINITROTOLUENE	96.7	--	105.0	100.0
	2-NITROTOLUENE	91.7	--	102.5	97.5
EXP	3-NITROTOLUENE	91.7	--	100.0	95.0
	4-AMINO-2,6-DINITROTOLUENE	103.3	--	102.5	100.0
	4-NITROTOLUENE	95.0	--	102.5	100.0
	HMX	100.0	--	105.0	100.0
	NITROBENZENE	98.3	--	107.5	105.0
	RDX	101.7	--	102.5	100.0
	TETRYL	69.0	--	97.5	92.5
M	ALUMINUM	100.0	--	--	--
	ANTIMONY	94.6	--	84.5	--
	ARSENIC	97.1	--	92.2	--
	BARIUM	99.8	--	--	--
	BERYLLIUM	96.1	--	98.7	--
	CADMIUM	97.5	--	97.9	--
	CALCIUM	98.0	--	85.1	--
	CHROMIUM	100.5	--	106.3	--
	COBALT	96.6	--	126.8	--
	COPPER	98.9	--	93.7	--
	IRON	98.6	--	--	--
	LEAD	96.9	--	147.0	--
	MAGNESIUM	97.5	--	92.9	--
	MANGANESE	95.5	--	--	--
	MERCURY	99.8	--	101.7	--
	NICKEL	98.2	--	104.8	--
	POTASSIUM	101.4	--	144.0	--
	SELENIUM	94.3	--	86.4	--
	SILVER	95.2	--	93.2	--
	SODIUM	98.0	--	96.1	--
	THALLIUM	98.1	--	97.1	--

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TIN	94.0	--	82.8	--
	TITANIUM	98.5	--	484.9	--
	VANADIUM	98.9	--	126.0	--
	ZINC	97.6	--	170.4	--
VOC	1,1,1,2-TETRACHLOROETHANE	98.6	--	90.5	92.1
	1,1,1-TRICHLOROETHANE	102.7	--	99.2	96.5
	1,1,2,2-TETRACHLOROETHANE	100.4	--	78.0	79.0
	1,1,2-TRICHLOROETHANE	94.7	--	80.7	83.3
	1,1-DICHLOROETHANE	102.0	--	99.3	95.7
	1,1-DICHLOROETHENE	96.9	--	87.8	87.6
	1,2,3-TRICHLOROPROPANE	84.7	--	68.3	68.2
	1,2-DIBROMO-3-CHLOROPROPANE	105.4	--	64.0	68.5
	1,2-DIBROMOETHANE	97.7	--	77.2	79.7
	1,2-DICHLOROETHANE	97.0	--	81.6	82.3
	1,2-DICHLOROPROPANE	94.1	--	88.6	84.3
	1,4-DIOXANE	79.2	--	76.3	81.4
	2-BUTANONE	90.7	--	54.9	57.7
	2-HEXANONE	98.4	--	58.4	65.8
VOC	4-METHYL-2-PENTANONE	92.7	--	62.1	62.7
	ACETONE	99.7	--	68.1	60.5
	ACETONITRILE	78.5	--	69.6	70.1
	BENZENE	94.9	--	88.1	88.1
	BROMODICHLOROMETHANE	95.1	--	85.1	79.8
	BROMOFORM	103.1	--	80.2	83.8
	BROMOMETHANE	80.7	--	65.7	66.1
	CARBON DISULFIDE	95.7	--	82.2	89.8
	CARBON TETRACHLORIDE	102.7	--	97.2	90.6
	CHLOROBENZENE	97.1	--	86.4	89.1
	CHLORODIBROMOMETHANE	96.7	--	88.6	91.3
	CHLOROETHANE	111.7	--	87.4	80.3
	CHLOROFORM	99.7	--	98.7	93.1
	CHLOROMETHANE	86.6	--	83.9	81.9
	CIS-1,2-DICHLOROETHENE	97.4	--	95.8	92.5
	CIS-1,3-DICHLOROPROPENE	99.7	--	79.7	79.9
	DIBROMOMETHANE	99.4	--	85.4	80.4
	DICHLORODIFLUOROMETHANE	95.7	--	58.7	69.0
	ETHYLBENZENE	94.4	--	85.8	88.8
	ISOBUTANOL	83.6	--	62.8	63.8
	METHYLENE CHLORIDE	104.7	--	100.8	83.3
	PROPIONITRILE	85.5	--	66.9	68.4
	STYRENE	94.6	--	83.8	87.4
	TETRACHLOROETHENE	97.0	--	77.9	81.3

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TOLUENE	94.9	--	86.8	92.0
	TOTAL XYLENES	97.6	--	88.7	88.7
	TRANS-1,2-DICHLOROETHENE	95.7	--	89.8	88.0
	TRANS-1,3-DICHLOROPROPENE	101.6	--	77.7	83.8
	TRICHLOROETHENE	94.6	--	81.0	117.6
	TRICHLOROFLUOROMETHANE	94.7	--	77.1	74.6
	VINYL CHLORIDE	97.3	--	90.9	90.9
PAH	2-METHYLNAPHTHALENE	63.2	--	58.1	68.2
	ACENAPHTHENE	65.6	--	62.2	67.7
	ACENAPHTHYLENE	65.6	--	62.2	65.8
	ANTHRACENE	63.2	--	69.5	68.2
	BENZO(A)ANTHRACENE	75.2	--	74.9	69.9
	BENZO(A)PYRENE	67.4	--	71.8	68.2
	BENZO(B)FLUORANTHENE	71.6	--	76.3	75.9
	BENZO(G,H,I)PERYLENE	63.2	--	64.9	66.4
	BENZO(K)FLUORANTHENE	63.2	--	74.2	74.6
	CHRYSENE	77.6	--	77.6	76.3
	DIBENZO(A,H)ANTHRACENE	63.2	--	74.9	68.5
	FLUORANTHENE	73.4	--	80.4	75.8
	FLUORENE	66.8	--	67.2	69.5
	INDENO(1,2,3-CD)PYRENE	65.6	--	66.3	67.6
	NAPHTHALENE	70.4	--	59.0	64.0
PEST/PCB	PHENANTHRENE	69.8	--	65.0	70.0
	PYRENE	82.5	--	76.3	85.4
	AROCLOR-1016	104.0	--	142.5	143.0
	AROCLOR-1260	108.0	--	110.5	109.5
Round 3					
EXP*	1,3,5-TRINITROBENZENE	19.0	--	114.0	83.0
	1,3-DINITROBENZENE	112.0	--	132.0	94.0
	2,4,6-TRINITROTOLUENE	86.0	--	114.0	64.0
	2,4-DIAMINO-6-NITROTOLUENE	94.0	--	6.0	7.0
	2,4-DINITROTOLUENE	108.0	--	128.0	92.0
	2,6-DIAMINO-4-NITROTOLUENE	112.0	--	0.0	0.0
	2,6-DINITROTOLUENE	112.0	--	138.0	98.0
	2-AMINO-4,6-DINITROTOLUENE	99.0	--	114.0	70.0
	2-NITROTOLUENE	107.0	--	110.0	92.0
	3,5-DINITROANILINE	114.0	--	109.0	109.0
	3-NITROTOLUENE	108.0	--	0.0	94.0
	4,4'-TN-AZOXY	103.0	--	45.0	60.0
	4-AMINO-2,6-DINITROTOLUENE	130.0	--	195.0	132.0
	4-NITROTOLUENE	113.0	--	110.0	97.0
	DNX	98.0	--	0.0	118.0

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA
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		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	HMX	104.0	--	134.0	69.0
	MNX	102.0	--	92.0	99.0
	NITROBENZENE	109.0	--	150.0	62.0
	RDX	112.0	--	140.0	84.0
	TETRYL	0.0	--	0.0	0.0
	TNX	97.0	--	99.0	104.0
M	ALUMINUM	109.2	--	156.7	--
	ANTIMONY	106.8	--	100.9	--
	ARSENIC	106.0	--	85.9	--
	BARIUM	108.6	--	124.9	--
	BERYLLIUM	101.6	--	99.7	--
	CADMIUM	105.6	--	97.8	--
	CALCIUM	107.1	--	87.7	--
	CHROMIUM	109.6	--	78.5	--
	COBALT	108.0	--	80.2	--
	COPPER	110.4	--	84.1	--
	IRON	103.9	--	49.2	--
	LEAD	108.6	--	82.9	--
	MAGNESIUM	108.2	--	87.5	--
	MANGANESE	109.8	--	182.8	--
	MERCURY	100.6	--	112.2	--
	NICKEL	111.0	--	89.2	--
	POTASSIUM	140.2	--	88.4	--
	SELENIUM	104.6	--	86.3	--
	SILVER	101.8	--	92.0	--
	SODIUM	108.9	--	89.9	--
	THALLIUM	106.2	--	102.0	--
	TIN	109.0	--	97.8	--
	VANADIUM	107.0	--	85.1	--
	ZINC	115.2	--	71.6	--
PEST/PCB	AROCLOR-1016	100.0	--	106.0	111.0
	AROCLOR-1260	102.0	--	112.0	125.0

1 Percent recovery information was not available for chemical parameters.
* All EXP results for Round 3 are vegetation samples

-- Not applicable
DIOX - Dioxins and furans
EXP - Energetics
HERB - Herbicides
LCS - Laboratory control sample
LCSD - Laboratory control sample duplicate

TABLE H-9

SOLID MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**

M - Metals
MS - Matrix spike
MSD - Matrix spike duplicate
PEST/PCB - Pesticides and polychlorinated biphenyls
RPD - Relative percent difference (See QAPP for calculation method)
SVOAC- Semivolatile organic compound
SUR - Surrogate compound
TRG - Target compound
VOC - Volatile organic compound
WET - Wet chemistry parameters

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
Composting operation[1]					
NA	NA	NA	NA	NA	NA
Round 1					
DIOX	1,2,3,4,6,7,8,9-OCDD	108.0	111.0	--	--
	1,2,3,4,6,7,8,9-OCDF	104.5	110.5	--	--
	1,2,3,4,6,7,8-HpCDD	92.9	100.7	--	--
	1,2,3,4,6,7,8-HpCDF	94.8	104.7	--	--
	1,2,3,4,7,8,9-HpCDF	103.1	97.0	--	--
	1,2,3,4,7,8-HxCDD	98.9	107.5	--	--
	1,2,3,4,7,8-HxCDF	94.9	107.0	--	--
	1,2,3,6,7,8-HxCDD	93.7	102.0	--	--
	1,2,3,6,7,8-HxCDF	102.0	106.5	--	--
	1,2,3,7,8,9-HxCDD	97.0	100.2	--	--
	1,2,3,7,8,9-HxCDF	94.6	103.2	--	--
	1,2,3,7,8-PeCDD	99.6	103.0	--	--
	1,2,3,7,8-PeCDF	89.6	96.2	--	--
	2,3,4,6,7,8-HxCDF	96.7	98.0	--	--
	2,3,4,7,8-PeCDF	111.0	123.0	--	--
	2,3,7,8-TCDD	102.2	107.5	--	--
	2,3,7,8-TCDF	94.1	98.4	--	--
EXP	1,3,5-TRINITROBENZENE	91.1	--	89.7	90.7
	1,3-DINITROBENZENE	92.7	--	90.7	91.3
	2,4,6-TRINITROTOLUENE	97.1	--	94.7	95.0
	2,4-DINITROTOLUENE	93.4	--	90.0	90.7
	2,6-DINITROTOLUENE	95.9	--	92.7	93.3
	2-AMINO-4,6-DINITROTOLUENE	94.1	--	92.0	92.7
	2-NITROTOLUENE	95.3	--	92.7	92.3
	3-NITROTOLUENE	94.6	--	92.0	92.0
	4-AMINO-2,6-DINITROTOLUENE	93.3	--	91.0	91.7
	4-NITROTOLUENE	94.9	--	92.7	92.7
	HMX	92.7	--	77.3	75.0
	NITROBENZENE	93.6	--	91.7	90.7
	PICRAMIC ACID	72.4	--	73.5	86.0
	PICRIC ACID	129.6	--	108.0	110.5
	RDX	88.4	--	59.7	58.7
	TETRYL	84.6	--	82.7	83.3
HERB	HEXACHLOROPHENE	42.0	--	30.6	32.2
	PENTACHLOROPHENOL	57.7	--	45.0	46.8
M	ALUMINUM	93.3	--	98.5	--
	ANTIMONY	96.3	--	97.5	--
	ARSENIC	94.6	--	96.7	--

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	Parameter	LCS	LCSD	MS	MSD
M	BARIUM	97.2	--	98.8	--
	BERYLLIUM	94.4	--	99.4	--
	CADMIUM	95.2	--	95.1	--
	CALCIUM	93.2	--	99.3	--
	CHROMIUM	95.3	--	97.3	--
	COBALT	96.1	--	96.5	--
	COPPER	97.9	--	96.7	--
	IRON	98.9	--	97.7	--
	LEAD	93.4	--	94.0	--
	LITHIUM	94.6	--	97.8	--
	MAGNESIUM	96.0	--	97.2	--
	MANGANESE	97.2	--	102.2	--
	MERCURY	100.5	--	101.4	--
	NICKEL	97.6	--	97.0	--
	POTASSIUM	93.1	--	93.0	--
	SELENIUM	99.1	--	98.9	--
	SILVER	96.8	--	93.5	--
	SODIUM	94.3	--	98.3	--
	STRONTIUM	95.0	--	97.8	--
	THALLIUM	92.7	--	93.6	--
	TIN	96.4	--	96.6	--
	TITANIUM	94.8	--	95.8	--
	VANADIUM	94.1	--	96.8	--
	ZINC	94.8	--	115.7	--
SVOC	1,2,4-TRICHLOROBENZENE	60.8	--	49.0	45.0
	1,2-DICHLOROBENZENE	55.8	--	47.3	43.3
	1,3-DICHLOROBENZENE	53.5	--	45.0	41.0
	1,4-DICHLOROBENZENE	54.9	--	47.0	43.0
	2,4,5-TRICHLOROPHENOL	79.0	--	65.0	65.3
	2,4,6-TRICHLOROPHENOL	64.8	--	51.0	46.7
	2,4-DICHLOROPHENOL	80.0	--	63.7	65.0
	2,4-DIMETHYLPHENOL	88.0	--	86.0	89.3
	2,4-DINITROPHENOL	26.3	--	19.0	16.3
(PAH)	2-CHLORONAPHTHALENE	70.9	--	59.7	60.3
	2-CHLOROPHENOL	67.5	--	63.7	62.3
(PAH)	2-METHYLNAPHTHALENE	63.2	--	46.0	47.0
	2-METHYLPHENOL	86.0	--	84.3	86.0
	2-NITROANILINE	95.0	--	89.7	93.3
	2-NITROPHENOL	78.0	--	64.0	47.7
	3,3'-DICHLOROBENZIDINE	63.5	--	67.3	72.3
	3,4-METHYLPHENOL	87.0	--	81.0	86.3
	3-NITROANILINE	91.5	--	91.3	93.0

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	4,6-DINITRO-2-METHYLPHENOL	44.8	--	30.3	21.7
	4-BROMOPHENYL-PHENYLETHER	95.5	--	89.7	91.3
	4-CHLORO-3-METHYLPHENOL	83.0	--	72.7	86.0
	4-CHLOROANILINE	83.5	--	96.3	100.3
SVOC	4-CHLOROPHENYL-PHENYLETHER	96.0	--	86.0	84.3
	4-NITROANILINE	89.5	--	79.3	82.7
	4-NITROPHENOL	43.4	--	37.0	26.3
(PAH)	ACENAPHTHENE	69.8	--	58.0	58.0
(PAH)	ACENAPHTHYLENE	71.2	--	59.5	59.0
(PAH)	ANTHRACENE	66.4	--	64.0	63.0
(PAH)	BENZO[A]ANTHRACENE	80.8	--	81.0	79.5
(PAH)	BENZO[A]PYRENE	72.7	--	72.5	73.5
(PAH)	BENZO[B]FLUORANTHENE	87.4	--	92.0	87.5
(PAH)	BENZO[G,H,I]PERYLENE	76.9	--	54.0	57.5
(PAH)	BENZO[K]FLUORANTHENE	82.2	--	78.5	83.5
	BENZYL ALCOHOL	90.5	--	89.7	95.0
	BIS(2-CHLOROETHOXY)METHANE	74.5	--	72.7	70.7
	BIS(2-CHLOROETHYL)ETHER	81.0	--	72.7	74.3
	BIS(2-CHLOROISOPROPYL)ETHER	90.5	--	93.3	93.0
	BIS(2-ETHYLHEXYL)PHTHALATE	111.5	--	107.3	100.0
	BUTYLBENZYLPHTHALATE	85.0	--	88.0	89.7
(PAH)	CHRYSENE	89.0	--	83.0	86.5
	DIBENZO[A,H]ANTHRACENE	74.3	--	57.0	57.5
	DIBENZOFURAN	97.5	--	87.7	87.7
	DIETHYLPHTHALATE	97.0	--	89.7	89.7
	DIMETHYLPHTHALATE	96.5	--	88.0	89.7
	DI-N-BUTYLPHTHALATE	91.0	--	88.0	89.7
	DI-N-OCTYLPHTHALATE	89.5	--	95.0	96.3
	DIPHENYLAMINE	80.5	--	72.3	75.7
(PAH)	FLUORANTHENE	82.4	--	83.0	82.5
(PAH)	FLUORENE	72.8	--	64.0	66.5
	HEXACHLOROBENZENE	94.5	--	86.0	87.7
	HEXACHLOROBUTADIENE	56.8	--	45.3	39.0
	HEXACHLOROCYCLOPENTADIENE	6.4	--	4.7	9.0
	HEXACHLOROETHANE	46.8	--	40.0	35.7
(PAH)	INDENO[1,2,3-CD]PYRENE	79.0	--	60.0	61.5
	ISOPHORONE	79.5	--	96.3	96.3
(PAH)	NAPHTHALENE	58.2	--	43.0	43.5
	N-NITROSODIMETHYLAMINE	74.0	--	71.0	72.7
	N-NITROSO-DI-N-PROPYLAMINE	90.0	--	84.7	91.7
(PAH)	PHENANTHRENE	80.8	--	77.5	76.0
	PHENOL	68.5	--	64.0	67.3

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
(PAH)	PYRENE	91.6	--	87.5	87.5
VOC	1,1,1-TRICHLOROETHANE	--	--	100.0	100.0
	1,1,2,2-TETRACHLOROETHANE	--	--	90.0	93.0
	1,1,2-TRICHLOROETHANE	--	--	88.0	83.0
	1,1-DICHLOROETHANE	--	--	97.0	97.0
	1,1-DICHLOROETHENE	102.8	--	95.0	99.0
	1,2-DICHLOROETHANE	--	--	93.0	93.0
	1,2-DICHLOROPROPANE	--	--	98.0	97.0
VOC	1,4-DIOXANE	87.2	--	88.0	88.0
	2-BUTANONE	--	--	120.0	120.0
	2-HEXANONE	--	--	110.0	100.0
	4-METHYL-2-PENTANONE	--	--	110.0	110.0
	ACETONE	--	--	95.0	94.0
	ACETONITRILE	88.2	--	90.0	86.0
	BENZENE	103.2	--	97.0	98.0
	BROMODICHLOROMETHANE	--	--	96.0	96.0
	BROMOFORM	--	--	97.0	91.0
	BROMOMETHANE	--	--	53.0	52.0
	CARBON DISULFIDE	--	--	120.0	120.0
	CARBON TETRACHLORIDE	--	--	110.0	110.0
	CHLOROBENZENE	96.2	--	96.0	91.0
	CHLOROETHANE	--	--	79.0	77.0
	CHLOROFORM	--	--	99.0	99.0
	CHLOROMETHANE	--	--	51.0	50.0
	CIS-1,2-DICHLOROETHENE	--	--	99.0	100.0
	CIS-1,3-DICHLOROPROPENE	--	--	94.0	93.0
	DIBROMOCHLOROMETHANE	--	--	93.0	95.0
	ETHYLBENZENE	--	--	98.0	95.0
	ISOBUTYL ALCOHOL	98.3	--	98.0	89.0
	METHYLENE CHLORIDE	--	--	92.0	98.0
	PROPIONITRILE	99.5	--	94.0	90.0
	STYRENE	--	--	92.0	93.0
	TETRACHLOROETHENE	--	--	100.0	95.0
	TOLUENE	92.0	--	90.0	88.0
	TRANS-1,2-DICHLOROETHENE	--	--	94.0	96.0
	TRANS-1,3-DICHLOROPROPENE	--	--	82.0	76.0
	TRICHLOROETHENE	98.2	--	97.0	96.0
	VINYL CHLORIDE	--	--	60.0	59.0
PCB	AROCLOR-1016	90.0	--	--	--
	AROCLOR-1260	87.0	--	--	--
MISC	AMMONIA AS N (EPA 350.1)	103.8	--	89.8	89.3
	NITRATE/NITRITE (EPA 353.2)	104.7	--	99.5	97.5

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
Round 2					
EXP	1,3,5-TRINITROBENZENE	96.6	--	95.4	88.3
	1,3-DINITROBENZENE	97.0	--	94.4	87.3
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	--	--	58.8	64.6
	2,4,6-TRINITROTOLUENE	96.6	--	87.1	73.3
	2,4-DIAMINO-6-NITROTOLUENE	118.3	--	120.3	141.5
	2,4-DINITROTOLUENE	87.4	--	85.7	80.0
	2,6-DIAMINO-4-NITROTOLUENE	107.2	--	96.7	104.9
	2,6-DINITROTOLUENE	90.3	--	86.8	80.4
	2-AMINO-4,6-DINITROTOLUENE	97.0	--	102.9	94.5
	2-NITROTOLUENE	82.3	--	78.5	74.4
	3,5-DINITROANILINE	--	--	112.1	96.8
EXP	3-NITROTOLUENE	79.9	--	76.0	71.0
	4-AMINO-2,6-DINITROTOLUENE	99.0	--	107.7	94.4
	4-NITROTOLUENE	83.2	--	80.6	75.8
	DNX	--	--	87.1	89.4
	HMX	94.6	--	96.8	77.6
	MNX	--	--	108.2	112.8
	NITROBENZENE	93.8	--	92.1	86.3
	RDX	102.9	--	157.7	81.7
	TETRYL	91.2	--	90.3	83.3
	TNX	--	--	92.7	105.0
M	ALUMINUM	100.5	--	104.9	--
	ANTIMONY	96.4	--	98.6	--
	ARSENIC	97.9	--	100.4	--
	BARIUM	97.3	--	120.8	--
	BERYLLIUM	96.0	--	97.1	--
	CADMIUM	96.6	--	97.0	--
	CALCIUM	100.2	--	97.2	--
	CHROMIUM	100.3	--	100.7	--
	COBALT	96.8	--	94.4	--
	COPPER	98.6	--	96.2	--
	IRON	99.6	--	100.5	--
	LEAD	96.4	--	95.3	--
	MAGNESIUM	99.1	--	111.5	--
	MANGANESE	99.0	--	101.2	--
	MERCURY	97.1	--	103.6	--
	NICKEL	98.2	--	97.2	--
	POTASSIUM	102.9	--	104.5	--
	SELENIUM	99.1	--	104.2	--
	SILVER	91.2	--	88.9	--
	SODIUM	98.5	--	128.5	--

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	THALLIUM	98.4	--	96.8	--
	TIN	96.8	--	96.2	--
	TITANIUM	98.8	--	100.3	--
	VANADIUM	98.9	--	101.0	--
	ZINC	96.9	--	100.5	--
MF	ALUMINUM	--	--	74.3	--
	ANTIMONY	--	--	73.4	--
	ARSENIC	--	--	74.0	--
	BARIUM	--	--	74.2	--
	BERYLLIUM	--	--	71.6	--
	CADMIUM	--	--	72.4	--
	CALCIUM	--	--	97.7	--
	CHROMIUM	--	--	74.3	--
	COBALT	--	--	70.7	--
	COPPER	--	--	72.6	--
	IRON	--	--	71.7	--
MF	LEAD	--	--	74.2	--
	MAGNESIUM	--	--	71.4	--
	MANGANESE	--	--	56.8	--
	NICKEL	--	--	71.4	--
	POTASSIUM	--	--	76.4	--
	SELENIUM	--	--	73.3	--
	SILVER	--	--	66.9	--
	SODIUM	--	--	97.4	--
	THALLIUM	--	--	73.9	--
	TIN	--	--	73.4	--
	TITANIUM	--	--	74.3	--
	VANADIUM	--	--	74.4	--
	ZINC	--	--	70.7	--
MISC	AMMONIA-N	105.1	--	64.3	70.8
	CHLORIDE	98.9	--	96.8	97.6
	NITRITE/NITRATE-N	101.5	--	88.0	86.7
	SULFATE	100.5	--	95.4	94.2
	TOTAL ORGANIC CARBON	100.7	--	84.3	86.3
VOC	1,1,1,2-TETRACHLOROETHANE	95.1	--	103.0	97.5
	1,1,1-TRICHLOROETHANE	105.4	--	117.0	110.0
	1,1,2,2-TETRACHLOROETHANE	91.4	--	85.5	83.0
	1,1,2-TRICHLOROETHANE	95.4	--	93.8	93.1
	1,1-DICHLOROETHANE	105.9	--	109.0	106.8
	1,1-DICHLOROETHENE	103.9	--	110.0	108.5
	1,2,3-TRICHLOROPROPANE	85.4	--	74.8	74.8
	1,2-DIBROMO-3-CHLOROPROPANE	106.4	--	84.4	87.3

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
VOC	1,2-DIBROMOETHANE	95.5	--	94.5	90.2
	1,2-DICHLOROETHANE	97.3	--	101.0	98.8
	1,2-DICHLOROPROPANE	98.4	--	99.0	98.2
	1,4-DIOXANE	88.0	--	90.0	93.7
	2-BUTANONE	98.4	--	80.3	87.1
	2-HEXANONE	106.1	--	78.4	79.9
	4-METHYL-2-PENTANONE	99.8	--	85.7	86.0
	ACETONE	104.3	--	77.0	76.8
	ACETONITRILE	87.0	--	86.3	87.0
	BENZENE	98.1	--	103.8	99.0
	BROMODICHLOROMETHANE	94.5	--	97.2	96.6
	BROMOFORM	102.8	--	99.5	99.3
	BROMOMETHANE	76.1	--	68.3	75.4
	CARBON DISULFIDE	94.2	--	121.0	115.0
	CARBON TETRACHLORIDE	103.9	--	116.0	107.3
	CHLOROBENZENE	97.2	--	98.0	102.0
	CHLORODIBROMOMETHANE	99.5	--	105.0	95.9
	CHLOROETHANE	96.9	--	98.4	98.0
	CHLOROFORM	102.4	--	108.6	106.0
	CHLOROMETHANE	92.8	--	87.3	87.0
	CIS-1,2-DICHLOROETHENE	102.1	--	106.5	105.7
	CIS-1,3-DICHLOROPROPENE	101.4	--	97.0	96.3
	DIBROMOMETHANE	102.3	--	104.7	102.7
	DICHLORODIFLUOROMETHANE	84.5	--	89.8	86.9
	ETHYLBENZENE	95.8	--	102.0	96.0
	ISOBUTANOL	93.9	--	92.7	94.7
	METHYLENE CHLORIDE	106.8	--	110.8	104.6
	PROPIONITRILE	90.7	--	92.0	95.3
	STYRENE	97.6	--	104.0	98.0
	TETRACHLOROETHENE	96.9	--	102.0	102.0
	TOLUENE	96.1	--	103.0	98.0
	TOTAL XYLENES	98.6	--	100.0	96.5
	TRANS-1,2-DICHLOROETHENE	99.8	--	106.3	103.3
	TRANS-1,3-DICHLOROPROPENE	97.8	--	89.3	91.3
	TRICHLOROETHENE	98.7	--	103.8	101.0
	TRICHLOROFLUOROMETHANE	103.5	--	118.0	117.0
	VINYL CHLORIDE	96.7	--	98.3	96.3
OVG	ETHANE	100.0	100.3	--	--
	ETHENE	100.0	101.0	--	--
	METHANE	100.5	101.0	--	--
PAH	2-METHYLNAPHTHALENE	54.0	--	56.6	62.4
	ACENAPHTHENE	65.0	--	59.1	62.4

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	ACENAPHTHYLENE	64.0	--	62.4	73.3
	ANTHRACENE	55.9	--	38.3	34.1
	BENZO(A)ANTHRACENE	78.2	--	83.3	69.9
	BENZO(A)PYRENE	45.0	--	74.1	55.0
	BENZO(B)FLUORANTHENE	81.8	--	99.1	73.3
	BENZO(G,H,I)PERYLENE	73.2	--	75.8	56.6
	BENZO(K)FLUORANTHENE	83.5	--	83.3	69.1
	CHRYSENE	84.0	--	100.8	82.4
	DIBENZO(A,H)ANTHRACENE	73.2	--	60.0	50.0
	FLUORANTHENE	78.2	--	154.1	123.3
	FLUORENE	73.2	--	71.6	80.8
	INDENO(1,2,3-CD)PYRENE	75.9	--	77.4	57.4
	NAPHTHALENE	58.1	--	62.4	71.6
	PHENANTHRENE	76.8	--	109.0	97.4
	PYRENE	80.0	--	129.1	94.9
PCB	AROCLOR-1016	93.9	--	--	--
	AROCLOR-1260	108.0	--	--	--
Round 3					
EXP	1,3,5-TRINITROBENZENE	100.5	--	95.5	95.6
	1,3-DINITROBENZENE	102.6	--	96.3	96.8
	2,4,6-TRINITROTOLUENE	97.5	--	90.3	91.3
	2,4-DIAMINO-6-NITROTOLUENE	104.7	--	107.0	109.0
	2,4-DINITROTOLUENE	93.7	--	86.5	87.4
	2,6-DIAMINO-4-NITROTOLUENE	123.7	--	112.0	102.0
	2,6-DINITROTOLUENE	98.8	--	91.3	92.4
	2-AMINO-4,6-DINITROTOLUENE	92.6	--	88.8	89.8
	2-NITROTOLUENE	87.5	--	79.5	79.9
	3,5-DINITROANILINE	101.7	--	111.0	111.0
	3-NITROTOLUENE	86.5	--	77.5	77.1
	4,4'-TN-AZOXY	38.7	--	31.0	30.0
	4-AMINO-2,6-DINITROTOLUENE	102.6	--	99.3	100.1
	4-NITROTOLUENE	91.6	--	83.6	83.9
	DNX	82.3	--	84.0	83.0
	HMX	100.4	--	103.3	99.5
	MNX	93.7	--	93.0	97.0
	NITROBENZENE	99.6	--	92.3	92.4
	RDX	105.6	--	114.1	100.3
	TETRYL	72.2	--	76.4	77.5
	TNX	68.3	--	67.0	73.0
M	ALUMINUM	102.7	--	101.5	--
	ANTIMONY	97.1	--	94.6	--
	ARSENIC	94.6	--	99.6	--

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	Parameter	LCS	LCSD	MS	MSD
	BARIUM	101.9	--	102.9	--
	BERYLLIUM	97.8	--	103.9	--
	CADMIUM	96.6	--	99.9	--
	CALCIUM	103.8	--	42.8	--
	CHROMIUM	102.0	--	104.2	--
	COBALT	102.8	--	109.0	--
	COPPER	104.7	--	109.9	--
	IRON	102.9	--	108.0	--
	LEAD	104.0	--	104.5	--
	MAGNESIUM	102.9	--	97.8	--
	MANGANESE	99.7	--	95.6	--
	MERCURY	97.8	--	97.5	--
	NICKEL	109.1	--	108.1	--
	POTASSIUM	102.5	--	100.2	--
	SELENIUM	90.1	--	92.1	--
	SILVER	96.1	--	101.1	--
	SODIUM	106.0	--	64.5	--
	THALLIUM	95.7	--	116.8	--
	TIN	102.4	--	96.6	--
	VANADIUM	104.0	--	107.8	--
	ZINC	94.9	--	94.6	--
MF	ALUMINUM	--	--	97.4	--
	ANTIMONY	--	--	103.4	--
	ARSENIC	--	--	95.5	--
	BARIUM	--	--	94.3	--
	BERYLLIUM	--	--	105.2	--
	CADMIUM	--	--	93.9	--
	CALCIUM	--	--	101.5	--
	CHROMIUM	--	--	104.1	--
	COBALT	--	--	107.6	--
	COPPER	--	--	111.9	--
	IRON	--	--	105.5	--
	LEAD	--	--	104.1	--
	MAGNESIUM	--	--	105.2	--
	MANGANESE	--	--	103.1	--
	MERCURY	--	--	104.0	--
	NICKEL	--	--	101.5	--
	POTASSIUM	--	--	96.6	--
	SELENIUM	--	--	90.1	--
	SILVER	--	--	97.8	--
	SODIUM	--	--	124.9	--
	THALLIUM	--	--	111.2	--

TABLE H-10

AQUEOUS MEAN PERCENT RECOVERIES OF LABORATORY BIAS INDICATORS FOR ROUNDS 1, 2 AND 3
SWMU 13 - (MINE FILL B)
SWMU 16 - (CAST HIGH EXPLOSIVES FILL/B146)
NSWC CRANE
CRANE, INDIANA

		Mean Percent Recovery			
Fraction	**Parameter**	**LCS**	**LCSD**	**MS**	**MSD**
	TIN	--	--	108.9	--
	VANADIUM	--	--	105.0	--
	ZINC	--	--	99.0	--
MISC	NITRITE/NITRATE-N	99.0	--	90.7	91.0

1 Percent recovery information was not available for chemical parameters.

-- Not applicable
DIOX - Dioxins and furans
EXP - Energetics
HERB - Herbicides
LCS - Laboratory control sample
LCSD - Laboratory control sample duplicate
M - Metals
MISC - Miscellaneous anlalyses
MS - Matrix spike
MSD - Matrix spike duplicate
OVG - Organic Gases
PCB - Polychlorinated biphenyls
PEST/PCB - Pesticides and polychlorinated biphenyls
RPD - Relative percent difference (See QAPP for calculation method)
SUR - Surrogate compound
SVOC - Semivolatile organic compound
TRG - Target compound
VOC - Volatile organic compound

TABLE H-11

RELATIVE PERCENT DIFFERENCES IN EXCESS OF REFERENCE POINTS FOR LABORATORY CONTROL SAMPLES AND MATRIX SPIKES COMPOSTING DATA, AND ROUNDS 1, 2, AND 3 SWMU 13 - (MINE FILL B) [1] NSWC CRANE CRANE, INDIANA

Round and Matrix	Analyte	Sample	MS/MSD RPD > 50%
Composting Operation Soil Samples			
EXP	HMX	MFBICS526	60.2
	RDX	BIOM10419073	60.1
	RDX	BIOM16907092	54.5
	RDX	BION10214051	86.5
	RDX	MFBPES246	118.8
	RDX	MFBPES316	65.2
	TETRYL	BIOS13619031	59.2
	TETRYL	BIOS17512051	75.5
	TETRYL	BIOS21237032	55.7
M	CHROMIUM	MFBICS664	53.4
	IRON	RKYICS010	72.1
	MANGANESE	RKYICS010	64.6
	MERCURY	G9J150195011	79.2
	MERCURY	MFBICS726	163.8
VOC	ACETONE	MFBICS410	121.2
	ACETONE	MFBICS431	110.1
	ACETONE	MFBICS437	90.9
Composting Operation Aqueous Samples			
NA	NA	NA	NA
Round 1 Soil Samples			
DIOX	2,3,7,8-TCDF	13SB040204	103.9
SVOC	2,4-DIMETHYLPHENOL	16SS260002	77.4
	2-METHYLPHENOL	16SS260002	52.8
	3,3'-DICHLOROBENZIDINE	13SS040002	200.0
	3,4-METHYLPHENOL	16SS260002	56.1
	3-NITROANILINE	13SS040002	82.8
	4-CHLOROANILINE	13SS040002	80.0
	4-CHLOROANILINE	16SS260002	54.2
	4-NITROANILINE	13SS040002	76.2
	HEXACHLOROCYCLOPENTADIENE	16SS260002	95.1
	HEXACHLOROETHANE	16SS260002	52.8
	ACENAPHTHENE	13SD050004	66.7
	ANTHRACENE	13SD050004	200.0
	BENZO[A]ANTHRACENE	13SD050004	200.0
	BENZO[A]PYRENE	13SD050004	200.0
	BENZO[B]FLUORANTHENE	13SD050004	200.0
	BENZO[B]FLUORANTHENE	16SD060004	50.3
	BENZO[G,H,I]PERYLENE	13SD050004	200.0
	BENZO[K]FLUORANTHENE	13SD050004	200.0
	CHRYSENE	13SD050004	200.0
	DIBENZO[A,H]ANTHRACENE	13SD050004	62.7

TABLE H-11

RELATIVE PERCENT DIFFERENCES IN EXCESS OF REFERENCE POINTS FOR LABORATORY CONTROL SAMPLES AND MATRIX SPIKES
COMPOSTING DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

Round and Matrix	Analyte	Sample	MS/MSD RPD > 50%
	FLUORANTHENE	13SD050004	200.0
	INDENO[1,2,3-CD]PYRENE	13SD050004	200.0
	PHENANTHRENE	13SD050004	200.0
	PYRENE	13SD050004	200.0

	Analyte	Sample	MS-MSD RPD > 30%
Round 1 Aqueous Samples			
SVOC	2,4,6-TRIBROMOPHENOL [2]	16GW0501	51.7
	2,4,5-TRICHLOROPHENOL	16GW0501	81.3
	2,4,6-TRICHLOROPHENOL	16SW0201	40.0
	2,4,6-TRICHLOROPHENOL	16GW0501	52.4
	2,4-DICHLOROPHENOL	16GW0501	68.9
	2,4-DINITROPHENOL	16SW0201	200.0
	2,4-DINITROPHENOL	16GW0501	200.0
	2-CHLOROPHENOL	16GW0501	35.3
	2-NITROPHENOL	16SW0201	94.6
	2-NITROPHENOL	16GW0501	114.8
	4,6-DINITRO-2-METHYLPHENOL	16SW0201	200.0
	4,6-DINITRO-2-METHYLPHENOL	16GW0501	200.0
	4-CHLORO-3-METHYLPHENOL	16GW0501	51.9
	4-NITROPHENOL	16SW0201	134.5
	4-NITROPHENOL	16GW0501	133.3
	HEXACHLOROCYCLOPENTADIENE	16GW0501	63.4
	PHENOL	16GW0501	33.3

	Analyte	Sample	MS/MSD RPD > 50%
Round 2 Soil Samples			
VOC	DICHLORODIFLUOROMETHANE	16SB480203	200.0

	Analyte	Sample	MS/MSD RPD > 30%
Round 2 Aqueous Samples			
EXP	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE	13GWT3601	36.4
	2,4-DIAMINO-6-NITROTOLUENE	13GWT3601	36.6
	2,4-DIAMINO-6-NITROTOLUENE	13SW1302	39.5
	2,6-DIAMINO-4-NITROTOLUENE	13GWT3601	33.8
	2,6-DINITROTOLUENE	13GWT2102	31.4
	2-AMINO-4,6-DINITROTOLUENE	13SW1302	38.5
	3,5-DINITROANILINE	13GWT3601	33.6
	3,5-DINITROANILINE	13SW1302	179.5
	4-AMINO-2,6-DINITROTOLUENE	13SW1302	53.6
	4-NITROTOLUENE	13GWT2102	141.9
	MNX	13GWT0102	64.0

TABLE H-11

RELATIVE PERCENT DIFFERENCES IN EXCESS OF REFERENCE POINTS FOR LABORATORY CONTROL SAMPLES AND MATRIX SPIKES
COMPOSTING DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

Round and Matrix	Analyte	Sample	MS/MSD RPD > 50%
	MNX	13GWT2102	45.9
	MNX	13GWT3601	37.8
	MNX	13SW1302	33.7
	TNX	13GWT3601	40.0
	TNX	13SW1302	34.4
Miscellaneous	AMMONIA-N	13GWT0102	48.0
	AMMONIA-N	13SW1102	34.1
	AMMONIA-N	13SW1302	47.0
SVOA	PYRENE	13SW3201	30.5

	Analyte	Sample	MS/MSD RPD > 50%
Round 3 Solid Samples			
EXP	2,4,6-TRINITROTOLUENE	13VG006010001	54
	3-NITROTOLUENE	13VG006010001	207
	DNX	13VG006010001	203
	HMX	13VG006010001	64
	RDX	13VG006010001	51

	Analyte	Sample	MS/MSD RPD > 30%
Round 3 Aqueous Samples			
EXP	RDX	16GWT1002	36.4

DIOX = Dioxins and furans
EXP = Explosives
TRG = Target compounds
SUR = Surrogates
HERB = Herbicide
MS = Matrix spike
MSD = Matrix spike duplicate
NA = Not applicable
RPD = Relative percent difference (See QAPP for calculation method)
SVOC = Semivoatile organic compound
VOC = Volatile organic compound

1 Inorganic and organic parameter precision for LCS/LCSD and MS/MSD pairs that exceed reference points.
The reference points are: 30% (aqueous matrix) and 50% (solid matrix). A limited number of LCS/LCSI pairs exceed the reference points for the Composting Operation only; see Section 3.3.4 of text for tallies
All field QC blanks are omitted from this tally.
All Soil and Water LCS RPDs were less than 50%.
2 Surrogate Compound

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
Composting Operation											
EXP	BIOM10419052	2,4,6-TRINITROTOLUENE	--	--	66.1	--	--	--	--	NA	NA
	BIOM10419113	HMX	--	--	63.6	--	--	--	--	NA	NA
	BIOM10419113	RDX	--	--	162.0	--	--	--	--	NA	NA
	BIOM10609113	HMX	--	--	76.9	--	--	--	--	NA	NA
	BIOM10609113	RDX	--	--	163.4	--	--	--	--	NA	NA
	BIOM10900113	4-AMINO-2,6-DINITROTOLUENE	--	--	72.8	--	--	--	--	NA	NA
	BIOM11100113	2,4,6-TRINITROTOLUENE	--	--	104.6	--	--	--	--	NA	NA
	BIOM11100113	2-AMINO-4,6-DINITROTOLUENE	--	--	85.3	--	--	--	--	NA	NA
	BIOM11100113	4-AMINO-2,6-DINITROTOLUENE	--	--	72.7	--	--	--	--	NA	NA
	BIOM11300091	HMX	--	--	50.8	--	--	--	--	NA	NA
	BIOM11309113	2,4,6-TRINITROTOLUENE	--	--	145.7	--	--	--	--	NA	NA
	BIOM11309113	RDX	--	--	107.8	--	--	--	--	NA	NA
	BIOM11500091	2,4,6-TRINITROTOLUENE	--	--	86.2	--	--	--	--	NA	NA
	BIOM11508091	RDX	--	--	67.1	--	--	--	--	NA	NA
	BIOM12007091	RDX	--	--	87.4	--	--	--	--	NA	NA
	BIOM12309052	RDX	--	--	179.7	--	--	--	--	NA	NA
	BIOM12309113	RDX	--	--	121.3	--	--	--	--	NA	NA
	BIOM12809091	2,4,6-TRINITROTOLUENE	--	--	79.2	--	--	--	--	NA	NA
	BIOM12809091	RDX	--	--	89.2	--	--	--	--	NA	NA
	BIOM13210113	2,4,6-TRINITROTOLUENE	--	--	97.3	--	--	--	--	NA	NA
	BIOM13210113	RDX	--	--	68.3	--	--	--	--	NA	NA
	BIOM13811091	RDX	--	--	167.4	--	--	--	--	NA	NA
	BIOM14011052	HMX	--	--	80.6	--	--	--	--	NA	NA
	BIOM14011052	RDX	--	--	188.9	--	--	--	--	NA	NA
	BIOM14011113	HMX	--	--	88.6	--	--	--	--	NA	NA
	BIOM14011113	RDX	--	--	167.5	--	--	--	--	NA	NA
	BIOM14511052	RDX	--	--	68.5	--	--	--	--	NA	NA
	BIOM14814052	RDX	--	--	148.7	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	BIOM15212052	2,4,6-TRINITROTOLUENE	--	--	107.6	--	--	--	--	NA	NA
	BIOM15212052	HMX	--	--	92.0	--	--	--	--	NA	NA
	BIOM15212113	RDX	--	--	130.1	--	--	--	--	NA	NA
	BIOM15315052	RDX	--	--	69.6	--	--	--	--	NA	NA
	BIOM15609031	RDX	--	--	106.1	--	--	--	--	NA	NA
	BIOM15609092	HMX	--	--	53.3	--	--	--	--	NA	NA
	BIOM15709053	HMX	--	--	95.7	--	--	--	--	NA	NA
	BIOM15709113	HMX	--	--	75.6	--	--	--	--	NA	NA
	BIOM15709113	RDX	--	--	113.9	--	--	--	--	NA	NA
	BIOM16110032	HMX	--	--	70.2	--	--	--	--	NA	NA
	BIOM16110032	RDX	--	--	74.7	--	--	--	--	NA	NA
	BIOM16410053	RDX	--	--	65.9	--	--	--	--	NA	NA
	BIOM16410093	HMX	--	--	95.5	--	--	--	--	NA	NA
	BIOM16410093	RDX	--	--	100.6	--	--	--	--	NA	NA
EXP	BIOM16907052	HMX	--	--	108.2	--	--	--	--	NA	NA
	BIOM16907052	RDX	--	--	121.4	--	--	--	--	NA	NA
	BIOM16907113	HMX	--	--	53.8	--	--	--	--	NA	NA
	BIOM16907113	RDX	--	--	93.6	--	--	--	--	NA	NA
	BIOM17310052	HMX	--	--	94.8	--	--	--	--	NA	NA
	BIOM17310113	RDX	--	--	144.1	--	--	--	--	NA	NA
	BIOM18115052	RDX	--	--	138.0	--	--	--	--	NA	NA
	BIOM18115113	RDX	--	--	94.1	--	--	--	--	NA	NA
	BIOM18516052	RDX	--	--	90.5	--	--	--	--	NA	NA
	BIOM18533641	HMX	--	--	59.4	--	--	--	--	NA	NA
	BIOM19318112	HMX	--	--	106.6	--	--	--	--	NA	NA
	BIOM19318112	RDX	--	--	168.2	--	--	--	--	NA	NA
	BIOM19331072	2,4,6-TRINITROTOLUENE	--	--	70.6	--	--	--	--	NA	NA
	BIOM19331072	HMX	--	--	54.9	--	--	--	--	NA	NA
	BIOM19922071	RDX	--	--	64.2	--	--	--	--	NA	NA

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RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	BIOM19969092	HMX	--	--	85.8	--	--	--	--	NA	NA
	BIOM19969092	RDX	--	--	69.5	--	--	--	--	NA	NA
	BIOM20921091	2,4,6-TRINITROTOLUENE	--	--	118.0	--	--	--	--	NA	NA
	BIOM21020052	2,4,6-TRINITROTOLUENE	--	--	173.0	--	--	--	--	NA	NA
	BIOM21020052	RDX	--	--	143.5	--	--	--	--	NA	NA
	BIOM21020113	HMX	--	--	72.8	--	--	--	--	NA	NA
	BIOM21020113	RDX	--	--	113.7	--	--	--	--	NA	NA
	BIOM21318052	HMX	--	--	63.0	--	--	--	--	NA	NA
	BIOM21318052	RDX	--	--	161.2	--	--	--	--	NA	NA
	BIOM21318113	RDX	--	--	78.2	--	--	--	--	NA	NA
	BIOM21523052	RDX	--	--	133.1	--	--	--	--	NA	NA
	BIOM21523113	RDX	--	--	173.2	--	--	--	--	NA	NA
	BION10500053	2,4,6-TRINITROTOLUENE	--	--	181.5	--	--	--	--	NA	NA
	BION10500053	HMX	--	--	55.5	--	--	--	--	NA	NA
	BION10500053	RDX	--	--	105.3	--	--	--	--	NA	NA
	BION20018033	HMX	--	--	92.3	--	--	--	--	NA	NA
	BION20018033	RDX	--	--	100.0	--	--	--	--	NA	NA
	BION21617052	HMX	--	--	106.1	--	--	--	--	NA	NA
	BION21617052	RDX	--	--	167.0	--	--	--	--	NA	NA
	BIOS10300052	2,4,6-TRINITROTOLUENE	--	--	188.6	--	--	--	--	NA	NA
	BIOS10300052	HMX	--	--	190.1	--	--	--	--	NA	NA
	BIOS10300052	RDX	--	--	188.3	--	--	--	--	NA	NA
	BIOS10315091	HMX	--	--	74.1	--	--	--	--	NA	NA
	BIOS10315091	RDX	--	--	129.7	--	--	--	--	NA	NA
	BIOS10700051	2,4,6-TRINITROTOLUENE	--	--	95.9	--	--	--	--	NA	NA
	BIOS11000091	1,3,5-TRINITROBENZENE	--	--	105.2	--	--	--	--	NA	NA
	BIOS11000091	2,4,6-TRINITROTOLUENE	--	--	54.3	--	--	--	--	NA	NA
	BIOS11000091	2-AMINO-4,6-DINITROTOLUENE	--	--	90.6	--	--	--	--	NA	NA
	BIOS11000091	HMX	--	--	80.7	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	BIOS11209052	HMX	--	--	57.6	--	--	--	--	NA	NA
	BIOS11209113	RDX	--	--	56.5	--	--	--	--	NA	NA
	BIOS11400052	2,4,6-TRINITROTOLUENE	--	--	77.7	--	--	--	--	NA	NA
EXP	BIOS11400113	2,4,6-TRINITROTOLUENE	--	--	76.9	--	--	--	--	NA	NA
	BIOS11707113	RDX	--	--	144.4	--	--	--	--	NA	NA
	BIOS12207052	2,4,6-TRINITROTOLUENE	--	--	184.8	--	--	--	--	NA	NA
	BIOS12207113	RDX	--	--	86.3	--	--	--	--	NA	NA
	BIOS12509052	2,4,6-TRINITROTOLUENE	--	--	163.6	--	--	--	--	NA	NA
	BIOS12509113	2,4,6-TRINITROTOLUENE	--	--	148.6	--	--	--	--	NA	NA
	BIOS12509113	HMX	--	--	132.8	--	--	--	--	NA	NA
	BIOS12509113	RDX	--	--	75.7	--	--	--	--	NA	NA
	BIOS12707052	2,4,6-TRINITROTOLUENE	--	--	165.5	--	--	--	--	NA	NA
	BIOS12707052	4-AMINO-2,6-DINITROTOLUENE	--	--	94.4	--	--	--	--	NA	NA
	BIOS12707052	HMX	--	--	122.8	--	--	--	--	NA	NA
	BIOS12707052	RDX	--	--	147.2	--	--	--	--	NA	NA
	BIOS12911052	2,4,6-TRINITROTOLUENE	--	--	149.8	--	--	--	--	NA	NA
	BIOS12911052	RDX	--	--	107.5	--	--	--	--	NA	NA
	BIOS13308091	2,4,6-TRINITROTOLUENE	--	--	164.3	--	--	--	--	NA	NA
	BIOS13308091	RDX	--	--	54.5	--	--	--	--	NA	NA
	BIOS13509113	2,4,6-TRINITROTOLUENE	--	--	151.7	--	--	--	--	NA	NA
	BIOS13509113	4-AMINO-2,6-DINITROTOLUENE	--	--	50.7	--	--	--	--	NA	NA
	BIOS13609091	RDX	--	--	112.4	--	--	--	--	NA	NA
	BIOS13619052	2-AMINO-4,6-DINITROTOLUENE	--	--	63.5	--	--	--	--	NA	NA
	BIOS13619052	4-AMINO-2,6-DINITROTOLUENE	--	--	111.7	--	--	--	--	NA	NA
	BIOS13619052	RDX	--	--	91.6	--	--	--	--	NA	NA
	BIOS13619113	4-AMINO-2,6-DINITROTOLUENE	--	--	55.4	--	--	--	--	NA	NA
	BIOS13619113	RDX	--	--	52.3	--	--	--	--	NA	NA
	BIOS14313052	2,4,6-TRINITROTOLUENE	--	--	112.5	--	--	--	--	NA	NA
	BIOS14313113	2,4,6-TRINITROTOLUENE	--	--	150.5	--	--	--	--	NA	NA

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RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	BIOS14618091	2,4,6-TRINITROTOLUENE	--	--	140.0	--	--	--	--	NA	NA
	BIOS14618091	RDX	--	--	198.5	--	--	--	--	NA	NA
	BIOS14710052	HMX	--	--	80.4	--	--	--	--	NA	NA
	BIOS14710052	RDX	--	--	77.2	--	--	--	--	NA	NA
	BIOS14710113	HMX	--	--	152.0	--	--	--	--	NA	NA
	BIOS14710113	RDX	--	--	143.8	--	--	--	--	NA	NA
	BIOS15010052	2,4,6-TRINITROTOLUENE	--	--	171.4	--	--	--	--	NA	NA
	BIOS15010052	RDX	--	--	96.1	--	--	--	--	NA	NA
	BIOS15010113	HMX	--	--	73.7	--	--	--	--	NA	NA
	BIOS15010113	RDX	--	--	140.7	--	--	--	--	NA	NA
	BIOS15112053	2,4,6-TRINITROTOLUENE	--	--	198.7	--	--	--	--	NA	NA
	BIOS15112113	RDX	--	--	170.7	--	--	--	--	NA	NA
	BIOS15909113	2,4,6-TRINITROTOLUENE	--	--	163.4	--	--	--	--	NA	NA
	BIOS16308031	HMX	--	--	102.6	--	--	--	--	NA	NA
	BIOS16308091	RDX	--	--	117.1	--	--	--	--	NA	NA
	BIOS16710052	HMX	--	--	50.8	--	--	--	--	NA	NA
	BIOS16710113	HMX	--	--	136.9	--	--	--	--	NA	NA
	BIOS17110113	HMX	--	--	112.0	--	--	--	--	NA	NA
	BIOS17410091	HMX	--	--	75.5	--	--	--	--	NA	NA
	BIOS17410091	RDX	--	--	92.9	--	--	--	--	NA	NA
	BIOS17512052	RDX	--	--	137.7	--	--	--	--	NA	NA
EXP	BIOS17512113	RDX	--	--	115.6	--	--	--	--	NA	NA
	BIOS17810091	HMX	--	--	78.8	--	--	--	--	NA	NA
	BIOS17810091	RDX	--	--	151.9	--	--	--	--	NA	NA
	BIOS17916052	HMX	--	--	84.7	--	--	--	--	NA	NA
	BIOS17916113	HMX	--	--	75.1	--	--	--	--	NA	NA
	BIOS17916113	RDX	--	--	165.5	--	--	--	--	NA	NA
	BIOS18312052	RDX	--	--	65.0	--	--	--	--	NA	NA
	BIOS18719113	RDX	--	--	65.9	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP[3]	FDUP	LDUP[3]	LDUP[3]	FDUP	LDUP[3]	FDUP	FDUP
	BIOS19117113	HMX	--	--	89.9	--	--	--	--	NA	NA
	BIOS19117113	RDX	--	--	160.0	--	--	--	--	NA	NA
	BIOS19624033	2,4,6-TRINITROTOLUENE	--	--	79.9	--	--	--	--	NA	NA
	BIOS19624033	HMX	--	--	61.3	--	--	--	--	NA	NA
	BIOS19624033	RDX	--	--	52.8	--	--	--	--	NA	NA
	BIOS20120053	RDX	--	--	157.8	--	--	--	--	NA	NA
	BIOS20147031	RDX	--	--	64.6	--	--	--	--	NA	NA
	BIOS20147092	HMX	--	--	75.3	--	--	--	--	NA	NA
	BIOS21118091	2,4,6-TRINITROTOLUENE	--	--	186.8	--	--	--	--	NA	NA
	BIOS21118091	HMX	--	--	153.3	--	--	--	--	NA	NA
	BIOS21118091	RDX	--	--	196.0	--	--	--	--	NA	NA
	MFBICS445	2,4,6-TRINITROTOLUENE	--	--	179.0	--	--	--	--	NA	NA
	MFBICS445	RDX	--	--	105.0	--	--	--	--	NA	NA
	MFBICS481	HMX	--	--	54.5	--	--	--	--	NA	NA
	MFBICS508	HMX	--	--	118.4	--	--	--	--	NA	NA
	MFBICS508	RDX	--	--	94.5	--	--	--	--	NA	NA
	MFBICS566	RDX	--	--	166.1	--	--	--	--	NA	NA
	MFBICS575	2,4,6-TRINITROTOLUENE	--	--	81.9	--	--	--	--	NA	NA
	MFBICS575	PETN	--	--	57.1	--	--	--	--	NA	NA
	MFBICS592	4-AMINO-2,6-DINITROTOLUENE	--	--	71.0	--	--	--	--	NA	NA
	MFBICS592	RDX	--	--	118.5	--	--	--	--	NA	NA
	MFBICS640	HMX	--	--	98.2	--	--	--	--	NA	NA
	MFBICS640	RDX	--	--	92.4	--	--	--	--	NA	NA
	MFBICS646	2,4,6-TRINITROTOLUENE	--	--	139.2	--	--	--	--	NA	NA
	MFBICS646	2-AMINO-4,6-DINITROTOLUENE	--	--	150.3	--	--	--	--	NA	NA
	MFBICS646	4-AMINO-2,6-DINITROTOLUENE	--	--	126.7	--	--	--	--	NA	NA
	MFBICS646	HMX	--	--	113.0	--	--	--	--	NA	NA
	MFBICS693	HMX	--	--	92.0	--	--	--	--	NA	NA
	MFBICS693	RDX	--	--	71.0	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	MFBICS726	HMX	--	--	105.5	--	--	--	--	NA	NA
	MFBICS726	RDX	--	--	155.9	--	--	--	--	NA	NA
	MFBPES013	RDX	--	--	140.1	--	--	--	--	NA	NA
	MFBPES047	HMX	--	--	139.1	--	--	--	--	NA	NA
	MFBPES113	RDX	--	--	96.0	--	--	--	--	NA	NA
	MFBPES131	HMX	--	--	58.8	--	--	--	--	NA	NA
	MFBPES183	HMX	--	--	92.3	--	--	--	--	NA	NA
	MFBPES246	4-AMINO-2,6-DINITROTOLUENE	--	--	53.2	--	--	--	--	NA	NA
	MFBPES246	HMX	--	--	55.6	--	--	--	--	NA	NA
	MFBPES246	RDX	--	--	69.6	--	--	--	--	NA	NA
EXP	MFBPES425	RDX	--	--	60.3	--	--	--	--	NA	NA
M	MFBICS430	LEAD	--	--	88.9	NR	--	--	--	NA	NA
	MFBICS430	MERCURY	--	--	100.8	NR	--	--	--	NA	NA
	MFBICS436	CHROMIUM	--	--	75.8	NR	--	--	--	NA	NA
	MFBICS445	CHROMIUM	--	--	50.3	NR	--	--	--	NA	NA
	MFBICS466	CADMIUM	--	--	61.3	NR	--	--	--	NA	NA
	MFBICS466	MERCURY	--	--	95.4	NR	--	--	--	NA	NA
	MFBICS508	BARIUM	--	--	55.3	NR	--	--	--	NA	NA
	MFBICS508	MERCURY	--	--	82.3	NR	--	--	--	NA	NA
	MFBICS640	ARSENIC	--	--	79.2	NR	--	--	--	NA	NA
	MFBICS640	MERCURY	--	--	52.1	NR	--	--	--	NA	NA
	MFBICS646	CHROMIUM	--	--	71.7	NR	--	--	--	NA	NA
	MFBICS646	LEAD	--	--	141.8	NR	--	--	--	NA	NA
	MFBICS708	MERCURY	--	--	57.1	NR	--	--	--	NA	NA
	MFBICS726	ARSENIC	--	--	69.1	NR	--	--	--	NA	NA
	MFBICS741	MERCURY	--	--	81.5	NR	--	--	--	NA	NA
	MFBPES033	LEAD	--	--	80.5	NR	--	--	--	NA	NA
	MFBPES047	BARIUM	--	--	69.1	NR	--	--	--	NA	NA
	MFBPES067	BARIUM	--	--	144.5	NR	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP[3]	FDUP	LDUP[3]	LDUP[3]	FDUP	LDUP[3]	FDUP	FDUP
	MFBPES131	BARIUM	--	--	80.7	NR	--	--	--	NA	NA
	MFBPES131	CHROMIUM	--	--	101.1	NR	--	--	--	NA	NA
	MFBPES131	LEAD	--	--	140.1	NR	--	--	--	NA	NA
	MFBPES143	BARIUM	--	--	71.5	NR	--	--	--	NA	NA
	MFBPES143	LEAD	--	--	54.8	NR	--	--	--	NA	NA
	MFBPES187	ARSENIC	--	--	78.4	NR	--	--	--	NA	NA
	MFBPES205	ARSENIC	--	--	50.9	NR	--	--	--	NA	NA
	MFBPES211	MERCURY	--	--	76.3	NR	--	--	--	NA	NA
	MFBPES405	ARSENIC	--	--	62.1	NR	--	--	--	NA	NA
	MFBPES445	LEAD	--	--	64.8	NR	--	--	--	NA	NA
Round 1											
AVS/SEM	13SD050004	COPPER	84.8	--	--	--	--	--	--	NA	NA
		LEAD	146.9	--	--	--	--	--	--	NA	NA
		NICKEL	92.1	--	--	--	--	--	--	NA	NA
	16SD060004	CADMIUM	53.3	--	--	--	--	--	--	NA	NA
DIOX	13SS040002	TOTAL HXCDD	--	--	71.6	--	--	--	--	NA	NA
		TOTAL HXCDF	--	--	52.8	--	--	--	--	NA	NA
	13SS090002	2,3,7,8-TCDF	--	--	103.4	--	--	--	--	NA	NA
		TOTAL PECDF	--	--	67.2	--	--	--	--	NA	NA
METALS (Total)	13SD050004	CALCIUM	194.9	--	--	--	--	--	--	NA	NA
		CHROMIUM	66.7	--	--	--	--	--	--	NA	NA
		LEAD	138.9	--	--	--	--	--	--	NA	NA
		MAGNESIUM	156.8	--	--	--	--	--	--	NA	NA
		STRONTIUM	182.7	--	--	--	--	--	--	NA	NA
METALS (Total)	13SD050004	ZINC	59.0	62.5	--	--	--	--	--	NA	NA
	16SB130204	LITHIUM	--	--	--	60.2	--	--	--	NA	NA
	16SB230203	ALUMINUM	--	--	55.5	--	--	--	--	NA	NA
		ARSENIC	--	--	68.9	--	--	--	--	NA	NA
		CHROMIUM	--	--	59.7	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP[3]	FDUP	LDUP[3]	LDUP[3]	FDUP	LDUP[3]	FDUP	FDUP
		COBALT	--	--	50.0	--	--	--	--	NA	NA
		IRON	--	--	54.4	--	--	--	--	NA	NA
		LEAD	--	--	58.4	--	--	--	--	NA	NA
		MAGNESIUM	--	--	52.8	--	--	--	--	NA	NA
		MANGANESE	--	--	83.5	--	--	--	--	NA	NA
		NICKEL	--	--	51.9	--	--	--	--	NA	NA
		TITANIUM	--	--	61.2	--	--	--	--	NA	NA
		VANADIUM	--	--	55.5	--	--	--	--	NA	NA
		ZINC	--	--	50.2	--	--	--	--	NA	NA
	16SB260204	COBALT	--	--	47.7	59.4	--	--	--	NA	NA
		MANGANESE	--	--	58.1	54.9	--	--	--	NA	NA
		TIN	--	--	30.1	116.4	--	--	--	NA	NA
	16SB400608	MANGANESE	--	--	63.7	--	--	--	--	NA	NA
		MERCURY	--	--	79.1	--	--	--	--	NA	NA
		STRONTIUM	--	--	50.2	--	--	--	--	NA	NA
		TITANIUM	--	--	54.5	--	--	--	--	NA	NA
	16SD060004	ANTIMONY	189.3	42.2	--	--	--	--	--	NA	NA
		ARSENIC	40.0	57.5	--	--	--	--	--	NA	NA
		BARIUM	129.9	81.2	--	--	--	--	--	NA	NA
		CADMIUM	125.0	97.5	--	--	--	--	--	NA	NA
		CALCIUM	123.5	32.2	--	--	--	--	--	NA	NA
		CHROMIUM	59.4	20.0	--	--	--	--	--	NA	NA
		COPPER	161.5	138.0	--	--	--	--	--	NA	NA
		LEAD	143.3	45.6	--	--	--	--	--	NA	NA
		MAGNESIUM	50.8	38.2	--	--	--	--	--	NA	NA
		MANGANESE	141.9	24.0	--	--	--	--	--	NA	NA
		MERCURY	--	92.6	--	--	--	--	--	NA	NA
		NICKEL	60.9	62.5	--	--	--	--	--	NA	NA
		STRONTIUM	127.5	41.5	--	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP[3]	FDUP	LDUP[3]	LDUP[3]	FDUP	LDUP[3]	FDUP	FDUP
		TIN	178.1	15.3	--	--	--	--	--	NA	NA
		TITANIUM	74.7	81.4	--	--	--	--	--	NA	NA
		ZINC	161.2	86.6	--	--	--	--	--	NA	NA
	16SD110004	BARIUM	69.0	--	--	--	--	--	--	NA	NA
		MANGANESE	50.2	--	--	--	--	--	--	NA	NA
	16SS090002	ARSENIC	--	--	69.4	--	--	--	--	NA	NA
		BARIUM	--	--	68.5	--	--	--	--	NA	NA
		CALCIUM	--	--	67.4	--	--	--	--	NA	NA
		COPPER	--	--	77.4	--	--	--	--	NA	NA
		MAGNESIUM	--	--	89.1	--	--	--	--	NA	NA
		MANGANESE	--	--	95.0	--	--	--	--	NA	NA
		STRONTIUM	--	--	64.3	--	--	--	--	NA	NA
		ZINC	--	--	82.1	--	--	--	--	NA	NA
METALS (Total)	16SS120002	ANTIMONY	--	--	--	77.7	--	--	--	NA	NA
		CADMIUM	--	--	--	93.2	--	--	--	NA	NA
		COPPER	--	--	--	104.9	--	--	--	NA	NA
		LEAD	--	--	--	136.8	--	--	--	NA	NA
		ZINC	--	--	--	108.3	--	--	--	NA	NA
	16SS150002	ANTIMONY	--	--	--	99.8	--	--	--	NA	NA
		LEAD	--	--	--	51.5	--	--	--	NA	NA
		MERCURY	--	--	--	110.8	--	--	--	NA	NA
	16SS170002	BARIUM	--	--	89.9	--	--	--	--	NA	NA
		CALCIUM	--	--	72.5	--	--	--	--	NA	NA
		COBALT	--	--	86.2	--	--	--	--	NA	NA
		COPPER	--	--	55.3	--	--	--	--	NA	NA
		LEAD	--	--	133.7	--	--	--	--	NA	NA
		MAGNESIUM	--	--	80.8	--	--	--	--	NA	NA
		MANGANESE	--	--	77.0	--	--	--	--	NA	NA
		NICKEL	--	--	78.1	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	16SS210002	ANTIMONY	--	--	--	162.0	--	--	--	NA	NA
		CALCIUM	--	--	--	59.3	--	--	--	NA	NA
		COPPER	--	--	--	103.7	--	--	--	NA	NA
	16SS230002	ALUMINUM	--	--	68.4	--	--	--	--	NA	NA
		ARSENIC	--	--	72.7	--	--	--	--	NA	NA
		BARIUM	--	--	62.1	--	--	--	--	NA	NA
		CHROMIUM	--	--	69.1	--	--	--	--	NA	NA
		COPPER	--	--	58.9	--	--	--	--	NA	NA
		IRON	--	--	75.4	--	--	--	--	NA	NA
		LEAD	--	--	76.1	--	--	--	--	NA	NA
		MAGNESIUM	--	--	62.9	--	--	--	--	NA	NA
		MANGANESE	--	--	98.5	--	--	--	--	NA	NA
		STRONTIUM	--	--	141.6	--	--	--	--	NA	NA
		TITANIUM	--	--	119.8	--	--	--	--	NA	NA
		VANADIUM	--	--	57.3	--	--	--	--	NA	NA
		ZINC	--	--	154.1	--	--	--	--	NA	NA
	16SS260002	BARIUM	--	--	10.4	50.2	--	--	--	NA	NA
		CALCIUM	--	--	132.9	9.4	--	--	--	NA	NA
		COBALT	--	--	10.0	110.4	--	--	--	NA	NA
		MAGNESIUM	--	--	106.4	--	--	--	--	NA	NA
		MANGANESE	--	--	24.6	119.2	--	--	--	NA	NA
	16SW0701	TITANIUM	--	--	--	--	--	81.4	--	NA	NA
MISC	13SD050004	TOTAL ORGANIC CARBON	142.3	--	--	--	--	--	--	NA	NA
	13SW1001	AMMONIA-N	--	--	--	--	--	120.0	--	NA	NA
	16SD060004	CATION EXCHANGE CAPACITY	99.6	--	--	--	--	--	--	NA	NA
SVOC	13SS040002	BENZO(G,H,I)PERYLENE	--	--	56.0	--	--	--	--	NA	NA
	13SS090002	BENZO(A)ANTHRACENE	--	--	184.6	--	--	--	--	NA	NA
		BENZO(A)PYRENE	--	--	173.5	--	--	--	--	NA	NA
		BENZO(B)FLUORANTHENE	--	--	168.8	--	--	--	--	NA	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
		BENZO(G,H,I)PERYLENE	--	--	171.7	--	--	--	--	NA	NA
		BENZO(K)FLUORANTHENE	--	--	158.5	--	--	--	--	NA	NA
SVOC	13SS090002	CHRYSENE	--	--	173.8	--	--	--	--	NA	NA
		DIBENZO(A,H)ANTHRACENE	--	--	170.4	--	--	--	--	NA	NA
		FLUORANTHENE	--	--	195.0	--	--	--	--	NA	NA
		INDENO(1,2,3-CD)PYRENE	--	--	170.9	--	--	--	--	NA	NA
		PHENANTHRENE	--	--	196.8	--	--	--	--	NA	NA
		PYRENE	--	--	195.7	--	--	--	--	NA	NA
	16SD060004	CHRYSENE	52.6	--	--	--	--	--	--	NA	NA
	16SD110004	BENZO(A)ANTHRACENE	50.6	--	--	--	--	--	--	NA	NA
		BENZO(G,H,I)PERYLENE	54.3	--	--	--	--	--	--	NA	NA
		BENZO(K)FLUORANTHENE	71.3	--	--	--	--	--	--	NA	NA
		INDENO(1,2,3-CD)PYRENE	63.1	--	--	--	--	--	--	NA	NA
	16SS090002	BENZO(A)ANTHRACENE	--	--	54.5	--	--	--	--	NA	NA
		BENZO(B)FLUORANTHENE	--	--	70.3	--	--	--	--	NA	NA
		FLUORANTHENE	--	--	61.2	--	--	--	--	NA	NA
	16SS230002	SAFROLE	--	--	90.9	--	--	--	--	NA	NA
PCB	13SS040002	AROCLOR-1248	--	--	101.1	--	--	--	--	NA	NA
Round 2											
METALS (Total)	13SD290004	CHROMIUM	72.5	--	--	--	--	--	--	--	NA
	16SD170004	CALCIUM	73.5	--	--	--	--	--	--	--	NA
	16SD170004	TITANIUM	79.1	--	--	--	--	--	--	--	NA
	16SD170004	ZINC	90.5	--	--	--	--	--	--	--	NA
	16SD170004	ARSENIC	90.9	--	--	--	--	--	--	--	NA
	16SS450002	ANTIMONY	--	--	95.2	--	--	--	--	--	NA
	16SS450002	LEAD	--	--	59.2	--	--	--	--	--	NA
VOC	16SB500103	TOTAL XYLENES	--	--	66.7	--	--	--	--	--	NA
PCB	13SB210204	AROCLOR-1248	--	--	96.3	--	--	--	--	--	NA
SVOC	13SD320004	BENZO(K)FLUORANTHENE	57.1	--	--	--	--	--	--	--	NA

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

			SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
Fraction	Sample	Parameter	FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
EXP	13GWT0903	TNX	--	--	--	--	--	--	--	88.5	NA
	13SW1401	TNX	--	--	--	--	--	55.8	--	--	NA
METALS(Total)	13GWT0802	IRON	--	--	--	--	--	53.5	--	53.5	NA
	13GWT3601	TITANIUM	--	--	--	--	--	--	--	126.3	NA
	13SW1401-F	TITANIUM	--	--	--	--	--	54.8	--	--	NA
	13SW2501-F	ZINC	--	--	--	--	--	73.3	--	--	NA
MISC	13SW1302	AMMONIA-N	--	--	--	--	--	120.0	--	--	NA
OVG	16GWT1201	ETHENE	--	--	--	--	--	--	--	83.0	NA
	16GWT1201	ETHANE	--	--	--	--	--	--	--	96.0	NA
Round 3											
METALS	13GWT0503-F	IRON	--	--	--	--	--	--	38.9	--	--
	13GWT2503	ANTIMONY	--	--	--	--	--	--	43.3	--	--
	13GWT2503	SILVER	--	--	--	--	--	--	32.6	--	--
	13GWT2503	THALLIUM	--	--	--	--	--	--	39.8	--	--
	13GWT4801	ALUMINUM	--	--	--	--	--	--	141.9	--	--
	13GWT4801	ANTIMONY	--	--	--	--	--	--	43.9	--	--
	13SD3102	CALCIUM	154.5	--	--	--	--	--	--	--	--
	13SD3102	CHROMIUM	51.7	--	--	--	--	--	--	--	--
	13SD3102	IRON	53.7	--	--	--	--	--	--	--	--
	13SD3102	MAGNESIUM	109.3	--	--	--	--	--	--	--	--
	13SW2802-F	ALUMINUM	--	--	--	--	--	35.2	--	--	--
	13SW2802-F	CHROMIUM	--	--	--	--	--	39.5	--	--	--
	13SW2802-F	IRON	--	--	--	--	--	63.3	--	--	--
	16GWT1901	ANTIMONY	--	--	--	--	--	--	92.0	--	--
	16GWT1901	LEAD	--	--	--	--	--	--	75.0	--	--
	16GWT1901	TIN	--	--	--	--	--	--	38.0	--	--
	16SS850002	SILVER	--	--	--	104.6	--	--	--	--	--
	16SS850002	SODIUM	--	--	--	66.7	--	--	--	--	--
	16SW1901	CADMIUM	--	--	--	--	55.8	--	--	--	--
	16SW1901-F	ALUMINUM	--	--	--	--	41.8	--	--	--	--
	16SW1901-F	ARSENIC	--	--	--	--	31.8	--	--	--	--

TABLE H-12

RPDS[1] EXCEEDING REFERENCE POINTS FOR FIELD AND LABORATORY DUPLICATES
COMPOSITNG DATA, AND ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B) [2]
SWMU 16 - (CAST HIGH)
NSWC CRANE
CRANE, INDIANA

Fraction	Sample	Parameter	SEDIMENT RPD > 50%		SOIL RPD > 50%		SURFACE WATER RPD > 30%		GROUND WATER RPD > 30%		VEGETATION
			FDUP	LDUP [3]	FDUP	LDUP [3]	LDUP [3]	FDUP	LDUP [3]	FDUP	FDUP
	16SW2501	ALUMINUM	--	--	--	--	71.4	--	--	--	--
	16SW2501	LEAD	--	--	--	--	102.5	--	--	--	--
	16SW2501-F	ANTIMONY	--	--	--	--	55.4	--	--	--	--
	16SW2501-F	TIN	--	--	--	--	46.9	--	--	--	--
	16SW2901	SILVER	--	--	--	--	55.1	--	--	--	--

AVS/SEM = Acid volatiel sulfides/simultaneously extracted metals
DIOX = Dioxins and furans
FDUP = Field duplicate
LDUP = Laboratory duplicate
M = Metals
MISC = Miscellaneous parameters
NR = Not reported electronically
VOC = Volatile Orgnaic Compound
OVG = Organic Gases
PEST/PCB = Pesticides and polychlorinated biphenyls
RPD = Relative percent difference (See QAPP for calculation method)
SVOC = Semivoatile organic compound
-- Not applicable

1 Relative Percent Difference
2 Inorganic and organic parameter precision for field and laboratory duplicates that exceed at least one of the reference points. The reference points are: 30% for aqueous matrix; 50% for solid matrix. RPDs for trip blanks, rinsate blanks, source water blanks, and non-detects are omitted from this tally. Only samples that have both the original and duplicate results > 5X detection limit are included.
3 Laboratory duplicates were not analyzed for organic or miscellanous parameters.

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
ROUND 1								
EXP	1,3-DINITROBENZENE	P	0.0	25.0	0.0	0.0	0.0	0.0
		PU	0.0	25.0	0.0	0.0	0.0	0.0
		U	0.0	50.0	0.0	0.0	0.0	0.0
	2,4,6-TRINITROTOLUENE	P	0.0	20.0	0.0	0.0	0.0	0.0
		U	0.0	80.0	0.0	0.0	0.0	0.0
	2-AMINO-4,6-DINITROTOLUENE	P	0.0	14.3	0.0	0.0	0.0	0.0
		U	0.0	85.7	100.0	0.0	0.0	0.0
	4-AMINO-2,6-DINITROTOLUENE	P	0.0	12.5	0.0	0.0	0.0	0.0
		PU	0.0	37.5	0.0	0.0	0.0	0.0
		U	0.0	50.0	0.0	0.0	0.0	0.0
	4-NITROTOLUENE	U	0.0	100.0	0.0	0.0	0.0	0.0
	HMX	C	0.0	50.0	0.0	0.0	0.0	0.0
		D	0.0	25.0	0.0	0.0	0.0	0.0
		P	0.0	25.0	0.0	0.0	0.0	0.0
	RDX	P	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	66.7	0.0	0.0	0.0	0.0
HERB	PENTACHLOROPHENOL	P	0.0	100.0	0.0	0.0	0.0	0.0
M	ALUMINUM	A	0.0	28.9	0.0	100.0	0.0	0.0
		AI	0.0	39.5	0.0	0.0	0.0	0.0
		FGI	0.0	31.6	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	0.0	100.0	0.0	0.0
	ARSENIC	A	0.0	85.0	0.0	100.0	0.0	0.0
		AP	0.0	15.0	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	93.0	0.0	0.0	0.0	0.0
		AI	0.0	7.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
		AK	0.0	100.0	0.0	0.0	0.0	0.0
		K	0.0	0.0	0.0	0.0	100.0	0.0
	CALCIUM	A	0.0	61.9	0.0	100.0	0.0	0.0
		AI	0.0	38.1	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	72.0	0.0	100.0	0.0	0.0
		AK	0.0	8.0	0.0	0.0	0.0	0.0
		AKP	0.0	8.0	0.0	0.0	0.0	0.0
		AP	0.0	12.0	0.0	0.0	0.0	0.0
	COBALT	A	0.0	100.0	0.0	100.0	0.0	0.0
	COPPER	A	0.0	81.1	0.0	100.0	0.0	0.0
		AP	0.0	18.9	0.0	0.0	0.0	0.0
	IRON	A	0.0	68.4	0.0	100.0	0.0	0.0
		AF	0.0	31.6	0.0	0.0	0.0	0.0
	LEAD	A	0.0	95.5	0.0	100.0	0.0	0.0
		AP	0.0	4.5	0.0	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	LITHIUM	A	0.0	86.8	0.0	100.0	0.0	0.0
		AP	0.0	13.2	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	100.0	0.0	100.0	0.0	0.0
	MERCURY	P	0.0	100.0	0.0	0.0	0.0	0.0
	NICKEL	A	0.0	58.1	0.0	0.0	0.0	0.0
		AI	0.0	39.5	0.0	0.0	0.0	0.0
		AP	0.0	2.3	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	60.5	0.0	0.0	0.0	0.0
		AI	0.0	39.5	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	STRONTIUM	A	0.0	60.5	0.0	0.0	0.0	0.0
		AI	0.0	39.5	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	100.0	0.0	0.0
	TITANIUM	A	0.0	39.0	0.0	100.0	0.0	0.0
		AGI	0.0	29.3	0.0	0.0	0.0	0.0
		AP	0.0	31.7	0.0	0.0	0.0	0.0
	VANADIUM	A	0.0	66.7	0.0	100.0	0.0	0.0
		AP	0.0	33.3	0.0	0.0	0.0	0.0
	ZINC	A	0.0	11.6	0.0	0.0	0.0	0.0
		AIK	0.0	25.6	0.0	0.0	0.0	0.0
		AIKP	0.0	2.3	0.0	0.0	0.0	0.0
		AK	0.0	4.7	0.0	0.0	0.0	0.0
		AKP	0.0	9.3	0.0	0.0	0.0	0.0
		I	0.0	16.3	0.0	0.0	0.0	0.0
		IK	0.0	23.3	0.0	0.0	0.0	0.0
		IKP	0.0	7.0	0.0	0.0	0.0	0.0
MF	ALUMINUM	A	0.0	88.9	0.0	100.0	0.0	0.0
		P	0.0	11.1	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	0.0	100.0	0.0	0.0
	ARSENIC	A	0.0	80.0	0.0	100.0	0.0	0.0
		AP	0.0	20.0	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	CALCIUM	A	0.0	81.0	0.0	0.0	0.0	0.0
		AI	0.0	19.0	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	50.0	0.0	100.0	0.0	0.0
		AK	0.0	50.0	0.0	0.0	0.0	0.0
	COBALT	A	0.0	100.0	0.0	100.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	COPPER	A	0.0	52.9	0.0	100.0	0.0	0.0
		AI	0.0	23.5	0.0	0.0	0.0	0.0
		AP	0.0	23.5	0.0	0.0	0.0	0.0
	IRON	A	0.0	68.4	0.0	100.0	0.0	0.0
		AI	0.0	21.1	0.0	0.0	0.0	0.0
		AP	0.0	10.5	0.0	0.0	0.0	0.0
	LEAD	A	0.0	100.0	0.0	100.0	0.0	0.0
	LITHIUM	A	0.0	63.6	0.0	100.0	0.0	0.0
		AP	0.0	36.4	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	90.5	0.0	0.0	0.0	0.0
		AP	0.0	9.5	0.0	0.0	0.0	0.0
	NICKEL	A	0.0	94.4	0.0	100.0	0.0	0.0
		AP	0.0	5.6	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	76.2	0.0	0.0	0.0	0.0
		ADF	0.0	23.8	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	STRONTIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	100.0	0.0	0.0
	TITANIUM	A	0.0	27.8	0.0	100.0	0.0	0.0
		AI	0.0	16.7	0.0	0.0	0.0	0.0
		AP	0.0	55.6	0.0	0.0	0.0	0.0
	VANADIUM	A	0.0	50.0	0.0	100.0	0.0	0.0
		AP	0.0	50.0	0.0	0.0	0.0	0.0
	ZINC	A	0.0	6.3	0.0	100.0	0.0	0.0
		AK	0.0	31.3	0.0	0.0	0.0	0.0
		AKP	0.0	50.0	0.0	0.0	0.0	0.0
		K	0.0	12.5	0.0	0.0	0.0	0.0
MISC	AMMONIA-N	G	0.0	100.0	0.0	0.0	0.0	0.0
	NITRITE/NITRATE-N	A	0.0	100.0	0.0	100.0	0.0	0.0
OS	1,4-NAPHTHOQUINONE	C	0.0	0.0	0.0	0.0	100.0	0.0
	1,4-PHENYLENEDIAMINE	C	0.0	0.0	0.0	0.0	100.0	0.0
	2,3,4,6-TETRACHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2,4,5-TRICHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2,4,6-TRICHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DICHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DIMETHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2,4-DINITROPHENOL	E	0.0	0.0	0.0	0.0	100.0	33.3
		ER	0.0	0.0	0.0	0.0	0.0	66.7
	2,6-DICHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	2-CHLORONAPHTHALENE	C	0.0	0.0	0.0	0.0	100.0	0.0
	2-CHLOROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2-METHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	2-NITROPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	3&4-METHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	4,6-DINITRO-2-METHYLPHENOL	E	0.0	0.0	0.0	0.0	100.0	0.0
		R	0.0	0.0	0.0	0.0	0.0	100.0
	4-CHLORO-3-METHYLPHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
	4-NITROPHENOL	E	0.0	0.0	0.0	0.0	0.0	33.3
		ER	0.0	0.0	0.0	0.0	0.0	66.7
	4-NITROQUINOLINE-1-OXIDE	C	0.0	0.0	0.0	0.0	0.0	100.0
	A,A-DIMETHYLPHENETHYLAMINE	C	0.0	0.0	0.0	0.0	100.0	0.0
	ANILINE	C	0.0	0.0	0.0	0.0	100.0	0.0
	ARAMITE	C	0.0	0.0	0.0	0.0	0.0	100.0
	BIS(2-ETHYLHEXYL)PHTHALATE	A	100.0	0.0	0.0	0.0	0.0	0.0
	HEXACHLOROCYCLOPENTADIENE	E	0.0	0.0	0.0	0.0	0.0	100.0
	KEPONE	C	0.0	0.0	0.0	0.0	100.0	100.0
	METHAPYRILENE	C	0.0	0.0	0.0	0.0	100.0	0.0
	N-NITROSODIMETHYLAMINE	C	0.0	0.0	0.0	0.0	100.0	0.0
	PHENOL	R	0.0	0.0	0.0	0.0	0.0	100.0
OV	1,4-DIOXANE	C	0.0	0.0	0.0	0.0	100.0	0.0
	2-BUTANONE	C	0.0	0.0	0.0	0.0	100.0	0.0
	2-HEXANONE	C	0.0	0.0	0.0	0.0	100.0	0.0
	ACETONE	C	0.0	0.0	0.0	0.0	100.0	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	100.0
	BROMOMETHANE	C	0.0	0.0	0.0	0.0	100.0	0.0
	CARBON TETRACHLORIDE	C	0.0	0.0	0.0	0.0	100.0	0.0
	TRICHLOROETHENE	P	0.0	100.0	0.0	0.0	0.0	0.0
ROUND 2								
EXP	1,3,5-TRINITROBENZENE	DE	NA	50.0	NA	0.0	0.0	NA
		E	NA	0.0	NA	0.0	87.5	NA
		R	NA	0.0	NA	0.0	12.5	NA
		U	NA	50.0	NA	0.0	0.0	NA
	1,3-DINITROBENZENE	DU	NA	100.0	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	100.0	NA
	2,2',6,6'-TETRANITRO-4,4'-AZOXYTOL	H	NA	0.0	NA	0.0	100.0	NA
	2,4,6-TRINITROTOLUENE	E	NA	100.0	NA	0.0	92.3	NA
		R	NA	0.0	NA	0.0	7.7	NA
	2,4-DIAMINO-6-NITROTOLUENE	U	NA	100.0	NA	0.0	0.0	NA
	2,4-DINITROTOLUENE	DEU	NA	50.0	NA	0.0	0.0	NA
		E	NA	0.0	NA	0.0	92.3	NA
		R	NA	0.0	NA	0.0	7.7	NA
		U	NA	50.0	NA	0.0	0.0	NA

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	2,6-DIAMINO-4-NITROTOLUENE	GU	NA	66.7	NA	0.0	0.0	NA
		U	NA	33.3	NA	0.0	0.0	NA
	2,6-DINITROTOLUENE	DE	NA	50.0	NA	0.0	0.0	NA
		E	NA	0.0	NA	0.0	92.3	NA
		R	NA	0.0	NA	0.0	7.7	NA
		U	NA	50.0	NA	0.0	0.0	NA
	2-AMINO-4,6-DINITROTOLUENE	DU	NA	8.3	NA	0.0	0.0	NA
		E	NA	0.0	NA	0.0	85.7	NA
		EPU	NA	16.7	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	14.3	NA
		U	NA	75.0	NA	0.0	0.0	NA
	2-NITROTOLUENE	E	NA	0.0	NA	0.0	92.9	NA
		R	NA	0.0	NA	0.0	7.1	NA
	3,5-DINITROANILINE	D	NA	0.0	NA	0.0	100.0	NA
	3-NITROTOLUENE	DU	NA	25.0	NA	0.0	0.0	NA
		E	NA	0.0	NA	0.0	92.9	NA
		P	NA	25.0	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	7.1	NA
		U	NA	50.0	NA	0.0	0.0	NA
	4-AMINO-2,6-DINITROTOLUENE	D	NA	12.5	NA	0.0	0.0	NA
		P	NA	12.5	NA	0.0	0.0	NA
		PU	NA	12.5	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	100.0	NA
		U	NA	62.5	NA	0.0	0.0	NA
	4-NITROTOLUENE	E	NA	0.0	NA	0.0	92.9	NA
		R	NA	0.0	NA	0.0	7.1	NA
	DNX	PU	NA	5.0	NA	0.0	0.0	NA
		U	NA	95.0	NA	0.0	0.0	NA
	HMX	D	NA	8.3	NA	0.0	0.0	NA
		P	NA	16.7	NA	0.0	0.0	NA
		PU	NA	8.3	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	100.0	NA
		U	NA	66.7	NA	0.0	0.0	NA
	MNX	D	NA	9.1	NA	0.0	0.0	NA
		DU	NA	9.1	NA	0.0	0.0	NA
		G	NA	18.2	NA	0.0	0.0	NA
		P	NA	9.1	NA	0.0	0.0	NA
		PU	NA	18.2	NA	0.0	0.0	NA
		U	NA	36.4	NA	0.0	0.0	NA
	NITROBENZENE	R	NA	0.0	NA	0.0	100.0	NA
	RDX	D	NA	6.7	NA	0.0	0.0	NA
		P	NA	26.7	NA	0.0	0.0	NA
		PU	NA	13.3	NA	0.0	0.0	NA

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
		R	NA	0.0	NA	0.0	100.0	NA
		U	NA	53.3	NA	0.0	0.0	NA
	TETRYL	R	NA	0.0	NA	0.0	100.0	NA
	TNX	G	NA	22.2	NA	0.0	0.0	NA
		P	NA	11.1	NA	0.0	0.0	NA
		PU	NA	11.1	NA	0.0	0.0	NA
		U	NA	55.6	NA	0.0	0.0	NA
M	ALUMINUM	A	NA	81.7	NA	100.0	0.0	NA
		AG	NA	18.3	NA	0.0	0.0	NA
	ANTIMONY	A	NA	100.0	NA	100.0	0.0	NA
	ARSENIC	A	NA	85.7	NA	100.0	0.0	NA
		AP	NA	14.3	NA	0.0	0.0	NA
	BARIUM	A	NA	93.8	NA	0.0	0.0	NA
		AK	NA	6.3	NA	0.0	0.0	NA
	BERYLLIUM	A	NA	100.0	NA	100.0	0.0	NA
	CADMIUM	A	NA	100.0	NA	100.0	0.0	NA
	CALCIUM	A	NA	86.3	NA	0.0	0.0	NA
		AI	NA	13.8	NA	0.0	0.0	NA
	CHROMIUM	A	NA	87.5	NA	100.0	0.0	NA
		AG	NA	8.3	NA	0.0	0.0	NA
		AP	NA	4.2	NA	0.0	0.0	NA
	COBALT	A	NA	79.6	NA	100.0	0.0	NA
		AI	NA	14.8	NA	0.0	0.0	NA
		AP	NA	5.6	NA	0.0	0.0	NA
	COPPER	A	NA	49.0	NA	100.0	0.0	NA
		AI	NA	18.4	NA	0.0	0.0	NA
		AIP	NA	16.3	NA	0.0	0.0	NA
		AP	NA	16.3	NA	0.0	0.0	NA
	IRON	A	NA	96.2	NA	100.0	0.0	NA
		AG	NA	3.8	NA	0.0	0.0	NA
	LEAD	A	NA	100.0	NA	100.0	0.0	NA
	MAGNESIUM	A	NA	98.7	NA	100.0	0.0	NA
		AI	NA	1.3	NA	0.0	0.0	NA
	MANGANESE	A	NA	64.3	NA	100.0	0.0	NA
		AG	NA	2.9	NA	0.0	0.0	NA
		AI	NA	7.1	NA	0.0	0.0	NA
		AK	NA	22.9	NA	0.0	0.0	NA
		AKP	NA	1.4	NA	0.0	0.0	NA
		K	NA	1.4	NA	0.0	0.0	NA
	MERCURY	P	NA	100.0	NA	0.0	0.0	NA
	NICKEL	A	NA	88.9	NA	100.0	0.0	NA
		AP	NA	6.3	NA	0.0	0.0	NA
		P	NA	4.8	NA	0.0	0.0	NA

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	POTASSIUM	A	NA	97.5	NA	0.0	0.0	NA
		AG	NA	2.5	NA	0.0	0.0	NA
	SELENIUM	A	NA	100.0	NA	100.0	0.0	NA
	SILVER	A	NA	0.0	NA	100.0	0.0	NA
	SODIUM	A	NA	88.8	NA	0.0	0.0	NA
		AI	NA	11.3	NA	0.0	0.0	NA
	THALLIUM	A	NA	0.0	NA	100.0	0.0	NA
	TIN	A	NA	0.0	NA	100.0	0.0	NA
	TITANIUM	A	NA	42.3	NA	100.0	0.0	NA
		AG	NA	3.8	NA	0.0	0.0	NA
		AGI	NA	11.5	NA	0.0	0.0	NA
		AGIP	NA	3.8	NA	0.0	0.0	NA
		AP	NA	11.5	NA	0.0	0.0	NA
		P	NA	26.9	NA	0.0	0.0	NA
	VANADIUM	A	NA	56.3	NA	100.0	0.0	NA
		AG	NA	6.3	NA	0.0	0.0	NA
		AP	NA	37.5	NA	0.0	0.0	NA
	ZINC	A	NA	3.7	NA	100.0	0.0	NA
		AI	NA	5.6	NA	0.0	0.0	NA
		AIK	NA	22.2	NA	0.0	0.0	NA
		AIKP	NA	3.7	NA	0.0	0.0	NA
		AK	NA	20.4	NA	0.0	0.0	NA
		I	NA	1.9	NA	0.0	0.0	NA
		IK	NA	9.3	NA	0.0	0.0	NA
		IKP	NA	7.4	NA	0.0	0.0	NA
		K	NA	14.8	NA	0.0	0.0	NA
		KP	NA	11.1	NA	0.0	0.0	NA
MF	ALUMINUM	A	NA	100.0	NA	100.0	0.0	NA
	ANTIMONY	A	NA	100.0	NA	100.0	0.0	NA
	ARSENIC	A	NA	66.7	NA	100.0	0.0	NA
		AP	NA	33.3	NA	0.0	0.0	NA
	BARIUM	A	NA	95.5	NA	0.0	0.0	NA
		AK	NA	4.5	NA	0.0	0.0	NA
	BERYLLIUM	A	NA	100.0	NA	100.0	0.0	NA
	CADMIUM	A	NA	0.0	NA	100.0	0.0	NA
	CALCIUM	A	NA	100.0	NA	0.0	0.0	NA
	CHROMIUM	A	NA	100.0	NA	100.0	0.0	NA
	COBALT	A	NA	67.6	NA	100.0	0.0	NA
		AI	NA	13.5	NA	0.0	0.0	NA
		AP	NA	18.9	NA	0.0	0.0	NA
	COPPER	A	NA	19.2	NA	100.0	0.0	NA
		AI	NA	23.1	NA	0.0	0.0	NA
		AIP	NA	42.3	NA	0.0	0.0	NA

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
		AP	NA	15.4	NA	0.0	0.0	NA
	IRON	A	NA	100.0	NA	100.0	0.0	NA
	LEAD	A	NA	100.0	NA	100.0	0.0	NA
	MAGNESIUM	A	NA	100.0	NA	100.0	0.0	NA
	MANGANESE	A	NA	54.1	NA	100.0	0.0	NA
		AK	NA	40.5	NA	0.0	0.0	NA
		AKP	NA	5.4	NA	0.0	0.0	NA
	NICKEL	A	NA	42.9	NA	100.0	0.0	NA
		AI	NA	17.9	NA	0.0	0.0	NA
		AP	NA	10.7	NA	0.0	0.0	NA
		P	NA	28.6	NA	0.0	0.0	NA
	POTASSIUM	A	NA	100.0	NA	100.0	0.0	NA
	SELENIUM	A	NA	100.0	NA	100.0	0.0	NA
	SILVER	A	NA	0.0	NA	100.0	0.0	NA
	SODIUM	A	NA	100.0	NA	0.0	0.0	NA
	THALLIUM	A	NA	0.0	NA	100.0	0.0	NA
	TIN	A	NA	0.0	NA	100.0	0.0	NA
	TITANIUM	A	NA	3.8	NA	100.0	0.0	NA
		AF	NA	3.8	NA	0.0	0.0	NA
		AP	NA	19.2	NA	0.0	0.0	NA
		P	NA	73.1	NA	0.0	0.0	NA
	VANADIUM	A	NA	25.0	NA	100.0	0.0	NA
		AP	NA	75.0	NA	0.0	0.0	NA
	ZINC	A	NA	12.5	NA	100.0	0.0	NA
		AK	NA	20.8	NA	0.0	0.0	NA
		AKP	NA	12.5	NA	0.0	0.0	NA
		K	NA	25.0	NA	0.0	0.0	NA
		KP	NA	29.2	NA	0.0	0.0	NA
MISC	AMMONIA-N	D	NA	85.0	NA	0.0	100.0	NA
		H	NA	15.0	NA	0.0	0.0	NA
	NITRITE/NITRATE-N	A	NA	26.7	NA	100.0	0.0	NA
		D	NA	40.0	NA	0.0	0.0	NA
		G	NA	23.3	NA	0.0	0.0	NA
		GH	NA	3.3	NA	0.0	0.0	NA
		H	NA	6.7	NA	0.0	100.0	NA
OS	2-METHYLNAPHTHALENE	R	NA	0.0	NA	0.0	100.0	NA
	ACENAPHTHENE	R	NA	0.0	NA	0.0	100.0	NA
	ACENAPHTHYLENE	R	NA	0.0	NA	0.0	100.0	NA
	ANTHRACENE	R	NA	0.0	NA	0.0	100.0	NA
	BENZO(A)ANTHRACENE	R	NA	100.0	NA	0.0	100.0	NA
	BENZO(A)PYRENE	E	NA	0.0	NA	0.0	50.0	NA
		ER	NA	100.0	NA	0.0	50.0	NA
	BENZO(B)FLUORANTHENE	R	NA	100.0	NA	0.0	100.0	NA

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	BENZO(G,H,I)PERYLENE	R	NA	100.0	NA	0.0	100.0	NA
	BENZO(K)FLUORANTHENE	R	NA	100.0	NA	0.0	100.0	NA
	CHRYSENE	R	NA	100.0	NA	0.0	100.0	NA
	DIBENZO(A,H)ANTHRACENE	R	NA	0.0	NA	0.0	100.0	NA
	FLUORANTHENE	DR	NA	100.0	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	100.0	NA
	FLUORENE	R	NA	0.0	NA	0.0	100.0	NA
	INDENO(1,2,3-CD)PYRENE	R	NA	100.0	NA	0.0	100.0	NA
	NAPHTHALENE	R	NA	0.0	NA	0.0	100.0	NA
	PHENANTHRENE	R	NA	100.0	NA	0.0	100.0	NA
	PYRENE	DR	NA	100.0	NA	0.0	0.0	NA
		R	NA	0.0	NA	0.0	100.0	NA
ROUND 3								
EXP	1,3,5-TRINITROBENZENE	P	0.0	100.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
	1,3-DINITROBENZENE	P	0.0	100.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
	2,4,6-TRINITROTOLUENE	P	0.0	100.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
	2,4-DINITROTOLUENE	R	0.0	0.0	0.0	0.0	100.0	0.0
		U	0.0	100.0	0.0	0.0	0.0	0.0
	2,6-DINITROTOLUENE	R	0.0	0.0	0.0	0.0	100.0	0.0
		U	0.0	100.0	0.0	0.0	0.0	0.0
	2-AMINO-4,6-DINITROTOLUENE	P	0.0	30.0	0.0	0.0	0.0	0.0
		PU	0.0	20.0	0.0	0.0	0.0	0.0
		QU	0.0	10.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
		U	0.0	40.0	0.0	0.0	0.0	0.0
	2-NITROTOLUENE	P	0.0	50.0	0.0	0.0	0.0	0.0
		PU	0.0	50.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
	3-NITROTOLUENE	QU	0.0	100.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
	4-AMINO-2,6-DINITROTOLUENE	P	0.0	75.0	0.0	0.0	0.0	0.0
		R	0.0	0.0	0.0	0.0	100.0	0.0
		U	0.0	25.0	0.0	0.0	0.0	0.0
	4-NITROTOLUENE	R	0.0	0.0	0.0	0.0	100.0	0.0
	DNX	U	0.0	100.0	0.0	0.0	0.0	0.0
	HMX	P	0.0	33.3	0.0	0.0	0.0	0.0
		PU	0.0	16.7	0.0	0.0	0.0	0.0
		R	0.0	33.3	0.0	0.0	0.0	0.0
		U	0.0	16.7	0.0	0.0	0.0	0.0
	MNX	P	0.0	100.0	0.0	0.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
	NITROBENZENE	R	0.0	0.0	0.0	0.0	100.0	0.0
	RDX	P	0.0	57.1	0.0	0.0	0.0	0.0
		PU	0.0	14.3	0.0	0.0	0.0	0.0
		R	0.0	28.6	0.0	0.0	0.0	0.0
	TETRYL	R	0.0	0.0	0.0	0.0	100.0	0.0
	TNX	U	0.0	100.0	0.0	0.0	0.0	0.0
M	ALUMINUM	A	0.0	25.0	0.0	100.0	0.0	0.0
		AI	0.0	75.0	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	0.0	100.0	0.0	0.0
		D	0.0	0.0	0.0	0.0	100.0	0.0
	ARSENIC	A	0.0	75.0	0.0	100.0	0.0	0.0
		AP	0.0	25.0	0.0	0.0	0.0	0.0
	BARIUM	A	0.0	37.5	0.0	0.0	0.0	0.0
		AI	0.0	62.5	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	CALCIUM	A	0.0	25.0	0.0	0.0	0.0	0.0
		AI	0.0	75.0	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	87.5	0.0	100.0	0.0	0.0
		AP	0.0	12.5	0.0	0.0	0.0	0.0
	COBALT	A	0.0	33.3	0.0	100.0	0.0	0.0
		AI	0.0	66.7	0.0	0.0	0.0	0.0
	COPPER	A	0.0	28.6	0.0	100.0	0.0	0.0
		AI	0.0	28.6	0.0	0.0	0.0	0.0
		AP	0.0	42.9	0.0	0.0	0.0	0.0
	IRON	A	0.0	18.2	0.0	100.0	0.0	0.0
		AI	0.0	81.8	0.0	0.0	0.0	0.0
	LEAD	A	0.0	28.6	0.0	100.0	0.0	0.0
		AI	0.0	71.4	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	25.0	0.0	0.0	0.0	0.0
		AI	0.0	62.5	0.0	0.0	0.0	0.0
		I	0.0	12.5	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	0.0	100.0	0.0	0.0
		ADI	0.0	75.0	0.0	0.0	0.0	0.0
		AI	0.0	25.0	0.0	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	100.0	0.0	0.0
	NICKEL	A	0.0	40.0	0.0	100.0	0.0	0.0
		AI	0.0	60.0	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	50.0	0.0	0.0	0.0	0.0
		AI	0.0	50.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	42.9	0.0	100.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
		AI	0.0	57.1	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	100.0	0.0	0.0
		D	0.0	0.0	0.0	0.0	100.0	0.0
	VANADIUM	A	0.0	40.0	0.0	100.0	0.0	0.0
		AP	0.0	40.0	0.0	0.0	0.0	0.0
		P	0.0	20.0	0.0	0.0	0.0	0.0
	ZINC	A	0.0	14.3	0.0	100.0	0.0	0.0
		AI	0.0	71.4	0.0	0.0	0.0	0.0
		AK	0.0	14.3	0.0	0.0	0.0	0.0
MF	ALUMINUM	A	0.0	33.3	0.0	100.0	0.0	0.0
		AG	0.0	33.3	0.0	0.0	0.0	0.0
		AI	0.0	33.3	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	0.0	100.0	0.0	0.0
	ARSENIC	A	0.0	0.0	0.0	100.0	0.0	0.0
	BARIUM	A	0.0	60.0	0.0	0.0	0.0	0.0
		AI	0.0	40.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	CALCIUM	A	0.0	40.0	0.0	0.0	0.0	0.0
		ACI	0.0	10.0	0.0	0.0	0.0	0.0
		AD	0.0	20.0	0.0	0.0	0.0	0.0
		AI	0.0	30.0	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	33.3	0.0	100.0	0.0	0.0
		AP	0.0	66.7	0.0	0.0	0.0	0.0
	COBALT	A	0.0	0.0	0.0	100.0	0.0	0.0
		AI	0.0	80.0	0.0	0.0	0.0	0.0
		P	0.0	20.0	0.0	0.0	0.0	0.0
	COPPER	A	0.0	16.7	0.0	100.0	0.0	0.0
		AI	0.0	16.7	0.0	0.0	0.0	0.0
		AP	0.0	50.0	0.0	0.0	0.0	0.0
		P	0.0	16.7	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	0.0	100.0	0.0	0.0
		AG	0.0	50.0	0.0	0.0	0.0	0.0
		AI	0.0	50.0	0.0	0.0	0.0	0.0
	LEAD	A	0.0	100.0	0.0	100.0	0.0	0.0
	MAGNESIUM	A	0.0	50.0	0.0	0.0	0.0	0.0
		AI	0.0	50.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	0.0	100.0	0.0	0.0
		AI	0.0	66.7	0.0	0.0	0.0	0.0
		IP	0.0	33.3	0.0	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	100.0	0.0	0.0
	NICKEL	A	0.0	0.0	0.0	100.0	0.0	0.0

TABLE H-13

QUALIFICATION RATES FOR AQUEOUS SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier					
Fraction	Parameter	Code	BU	J	R	U	UJ	UR
		Al	0.0	80.0	0.0	0.0	0.0	0.0
		P	0.0	20.0	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	100.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	100.0	0.0	100.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	100.0	0.0	0.0
	VANADIUM	A	0.0	0.0	0.0	100.0	0.0	0.0
	ZINC	A	0.0	0.0	0.0	100.0	0.0	0.0
		Al	0.0	75.0	0.0	0.0	0.0	0.0
		AK	0.0	25.0	0.0	0.0	0.0	0.0

A = Lab Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	Parameter	Code	BJ	BU	J	R	U	UJ	UR
ROUND 1									
AVS/SEM	ACID VOLATILE SULFIDE	HP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	COPPER	G	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AG	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MERCURY	G	0.0	0.0	100.0	0.0	0.0	100.0	0.0
	ZINC	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
DIOX	1,2,3,4,6,7,8,9-OCDD	C	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2,3,4,6,7,8,9-OCDF	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
		CP	0.0	0.0	57.1	0.0	0.0	0.0	0.0
		P	0.0	0.0	42.9	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,6,7,8-HPCDF	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,4,7,8,9-HPCDF	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2,3,4,7,8-HXCDD	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2,3,4,7,8-HXCDF	A	0.0	0.0	0.0	0.0	66.7	0.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	33.3	0.0	0.0
	1,2,3,6,7,8-HXCDD	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,6,7,8-HXCDF	A	0.0	0.0	0.0	0.0	80.0	0.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	20.0	0.0	0.0
	1,2,3,7,8,9-HXCDD	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,7,8,9-HXCDF	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	1,2,3,7,8-PECDD	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	1,2,3,7,8-PECDF	CP	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	75.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,4,6,7,8-HXCDF	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,4,7,8-PECDF	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,7,8-TCDD	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	2,3,7,8-TCDF	P	0.0	0.0	80.0	0.0	0.0	0.0	0.0
		PQ	0.0	0.0	20.0	0.0	0.0	0.0	0.0
		W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TOTAL HPCDF	W	0.0	0.0	100.0	0.0	100.0	0.0	0.0

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	Parameter	Code	BJ	BU	J	R	U	UJ	UR
	TOTAL HXCDD	W	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	TOTAL HXCDF	QW	0.0	0.0	11.1	0.0	0.0	0.0	0.0
		W	0.0	0.0	88.9	0.0	100.0	0.0	0.0
	TOTAL PECDD	W	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TOTAL PECDF	QW	0.0	0.0	23.1	0.0	100.0	0.0	0.0
		W	0.0	0.0	76.9	0.0	0.0	0.0	0.0
	TOTAL TCDD	W	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	TOTAL TCDF	QW	0.0	0.0	18.8	0.0	50.0	0.0	0.0
		W	0.0	0.0	81.3	0.0	50.0	0.0	0.0
EXP	HMX	E	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		U	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	RDX	P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		U	0.0	0.0	50.0	0.0	0.0	0.0	0.0
HERB	PENTACHLOROPHENOL	P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		PU	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		U	0.0	0.0	25.0	100.0	0.0	0.0	0.0
M	ALUMINUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	33.3	0.0	100.0	0.0	0.0
		AF	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	ARSENIC	A	0.0	0.0	37.5	0.0	100.0	0.0	0.0
		AF	0.0	0.0	62.5	0.0	0.0	0.0	0.0
	BARIUM	AD	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		AF	0.0	0.0	56.0	0.0	0.0	0.0	0.0
		AFK	0.0	0.0	4.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	13.3	0.0	100.0	0.0	0.0
		ADF	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		ADFP	0.0	0.0	20.0	0.0	0.0	0.0	0.0
		AP	0.0	0.0	26.7	0.0	0.0	0.0	0.0
	CALCIUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CHROMIUM	A	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		AD	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	COBALT	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	COPPER	A	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		AFK	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	IRON	A	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		AF	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	4.0	0.0	0.0	0.0	0.0
		AF	0.0	0.0	4.0	0.0	0.0	0.0	0.0
		AFK	0.0	0.0	56.0	0.0	0.0	0.0	0.0
		AGK	0.0	0.0	8.0	0.0	0.0	0.0	0.0
		AK	0.0	0.0	28.0	0.0	0.0	0.0	0.0

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	LITHIUM	AD	0.0	0.0	36.0	0.0	0.0	0.0	0.0
		ADP	0.0	0.0	4.0	0.0	0.0	0.0	0.0
		DI	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	MAGNESIUM	A	0.0	0.0	32.0	0.0	0.0	0.0	0.0
		ADF	0.0	0.0	60.0	0.0	0.0	0.0	0.0
		AG	0.0	0.0	8.0	0.0	0.0	0.0	0.0
	MANGANESE	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		F	0.0	0.0	53.3	0.0	0.0	0.0	0.0
		FP	0.0	0.0	46.7	0.0	0.0	0.0	0.0
	NICKEL	A	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		ADFI	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	POTASSIUM	A	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		AD	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		F	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	SODIUM	A	0.0	0.0	75.0	0.0	100.0	0.0	0.0
		AF	0.0	0.0	25.0	0.0	0.0	0.0	0.0
	STRONTIUM	A	0.0	0.0	32.0	0.0	0.0	0.0	0.0
		AF	0.0	0.0	8.0	0.0	0.0	0.0	0.0
		AFK	0.0	0.0	52.0	0.0	0.0	0.0	0.0
		AG	0.0	0.0	8.0	0.0	0.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AD	0.0	0.0	22.2	0.0	0.0	0.0	0.0
		ADP	0.0	0.0	66.7	0.0	0.0	0.0	0.0
		AP	0.0	0.0	11.1	0.0	0.0	0.0	0.0
	TITANIUM	AD	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		ADFI	0.0	0.0	60.0	0.0	0.0	0.0	0.0
	VANADIUM	AD	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ZINC	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		ADF	0.0	0.0	5.0	0.0	0.0	0.0	0.0
		ADFG	0.0	0.0	5.0	0.0	0.0	0.0	0.0
		ADFGK	0.0	0.0	5.0	0.0	0.0	0.0	0.0
		ADFK	0.0	0.0	35.0	0.0	0.0	0.0	0.0
		AFI	0.0	0.0	5.0	0.0	0.0	0.0	0.0
		AFIK	0.0	0.0	45.0	0.0	0.0	0.0	0.0
MISC	TOTAL ORGANIC CARBON	D	0.0	0.0	11.1	0.0	0.0	0.0	0.0
		G	0.0	0.0	88.9	0.0	0.0	0.0	0.0
OS	1,4-PHENYLENEDIAMINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	3,3'-DICHLOROBENZIDINE	D	0.0	0.0	0.0	0.0	0.0	0.0	100.0

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	Parameter	Code	BJ	BU	J	R	U	UJ	UR
	3-NITROANILINE	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	4-CHLOROANILINE	D	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	4-NITROQUINOLINE-1-OXIDE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	A,A-DIMETHYLPHENETHYLAMINE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ACENAPHTHENE	D	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		G	0.0	0.0	50.0	0.0	0.0	100.0	0.0
	ACETOPHENONE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ANTHRACENE	G	0.0	0.0	50.0	0.0	0.0	100.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	ARAMITE	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	BENZO(A)ANTHRACENE	G	0.0	0.0	28.6	0.0	0.0	0.0	0.0
		N	0.0	0.0	14.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	57.1	0.0	0.0	0.0	0.0
	BENZO(A)PYRENE	G	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		N	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	BENZO(B)FLUORANTHENE	C	0.0	0.0	16.7	0.0	0.0	0.0	0.0
		G	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		N	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	16.7	0.0	0.0	0.0	0.0
	BENZO(G,H,I)PERYLENE	G	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		N	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	33.3	0.0	0.0	0.0	0.0
	BENZO(K)FLUORANTHENE	G	0.0	0.0	28.6	0.0	0.0	0.0	0.0
		N	0.0	0.0	28.6	0.0	0.0	0.0	0.0
		P	0.0	0.0	42.9	0.0	0.0	0.0	0.0
	BIS(2-ETHYLHEXYL)PHTHALATE	A	0.0	100.0	0.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CHRYSENE	G	0.0	0.0	40.0	0.0	0.0	0.0	0.0
		N	0.0	0.0	20.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	40.0	0.0	0.0	0.0	0.0
	DIBENZO(A,H)ANTHRACENE	G	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		N	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	DI-N-BUTYL PHTHALATE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	DI-N-OCTYL PHTHALATE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	FLUORANTHENE	G	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	66.7	0.0	0.0	0.0	0.0
	FLUORENE	D	0.0	0.0	50.0	0.0	0.0	0.0	0.0
		G	0.0	0.0	50.0	0.0	0.0	100.0	0.0
	HEXACHLOROCYCLOPENTADIENE	D	0.0	0.0	0.0	0.0	0.0	100.0	100.0
	INDENO(1,2,3-CD)PYRENE	G	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		N	0.0	0.0	25.0	0.0	0.0	0.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0	0.0

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	Parameter	Code	BJ	BU	J	R	U	UJ	UR
	KEPONE	C	0.0	0.0	0.0	0.0	0.0	100.0	100.0
	METHAPYRILENE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	NAPHTHALENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PHENANTHRENE	G	0.0	0.0	14.3	0.0	0.0	0.0	0.0
		GP	0.0	0.0	14.3	0.0	0.0	0.0	0.0
		P	0.0	0.0	71.4	0.0	0.0	0.0	0.0
	PHENOL	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PYRENE	G	0.0	0.0	33.3	0.0	0.0	0.0	0.0
		N	0.0	0.0	16.7	0.0	0.0	0.0	0.0
		P	0.0	0.0	50.0	0.0	0.0	0.0	0.0
OV	4-METHYL-2-PENTANONE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ACETONE	A	100.0	0.0	0.0	0.0	0.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	ACROLEIN	C	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	BROMOMETHANE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	CARBON DISULFIDE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	DICHLORODIFLUOROMETHANE	C	0.0	0.0	100.0	0.0	0.0	100.0	0.0
	METHYL IODIDE	C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	METHYLENE CHLORIDE	A	0.0	100.0	0.0	0.0	0.0	0.0	0.0
		C	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	TRANS-1,2-DICHLOROETHENE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	TRICHLOROFLUOROMETHANE	P	0.0	0.0	100.0	0.0	0.0	0.0	0.0
PEST/PCB	AROCLOR-1016	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	AROCLOR-1221	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	AROCLOR-1232	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	AROCLOR-1242	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	AROCLOR-1248	DGUR	0.0	0.0	7.7	0.0	0.0	0.0	0.0
		U	0.0	0.0	84.6	0.0	0.0	0.0	0.0
		URG	0.0	0.0	7.7	0.0	0.0	0.0	0.0
	AROCLOR-1254	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
	AROCLOR-1260	R	0.0	0.0	0.0	0.0	0.0	100.0	0.0
ROUND 2									
EXP	HMX	PU	NA	NA	100.0	NA	0.0	0.0	NA
M	ALUMINUM	A	NA	NA	100.0	NA	0.0	0.0	NA
	ANTIMONY	A	NA	NA	100.0	NA	0.0	0.0	NA
	ARSENIC	AI	NA	NA	100.0	NA	0.0	0.0	NA
	BARIUM	A	NA	NA	100.0	NA	0.0	0.0	NA
	BERYLLIUM	A	NA	NA	100.0	NA	0.0	0.0	NA
	CADMIUM	A	NA	NA	100.0	NA	0.0	0.0	NA
	CALCIUM	ADFI	NA	NA	100.0	NA	0.0	0.0	NA
	CHROMIUM	AGI	NA	NA	22.2	NA	0.0	0.0	NA
		AI	NA	NA	77.8	NA	0.0	0.0	NA
	COBALT	ADI	NA	NA	100.0	NA	0.0	0.0	NA

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	COPPER	AI	NA	NA	100.0	NA	0.0	0.0	NA
	IRON	A	NA	NA	100.0	NA	0.0	0.0	NA
	LEAD	AD	NA	NA	100.0	NA	0.0	0.0	NA
	MAGNESIUM	AI	NA	NA	100.0	NA	0.0	0.0	NA
	MANGANESE	A	NA	NA	88.9	NA	0.0	0.0	NA
		AD	NA	NA	11.1	NA	0.0	0.0	NA
	MERCURY	P	NA	NA	100.0	NA	0.0	0.0	NA
	NICKEL	AI	NA	NA	100.0	NA	0.0	0.0	NA
	POTASSIUM	ADI	NA	NA	100.0	NA	0.0	0.0	NA
	SELENIUM	A	NA	NA	88.9	NA	0.0	0.0	NA
		AP	NA	NA	11.1	NA	0.0	0.0	NA
	SILVER	A	NA	NA	0.0	NA	100.0	0.0	NA
	SODIUM	A	NA	NA	25.0	NA	100.0	0.0	NA
		AP	NA	NA	75.0	NA	0.0	0.0	NA
	THALLIUM	A	NA	NA	0.0	NA	100.0	0.0	NA
	TIN	A	NA	NA	0.0	NA	100.0	0.0	NA
	TITANIUM	ADI	NA	NA	100.0	NA	0.0	0.0	NA
	VANADIUM	AI	NA	NA	100.0	NA	0.0	0.0	NA
	ZINC	ADKI	NA	NA	100.0	NA	0.0	0.0	NA
OS	2-METHYLNAPHTHALENE	P	NA	NA	100.0	NA	0.0	0.0	NA
	BENZO(K)FLUORANTHENE	G	NA	NA	66.7	NA	0.0	0.0	NA
		P	NA	NA	33.3	NA	0.0	0.0	NA
PEST/PCB	AROCLOR-1016	R	NA	NA	0.0	NA	0.0	100.0	NA
	AROCLOR-1221	R	NA	NA	0.0	NA	0.0	100.0	NA
	AROCLOR-1232	R	NA	NA	0.0	NA	0.0	100.0	NA
	AROCLOR-1242	R	NA	NA	0.0	NA	0.0	100.0	NA
	AROCLOR-1248	GU	NA	NA	18.2	NA	0.0	0.0	NA
		RU	NA	NA	18.2	NA	0.0	0.0	NA
		U	NA	NA	63.6	NA	0.0	0.0	NA
	AROCLOR-1254	R	NA	NA	0.0	NA	0.0	100.0	NA
	AROCLOR-1260	R	NA	NA	0.0	NA	0.0	100.0	NA
Round 3									
M	ALUMINUM	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ANTIMONY	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ARSENIC	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BARIUM	D	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	BERYLLIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	CADMIUM	A	0.0	0.0	88.9	0.0	0.0	0.0	0.0
		AG	0.0	0.0	11.1	0.0	0.0	0.0	0.0
	CALCIUM	AFG	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	CHROMIUM	AGI	0.0	0.0	88.9	0.0	0.0	0.0	0.0
		AI	0.0	0.0	11.1	0.0	0.0	0.0	0.0
	COBALT	ADI	0.0	0.0	100.0	0.0	0.0	0.0	0.0

TABLE H-14

QUALIFICATION RATES FOR SOLID SAMPLES , ROUNDS 1, 2, AND 3
SWMU 13 - (MINE FILL B)(1)
NSWC CRANE
CRANE, INDIANA

			Validation Qualifier						
Fraction	**Parameter**	**Code**	**BJ**	**BU**	**J**	**R**	**U**	**UJ**	**UR**
	COPPER	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	IRON	AGI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	LEAD	A	0.0	0.0	11.1	0.0	0.0	0.0	0.0
		AK	0.0	0.0	88.9	0.0	0.0	0.0	0.0
	MAGNESIUM	AGI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MANGANESE	AFI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	MERCURY	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	NICKEL	A	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	POTASSIUM	AEI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	SELENIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	SILVER	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	SODIUM	A	0.0	0.0	100.0	0.0	100.0	0.0	0.0
	THALLIUM	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
	TIN	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0
		AP	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	VANADIUM	AI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	ZINC	DI	0.0	0.0	100.0	0.0	0.0	0.0	0.0
PEST/PCB	AROCLOR-1248	PU	0.0	0.0	100.0	0.0	0.0	0.0	0.0

A = Lab Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
N = Internal Standard Noncompliance
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography, interferences, etc.)
R = Surrogates Recovery Noncompliance
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
W = EMPC result

TABLE H-15

QUALIFICATION RATES FOR VEGETATION SAMPLES , ROUND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

		Validation Qualifier			
Fraction	Parameter	Code	J	UJ	UR
ROUND 3					
EXP	1,3,5-TRINITROBENZENE	E	0.0	100.0	0.0
	2,4-DIAMINO-6-NITROTOLUENE	D	0.0	0.0	100.0
		H	0.0	100.0	0.0
	2,6-DIAMINO-4-NITROTOLUENE	D	0.0	0.0	100.0
		H	100.0	100.0	0.0
	2,6-DINITROTOLUENE	P	14.3	0.0	0.0
		QU	28.6	0.0	0.0
		U	57.1	0.0	0.0
	2-AMINO-4,6-DINITROTOLUENE	U	100.0	0.0	0.0
	3,5-DINITROANILINE	H	0.0	100.0	0.0
	4,4'-TN-AZOXY	H	0.0	100.0	0.0
		HPU	100.0	0.0	0.0
	DNX	D	0.0	0.0	100.0
		H	0.0	100.0	0.0
		HU	100.0	0.0	0.0
	HMX	G	0.0	100.0	0.0
		GQ	14.3	0.0	0.0
		PQU	57.1	0.0	0.0
		PU	14.3	0.0	0.0
		U	14.3	0.0	0.0
	MNX	H	30.8	100.0	0.0
		HPU	15.4	0.0	0.0
		HU	53.8	0.0	0.0
	NITROBENZENE	QU	100.0	0.0	0.0
	RDX	Q	12.5	0.0	0.0
		QU	50.0	0.0	0.0
		U	37.5	0.0	0.0
	TETRYL	DE	0.0	0.0	5.9
		E	0.0	0.0	94.1
	TNX	H	0.0	100.0	0.0
		HPU	50.0	0.0	0.0
		HU	50.0	0.0	0.0

A = Lab Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance

TABLE H-15

QUALIFICATION RATES FOR VEGETATION SAMPLES , ROUND 3
SWMU 13 - (MINE FILL B)[1]
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 2

K = ICP Interference - includes ICS % R Noncompliance

N = Internal Standard Noncompliance

P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)

Q = Other problems (can encompass a number of issues; i.e.chromatography, interferences, etc.)

R = Surrogates Recovery Noncompliance

U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC

W = EMPC result

APPENDIX I – SWMU 13

RISK ASSESSMENT SUPPORT

APPENDIX I.1

RISK ASSESSMENT CALCULATIONS
AND
RAGS-PART D TABLES

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	SWMU 13	Maintenance Worker	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact surface soil during normal work activities.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may contact surface soil during normal work activities.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 13 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface soil while at the site.
		Air	SWMU 13	Maintenance Worker	Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
				Occupational Worker	Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
				Trespassers	Adolescents	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
	Subsurface Soil	Subsurface Soil	SWMU 13	Maintenance Worker	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Ingestion Dermal	None None	Trespassers are not exposed to subsurface soil.
		Air	SWMU 13	Maintenance Worker	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to subsurface soil.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to subsurface soil.
				Trespassers	Adolescents	Inhalation	None	Trespassers are not exposed to subsurface soil.
	Groundwater	Groundwater	All Aquifers	Maintenance Workers	Adult	Ingestion Dermal	None None	Maintenance workers are not expected to have contact with groundwater.
				Occupational Worker	Adult	Ingestion Dermal	Quant Quant	Occupational workers may be exposed to groundwater if groundwater was used as a potable water source.
				Trespassers	Adolescents	Ingestion Dermal	None None	Adolescent trespassers are not expected to be exposed to groundwater.
		Air	All Aquifers	Maintenance Workers	Adult	Inhalation	None	Maintenance workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Occupational Worker	Adult	Inhalation	None	Occupational workers are not expected to be exposed to COPCs that have volatilized from groundwater.
				Trespassers	Adolescents	Inhalation	None	Adolescent trespassers are not expected to be exposed to groundwater.
			Vapor Intrusion	Occupational Worker	Adult	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 4

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Water	Surface Water	Gully and Mainstream	Maintenance Workers	Adult	Ingestion Dermal	None Quant	Maintenance workers are not expected to ingest surface water. Maintenance workers may have dermal contact with surface water.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to surface water.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 13 is not limited by any physical restraint. Adolescent trespassers may be exposed to surface water while at the site.
	Sediment	Sediment	Gully and Mainstream	Maintenance Workers	Adult	Ingestion Dermal	Quant Quant	Maintenance workers may contact sediment.
				Occupational Worker	Adult	Ingestion Dermal	None None	Occupational workers are not expected to be exposed to sediment.
				Trespassers	Adolescents	Ingestion Dermal	Quant Quant	Although access to the base is controlled, once inside the base, access to the SWMU 13 is not limited by any physical restraint. Adolescent trespassers may be exposed to sediment while at the site.
Future	Surface Soil	Surface Soil	SWMU 13	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with surface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site this scenario is included to aid in future risk management decisions.
		Air	SWMU 13	Construction Workers	Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
				Recreational Users	Child	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
					Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
				Residents	Child	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
					Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
	Subsurface Soil	Subsurface Soil	SWMU 13	Construction Workers	Adult	Ingestion Dermal	Quant Quant	Construction workers may have contact with subsurface soil during excavation activities.
				Recreational Users	Child	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Recreational users are not expected to be exposed to subsurface soil.
				Residents	Child	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Ingestion Dermal	None None	Future residents are not expected to be exposed to subsurface soil.

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Air	SWMU 13	Construction Workers	Adult	Inhalation	Qual	Exposure is evaluated qualitatively by a comparison of site data to USEPA Generic SSLs for transfers from soil to air. Concentrations of all detected constituents were less than the SSLs.
				Recreational Users	Child	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Recreational workers are not expected to be exposed to subsurface soil.
		Air	SWMU 13	Residents	Child	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
					Adult	Inhalation	None	Future residents are not expected to be exposed to subsurface soil.
	Ground Water	Groundwater	All Aquifers	Construction Workers	Adult	Ingestion Dermal	None Quant	Construction workers are not expected to ingest groundwater. Construction workers may have dermal contact with ground water during excavation activities.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
					Adult	Ingestion Dermal	Quant Quant	Recreational users may be exposed to groundwater if groundwater was used as a potable water source.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
		Air	All Aquifers	Construction Workers	Adult	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13
				Recreational Users	Child	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13
					Adult	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13
				Residents	Child	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13
					Adult	Inhalation	None	No VOCs were identified as COPCs for groundwater at SWMU 13
			Vapor Intrusion	Residents	Child	Inhalation	Quant	No VOCs were identified as COPCs for groundwater at SWMU 13
					Adult	Inhalation	Quant	No VOCs were identified as COPCs for groundwater at SWMU 13
	Surface Water	Surface Water	Gully and Mainstream	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to surface water.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SWMU 13 - MINE FILL B
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Sediment	Sediment	Gully and Mainstream	Construction Workers	Adult	Ingestion Dermal	None None	Construction workers are not expected to be exposed to sediment.
				Recreational Users	Child	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
					Adult	Ingestion Dermal	Quant Quant	This scenario is evaluated on the assumption that the Facility would close and be turned into a state park in the future.
				Residents	Child	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.
					Adult	Ingestion Dermal	Quant Quant	Although a future residential scenario is considered unlikely at the site, this scenario is included to aid in future risk management decisions.

Notes:
Quant - Quantitative.
Qual - Qualitative.

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL - DIRECT CONTACT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dioxins (ng/kg)															
3268-87-9	1,2,3,4,6,7,8,9-OCDD	813 J	4140	ng/kg	13SS060002	12/12	---	4140	NA	39000	C(8)	NA	NA	No	BSL
39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.55 J	9.5 J	ng/kg	13SS140001	4/12	0.2 - 2	9.5	NA	39000	C	NA	NA	No	BSL
35822-46-9	1,2,3,4,6,7,8-HPCDD	6.2	45.4	ng/kg	13SS060002	12/12	---	45.4	NA	390	C	NA	NA	No	BSL
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.57 J	3.1 J	ng/kg	13SS100002	4/12	0.09 - 4	3.1	NA	390	C	NA	NA	No	BSL
55673-89-7	1,2,3,4,7,8,9-HPCDF	1.3 J	1.3 J	ng/kg	13SS140001	1/12	0.1 - 0.7	1.3	NA	390	C	NA	NA	No	BSL
39227-28-6	1,2,3,4,7,8-HXCDD	0.42 J	0.63 J	ng/kg	13SS130002	3/12	0.1 - 0.7	0.63	NA	39	C	NA	NA	No	BSL
70648-26-9	1,2,3,4,7,8-HXCDF	1.8 J	6.4	ng/kg	13SS140001	2/12	0.07 - 1.2	6.4	NA	39	C	NA	NA	No	BSL
57653-85-7	1,2,3,6,7,8-HXCDD	0.69 J	0.84 J	ng/kg	13SS140001	2/12	0.1 - 1	0.84	NA	39	C	NA	NA	No	BSL
57117-44-9	1,2,3,6,7,8-HXCDF	1.6 J	1.6 J	ng/kg	13SS140001	1/12	0.07 - 0.41	1.6	NA	39	C	NA	NA	No	BSL
19408-74-3	1,2,3,7,8,9-HXCDD	0.72 J	1.6 J	ng/kg	13SS130002	5/12	0.1 - 2	1.6	NA	39	C	NA	NA	No	BSL
72918-21-9	1,2,3,7,8,9-HXCDF	0.31 J	0.33 J	ng/kg	13SS140001	2/12	0.09 - 0.5	0.33	NA	39	C	NA	NA	No	BSL
40321-76-4	1,2,3,7,8-PECDD	0.71 J	0.71 J	ng/kg	13SS130002	1/12	0.1 - 0.8	0.71	NA	3.9	C	NA	NA	No	BSL
57117-41-6	1,2,3,7,8-PECDF	0.36 J	2.5 J	ng/kg	13SS140001	2/12	0.09 - 0.4	2.5	NA	78	C	NA	NA	No	BSL
60851-34-5	2,3,4,6,7,8-HXCDF	0.21 J	1.8 J	ng/kg	13SS140001	4/12	0.07 - 0.4	1.8	NA	39	C	NA	NA	No	BSL
57117-31-4	2,3,4,7,8-PECDF	0.47 J	21.8	ng/kg	13SS140001	7/12	0.1 - 0.53	21.8	NA	7.8	C	NA	NA	Yes	ASL
1746-01-6	2,3,7,8-TCDD	0.52 J	0.52 J	ng/kg	13SS090002	1/12	0.1 - 1.2	0.52	NA	3.9	C	NA	NA	No	BSL
51207-31-9	2,3,7,8-TCDF	0.35 J	21	ng/kg	13SS140001	10/12	0.1 - 0.3	21	NA	39	C	NA	NA	No	BSL
37871-00-4	TOTAL HPCDD	11.8	112	ng/kg	13SS060002	12/12	---	112	NA	NA	C	NA	NA	No	NTX
38998-75-3	TOTAL HPCDF	0.38 J	10.1 J	ng/kg	13SS140001	7/12	0.1 - 1.9	10.1	NA	NA	C	NA	NA	No	NTX
34465-46-8	TOTAL HXCDD	0.77 J	15.7 J	ng/kg	13SS050002	11/12	1.1	15.7	NA	NA	C	NA	NA	No	NTX
55684-94-1	TOTAL HXCDF	0.33	19.4 J	ng/kg	13SS140001	8/12	0.07 - 0.2	19.4	NA	NA	C	NA	NA	No	NTX
36088-22-9	TOTAL PECDD	0.71	0.71	ng/kg	13SS130002	1/12	0.1 - 2.8	0.71	NA	NA	C	NA	NA	No	NTX
30402-15-4	TOTAL PECDF	0.83	135 J	ng/kg	13SS140001	9/12	0.1 - 0.3	135	NA	NA	C	NA	NA	No	NTX
41903-57-5	TOTAL TCDD	0.52	2.1 J	ng/kg	13SS060002	2/12	0.1 - 2.2	2.1	NA	NA	C	NA	NA	No	NTX
55722-27-5	TOTAL TCDF	1.8	540 J	ng/kg	13SS140001	11/12	0.1	540	NA	NA	C	NA	NA	No	NTX
	2,3,7,8-TCDD TEQ	0.45	15.1	ng/kg	13SS140001	12/12	---	15.1	NA	3.9	C	NA	NA	Yes	NTX
Volatile Organics (ug/kg)															
156-60-5	TRANS-1,2-DICHLOROETHENE	2 J	2 J	ug/kg	13SS060002	1/2	1.4	2	NA	6900	N	180000	IDEM	No	BSL
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SS150002	2/2	---	3	NA	39000	N	NA	NA	No	BSL
Semivolatile Organics (ug/kg)															
83-32-9	ACENAPHTHENE	52 J	52 J	ug/kg	13SS090002	1/12	3.8 - 4.9	52	NA	370000	N	9500000	IDEM	No	BSL
120-12-7	ANTHRACENE	5 J	210 J	ug/kg	13SS090002	2/12	3.8 - 4.9	210	NA	2200000	N	47000000	IDEM	No	BSL
56-55-3	BENZO(A)ANTHRACENE	4 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4.9	1100	NA	620	C	5000	IDEM	Yes	ASL
50-32-8	BENZO(A)PYRENE	6 J	1000 J	ug/kg	13SS090002	6/12	3.8 - 4.9	1000	NA	62	C	500	IDEM	Yes	ASL
205-99-2	BENZO(B)FLUORANTHENE	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	620	C	5000	IDEM	Yes	ASL
191-24-2	BENZO(G,H,I)PERYLENE	6 J	750 J	ug/kg	13SS090002	6/12	3.8 - 4.9	750	NA	230000	N(9)	50000	IDEM	No	BSL
207-08-9	BENZO(K)FLUORANTHENE	5 J	640 J	ug/kg	13SS090002	7/12	3.8 - 4	640	NA	6200	C	50000	IDEM	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	91 J	140 J	ug/kg	13SS060002, 13SS090002	7/12	78 - 190	140	NA	35000	C	300000	IDEM	No	BSL
218-01-9	CHRYSENE	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	62000	C	500000	IDEM	No	BSL
53-70-3	DIBENZO(A,H)ANTHRACENE	200 J	200 J	ug/kg	13SS090002	1/12	3.8 - 4.9	200	NA	62	C	500	IDEM	Yes	ASL
206-44-0	FLUORANTHENE	6 J	1800 J	ug/kg	13SS090002	9/12	3.8 - 4	1800	NA	230000	N	6300000	IDEM	No	BSL
86-73-7	FLUORENE	50 J	50 J	ug/kg	13SS090002	1/12	3.8 - 4.9	50	NA	2700000	N	6300000	IDEM	No	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	4 J	650 J	ug/kg	13SS090002	6/12	3.8 - 4.9	650	NA	620	C	5000	IDEM	Yes	ASL
91-20-3	NAPHTHALENE	5 J	5 J	ug/kg	13SS100002	1/12	3.8 - 4.9	5	NA	5600	N	3200000	IDEM	No	BSL
85-01-8	PHENANTHRENE	4 J	1000 J	ug/kg	13SS090002	7/12	3.8 - 4.2	1000	NA	230000	N(9)	470000	IDEM	No	BSL
129-00-0	PYRENE	6 J	2400 J	ug/kg	13SS090002	9/12	3.8 - 4	2400	NA	230000	N	4700000	IDEM	No	BSL
Pesticides PCBs (ug/kg)															
12672296	AROCLOR-1248	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	220	C	1800	IDEM	Yes	ASL
Miscellaneous Parameters															
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA		NA	NA	No	NTX
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA		NA	NA	No	NTX

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE SOIL - DIRECT CONTACT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Screening values for dioxins/furans are based on the PRG for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.
9 - Pyrene is used as a surrogate for benzo(g,h,i)perylene and phananthrene.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
PRG = Preliminary Remediation Goal
sat = soil saturation concentration

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

BKG = Below Background
BSL = Below Screening Level
NTX = No Toxicity Data

Associated Samples

13SS020002	13SS090002-D	13SS190002	13SS300002
13SS030002	13SS150002	13SS200002	13SS320002
13SS040002	13SS100002	13SS210002	13SS330002
13SS040002-D	13SS110002	13SS220002	13SS340002
13SS050002	13SS120002	13SS230002	13SS350002
13SS060002	13SS130002	13SS240002	13SS360002
13SS070002	13SS140001	13SS250002	13SS370002
13SS080002	13SS160002	13SS260002	13SS380002
13SS080002-D	13SS170002	13SS270002	13SS390002
13SS090002	13SS180002	13SS290002	13SS400002

TABLE 2.2
COMPARISON OF SURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]		U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Dioxins (ng/kg)													
3268-87-9	1,2,3,4,6,7,8,9-OCDD	813 J	4140	ng/kg	13SS060002	12/12	---	4140	NA	430000	C(7)	2800	NA
39001-02-0	1,2,3,4,6,7,8,9-OCDF	0.55 J	9.5 J	ng/kg	13SS140001	4/12	0.2 - 2	9.5	NA	430000	C	2800	NA
35822-46-9	1,2,3,4,6,7,8-HPCDD	6.2	45.4	ng/kg	13SS060002	12/12	---	45.4	NA	4300	C	28	NA
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.57 J	3.1 J	ng/kg	13SS100002	4/12	0.09 - 4	3.1	NA	4300	C	28	NA
55673-89-7	1,2,3,4,7,8,9-HPCDF	1.3 J	1.3 J	ng/kg	13SS140001	1/12	0.1 - 0.7	1.3	NA	4300	C	28	NA
39227-28-6	1,2,3,4,7,8-HXCDD	0.42 J	0.63 J	ng/kg	13SS130002	3/12	0.1 - 0.7	0.63	NA	430	C	2.8	NA
70648-26-9	1,2,3,4,7,8-HXCDF	1.8 J	6.4	ng/kg	13SS140001	2/12	0.07 - 1.2	6.4	NA	430	C	2.8	NA
57653-85-7	1,2,3,6,7,8-HXCDD	0.69 J	0.84 J	ng/kg	13SS140001	2/12	0.1 - 1	0.84	NA	430	C	2.8	NA
57117-44-9	1,2,3,6,7,8-HXCDF	1.6 J	1.6 J	ng/kg	13SS140001	1/12	0.07 - 0.41	1.6	NA	430	C	2.8	NA
19408-74-3	1,2,3,7,8,9-HXCDD	0.72 J	1.6 J	ng/kg	13SS130002	5/12	0.1 - 2	1.6	NA	430	C	2.8	NA
72918-21-9	1,2,3,7,8,9-HXCDF	0.31 J	0.33 J	ng/kg	13SS140001	2/12	0.09 - 0.5	0.33	NA	430	C	2.8	NA
40321-76-4	1,2,3,7,8-PECDD	0.71 J	0.71 J	ng/kg	13SS130002	1/12	0.1 - 0.8	0.71	NA	43	C	0.28	NA
57117-41-6	1,2,3,7,8-PECDF	0.36 J	2.5 J	ng/kg	13SS140001	2/12	0.09 - 0.4	2.5	NA	860	C	5.6	NA
60851-34-5	2,3,4,6,7,8-HXCDF	0.21 J	1.8 J	ng/kg	13SS140001	4/12	0.07 - 0.4	1.8	NA	430	C	2.8	NA
57117-31-4	2,3,4,7,8-PECDF	0.47 J	21.8	ng/kg	13SS140001	7/12	0.1 - 0.53	21.8	NA	86	C	0.56	NA
1746-01-6	2,3,7,8-TCDD	0.52 J	0.52 J	ng/kg	13SS090002	1/12	0.1 - 1.2	0.52	NA	43	C	0.28	NA
51207-31-9	2,3,7,8-TCDF	0.35 J	21	ng/kg	13SS140001	10/12	0.1 - 0.3	21	NA	430	C	2.8	NA
37871-00-4	TOTAL HPCDD	11.8	112	ng/kg	13SS060002	12/12	---	112	NA	NA	C	NA	NA
38998-75-3	TOTAL HPCDF	0.38 J	10.1 J	ng/kg	13SS140001	7/12	0.1 - 1.9	10.1	NA	NA	C	NA	NA
34465-46-8	TOTAL HXCDD	0.77 J	15.7 J	ng/kg	13SS050002	11/12	1.1	15.7	NA	NA	C	NA	NA
55684-94-1	TOTAL HXCDF	0.33	19.4 J	ng/kg	13SS140001	8/12	0.07 - 0.2	19.4	NA	NA	C	NA	NA
36088-22-9	TOTAL PECDD	0.71	0.71	ng/kg	13SS130002	1/12	0.1 - 2.8	0.71	NA	NA	C	NA	NA
30402-15-4	TOTAL PECDF	0.83	135 J	ng/kg	13SS140001	9/12	0.1 - 0.3	135	NA	NA	C	NA	NA
41903-57-5	TOTAL TCDD	0.52	2.1 J	ng/kg	13SS060002	2/12	0.1 - 2.2	2.1	NA	NA	C	NA	NA
55722-27-5	TOTAL TCDF	1.8	540 J	ng/kg	13SS140001	11/12	0.1	540	NA	NA	C	NA	NA
	2,3,7,8-TCDD TEQ	0.45	15.1	ng/kg	13SS140001	12/12	0.1 - 1.2	15.1	NA	43	C	0.28	NA
Volatile Organics (ug/kg)													
156-60-5	TRANS-1,2-DICHLOROETHENE	2 J	2 J	ug/kg	13SS060002	1/2	1.4	2	NA	NA	N	34	680
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SS150002	2/2	---	3	NA	110000	N	8000	NA
Semivolatile Organics (ug/kg)													
83-32-9	ACENAPHTHENE	52 J	52 J	ug/kg	13SS090002	1/12	3.8 - 4.9	52		NA	N	31000	130000
120-12-7	ANTHRACENE	5 J	210 J	ug/kg	13SS090002	2/12	3.8 - 4.9	210	NA	NA	N	650000	51000
56-55-3	BENZO(A)ANTHRACENE	4 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4.9	1100	NA	NA	C	160	19000
50-32-8	BENZO(A)PYRENE	6 J	1000 J	ug/kg	13SS090002	6/12	3.8 - 4.9	1000	NA	NA	C	410	8200
205-99-2	BENZO(B)FLUORANTHENE	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	NA	C	490	57000
191-24-2	BENZO(G,H,I)PERYLENE	6 J	750 J	ug/kg	13SS090002	6/12	3.8 - 4.9	750	NA	NA	N	230000	16000
207-08-9	BENZO(K)FLUORANTHENE	5 J	640 J	ug/kg	13SS090002	7/12	3.8 - 4	640	NA	NA	C	490	39000
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	91 J	140 J	ug/kg	13SS060002, 13SS090002	7/12	78 - 190	140	NA	NA	C	180000	3600000
218-01-9	CHRYSENE	7 J	1100 J	ug/kg	13SS090002	7/12	3.8 - 4	1100	NA	NA	C	160	25000
53-70-3	DIBENZO(A,H)ANTHRACENE	200 J	200 J	ug/kg	13SS090002	1/12	3.8 - 4.9	200	NA	NA	C	1500	500
206-44-0	FLUORANTHENE	6 J	1800 J	ug/kg	13SS090002	9/12	3.8 - 4	1800	NA	NA	N	310000	880000
86-73-7	FLUORENE	50 J	50 J	ug/kg	13SS090002	1/12	3.8 - 4.9	50	NA	NA	N	41000	170000
193-39-5	INDENO(1,2,3-CD)PYRENE	4 J	650 J	ug/kg	13SS090002	6/12	3.8 - 4.9	650	NA	NA	C	1400	3100
91-20-3	NAPHTHALENE	5 J	5 J	ug/kg	13SS100002	1/12	3.8 - 4.9	5	NA	17000	N	3100	700
85-01-8	PHENANTHRENE	4 J	1000 J	ug/kg	13SS090002	7/12	3.8 - 4.2	1000	NA	NA	N	230000	13000
129-00-0	PYRENE	6 J	2400 J	ug/kg	13SS090002	9/12	3.8 - 4	2400	NA	NA	N	230000	570000
Pesticides PCBs (ug/kg)													
12672296	AROCLOR-1248	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	NA	C	NA	6200
Miscellaneous Parameters													
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA		NA	NA
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA		NA	NA

TABLE 2.2
COMPARISON OF SURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - Screening values for dioxins/furans are based on the value for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.

Definitions:
C = Carcinogen
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
sat = soil saturation concentration

Associated Samples

13SS010002			
13SS020002	13SS090002-D	13SS190002	13SS300002
13SS030002	13SS150002	13SS200002	13SS320002
13SS040002	13SS100002	13SS210002	13SS330002
13SS040002-D	13SS110002	13SS220002	13SS340002
13SS050002	13SS120002	13SS230002	13SS350002
13SS060002	13SS130002	13SS240002	13SS360002
13SS070002	13SS140001	13SS250002	13SS370002
13SS080002	13SS160002	13SS260002	13SS380002
13SS080002-D	13SS170002	13SS270002	13SS390002
13SS090002	13SS180002	13SS290002	13SS400002

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - DIRECT CONTACT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dioxins (ng/kg)															
3268-87-9	1,2,3,4,6,7,8,9-OCDD	330	4430	ng/kg	13SB010204	11/11	---	4430	NA	39000	C(8)	NA	IDEM	No	BSL
39001-02-0	1,2,3,4,6,7,8,9-OCDF	2.9 J	2.9 J	ng/kg	13SB100204	1/11	0.1 - 3.4	2.9	NA	39000	C	NA	IDEM	No	BSL
35822-46-9	1,2,3,4,6,7,8-HPCDD	5	26.2	ng/kg	13SB010204	11/11	---	26.2	NA	390	C	NA	IDEM	No	BSL
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.69	1.1 J	ng/kg	13SB100204	2/11	0.08 - 1.3	1.1	NA	390	C	NA	IDEM	No	BSL
39227-28-6	1,2,3,4,7,8-HXCDD	0.44 J	0.44 J	ng/kg	13SB130204	1/11	0.09 - 1.5	0.44	NA	39	C	NA	IDEM	No	BSL
70648-26-9	1,2,3,4,7,8-HXCDF	0.79	2.7 J	ng/kg	13SB040204	3/11	0.07 - 0.2	2.7	NA	39	C	NA	IDEM	No	BSL
19408-74-3	1,2,3,7,8,9-HXCDD	0.53 J	1.1 J	ng/kg	13SB110204	5/11	0.1 - 1.5	1.1	NA	39	C	NA	IDEM	No	BSL
40321-76-4	1,2,3,7,8-PECDD	0.21 J	0.21 J	ng/kg	13SB120204	1/11	0.1 - 1.1	0.21	NA	3.9	C	NA	IDEM	No	BSL
57117-41-6	1,2,3,7,8-PECDF	0.3 J	0.31	ng/kg	13SB090204	2/11	0.08 - 0.7	0.31	NA	78	C	NA	IDEM	No	BSL
60851-34-5	2,3,4,6,7,8-HXCDF	0.09 J	0.59 J	ng/kg	13SB100204	2/11	0.07 - 0.8	0.59	NA	39	C	NA	IDEM	No	BSL
57117-31-4	2,3,4,7,8-PECDF	0.31 J	15.4	ng/kg	13SB040204	3/11	0.1 - 0.66	15.4	NA	7.8	C	NA	IDEM	Yes	BSL
51207-31-9	2,3,7,8-TCDF	2.9	5.2	ng/kg	13SB100204	2/11	0.09 - 0.5	5.2	NA	39	C	NA	IDEM	No	BSL
37871-00-4	TOTAL HPCDD	8.7	52.1	ng/kg	13SB050204	11/11	---	52.1	NA	NA	C	NA	IDEM	No	NTX
38998-75-3	TOTAL HPCDF	1.5 J	2 J	ng/kg	13SB100204	2/11	0.1 - 1.4	2	NA	NA	C	NA	IDEM	No	NTX
34465-46-8	TOTAL HXCDD	0.65 J	4.2 J	ng/kg	13SB050204	9/11	0.2 - 1.4	4.2	NA	NA	C	NA	IDEM	No	NTX
55684-94-1	TOTAL HXCDF	0.43	5.4 J	ng/kg	13SB100204	4/11	0.07 - 0.13	5.4	NA	NA	C	NA	IDEM	No	NTX
36088-22-9	TOTAL PECDD	0.21	0.21	ng/kg	13SB120204	1/11	0.1 - 1.4	0.21	NA	NA	C	NA	IDEM	No	NTX
30402-15-4	TOTAL PECDF	0.3	71.8 J	ng/kg	13SB040204	5/11	0.09 - 0.49	71.8	NA	NA	C	NA	IDEM	No	NTX
41903-57-5	TOTAL TCDD	0.15	3 J	ng/kg	13SB100204	2/11	0.1 - 5.2	3	NA	NA	C	NA	IDEM	No	NTX
55722-27-5	TOTAL TCDF	1.7	292 J	ng/kg	13SB040204	5/11	0.09 - 1.3	292	NA	NA	C	NA	IDEM	No	NTX
	2,3,7,8-TCDD TEQ	0.41	9.7	ng/kg	13SB040204	11/11	---	9.7	NA	3.9	C	NA	IDEM	Yes	NTX
Volatile Organics (ug/kg)															
78-93-3	2-BUTANONE	18	18	ug/kg	13SB150204	1/2	1	18	NA	2200000	N	44000000	IDEM	No	BSL
108-10-1	4-METHYL-2-PENTANONE	3 J	3 J	ug/kg	13SB150204	1/2	1	3	NA	530000	N	12000000	IDEM	No	BSL
67-64-1	ACETONE	89 J	89 J	ug/kg	13SB150204	1/2	1	89	NA	1400000	N	4800000	IDEM	No	BSL
75-71-8	DICHLORODIFLUOROMETHANE	7 J	7 J	ug/kg	13SB150204	1/2	1	7	NA	9400	N	NA	NA	No	BSL
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SB150204	2/2	---	3	NA	39000	N	NA	NA	No	BSL
Semivolatile Organics (ug/kg)															
TTNUS042	3&4-METHYLPHENOL	560	560	ug/kg	13SB090204	1/11	76 - 87	560	NA	31000	C	910000	IDEM	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	90 J	130 J	ug/kg	13SB050204	6/11	76 - 83	130	NA	35000	C	300000	IDEM	No	BSL
218-01-9	CHRYSENE	4 J	4 J	ug/kg	13SB020204	1/11	3.7 - 4.3	4	NA	62000	C	500000	IDEM	No	BSL
206-44-0	FLUORANTHENE	7 J	7 J	ug/kg	13SB020204	1/11	3.7 - 4.3	7	NA	230000	N	6300000	IDEM	No	BSL
85-01-8	PHENANTHRENE	6 J	6 J	ug/kg	13SB020204	1/11	3.7 - 4.3	6	NA	230000	N(9)	470000	IDEM	No	BSL
108-95-2	PHENOL	110 J	110 J	ug/kg	13SB090204	1/11	76 - 87	110	NA	1800000	N	44000000	IDEM	No	BSL
129-00-0	PYRENE	13	13	ug/kg	13SB020204	1/11	3.7 - 4.3	13	NA	230000	N	4700000	IDEM	No	BSL
Pesticides PCBs (ug/kg)															
12672296	AROCLOR-1248	13 J	210000	ug/kg	13SB100204	21/46	9 - 20	210000	NA	220	C	1800	IDEM	Yes	ASL
Herbicides (ug/kg)															
87-86-5	PENTACHLOROPHENOL	0.67 J	0.85 J	ug/kg	13SB010204	2/11	0.51 - 0.58	0.85	NA	3000	C	20000	IDEM	No	BSL
Miscellaneous Parameters															
TTNUS014	Cation Exchange Capacity (meq/l)	13	14	mg/kg	13SB070810	2/2	---	14	NA	NA		NA	NA	No	NTX
TTNUS002	PH (S.U.)	5.3	5.8	mg/kg	13SB080608	2/2	---	5.8	NA	NA		NA	NA	No	NTX
TTNUS003	TOTAL ORGANIC CARBON (mg/kg)	1100 J	1100 J	mg/kg	13SB070810	1/2	1000	1100	NA	NA		NA	NA	No	NTX

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SUBSURFACE SOIL - DIRECT CONTACT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - Screening values for dioxins/furans are based on the PRG for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.
9 - Pyrene is used as a surrogate for phananthrene.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data

Associated Samples

13SB010204	13SB110204	13SB210204-D	13SB300204-D	13SB390204
13SB020204	13SB120204	13SB220204	13SB310406	13SB400204
13SB030204	13SB130204	13SB230204	13SB310406-D	13SB410406
13SB040204	13SB140204	13SB240203	13SB310608	13SB410608
13SB050204	13SB160204	13SB250204	13SB320204	13SB420406
13SB060204	13SB170204	13SB260204	13SB330204	13SB420608
13SB070810	13SB180204	13SB270204	13SB340204	13SB430406
13SB080608	13SB180204-D	13SB280204	13SB350204	13SB440406
13SB090204	13SB190203	13SB280406	13SB360204	13SB450406
13SB150204	13SB200204	13SB290204	13SB370204	13SB460406
13SB100204	13SB210204	13SB300204	13SB380204	13SB470406

TABLE 2.4
COMPARISON OF SUBSURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]	U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Dioxins (ng/kg)												
3268-87-9	1,2,3,4,6,7,8,9-OCDD	330	4430	ng/kg	13SB010204	11/11	---	4430	NA	430000 C(7)	2800	NA
39001-02-0	1,2,3,4,6,7,8,9-OCDF	2.9 J	2.9 J	ng/kg	13SB100204	1/11	0.1 - 3.4	2.9	NA	430000 C	2800	NA
35822-46-9	1,2,3,4,6,7,8-HPCDD	5	26.2	ng/kg	13SB010204	11/11	---	26.2	NA	4300 C	28	NA
67562-39-4	1,2,3,4,6,7,8-HPCDF	0.69	1.1 J	ng/kg	13SB100204	2/11	0.08 - 1.3	1.1	NA	4300 C	28	NA
39227-28-6	1,2,3,4,7,8-HXCDD	0.44 J	0.44 J	ng/kg	13SB130204	1/11	0.09 - 1.5	0.44	NA	430 C	2.8	NA
70648-26-9	1,2,3,4,7,8-HXCDF	0.73	2.7 J	ng/kg	13SB040204	3/11	0.07 - 0.2	2.7	NA	430 C	2.8	NA
19408-74-3	1,2,3,7,8,9-HXCDD	0.53 J	1.1 J	ng/kg	13SB110204	5/11	0.1 - 1.5	1.1	NA	430 C	2.8	NA
40321-76-4	1,2,3,7,8-PECDD	0.21 J	0.21 J	ng/kg	13SB120204	1/11	0.1 - 1.1	0.21	NA	43 C	0.28	NA
57117-41-6	1,2,3,7,8-PECDF	0.3 J	0.31	ng/kg	13SB090204	2/11	0.08 - 0.7	0.31	NA	860 C	5.6	NA
60851-34-5	2,3,4,6,7,8-HXCDF	0.09 J	0.59 J	ng/kg	13SB100204	2/11	0.07 - 0.8	0.59	NA	430 C	2.8	NA
57117-31-4	2,3,4,7,8-PECDF	0.31 J	15.4	ng/kg	13SB040204	3/11	0.1 - 0.66	15.4	NA	86 C	0.56	NA
51207-31-9	2,3,7,8-TCDF	2.9	5.2	ng/kg	13SB100204	2/11	0.09 - 0.5	5.2	NA	430 C	2.8	NA
37871-00-4	TOTAL HPCDD	8.7	52.1	ng/kg	13SB050204	11/11	---	52.1	NA	NA C	NA	NA
38998-75-3	TOTAL HPCDF	1.5 J	2 J	ng/kg	13SB100204	2/11	0.1 - 1.4	2	NA	NA C	NA	NA
34465-46-8	TOTAL HXCDD	0.65 J	4.2 J	ng/kg	13SB050204	9/11	0.2 - 1.4	4.2	NA	NA C	NA	NA
55684-94-1	TOTAL HXCDF	0.43	5.4 J	ng/kg	13SB100204	4/11	0.07 - 0.13	5.4	NA	NA C	NA	NA
36088-22-9	TOTAL PECDD	0.21	0.21	ng/kg	13SB120204	1/11	0.1 - 1.4	0.21	NA	NA C	NA	NA
30402-15-4	TOTAL PECDF	0.3	71.8 J	ng/kg	13SB040204	5/11	0.09 - 0.49	71.8	NA	NA C	NA	NA
41903-57-5	TOTAL TCDD	0.15	3 J	ng/kg	13SB100204	2/11	0.1 - 5.2	3	NA	NA C	NA	NA
55722-27-5	TOTAL TCDF	1.7	292 J	ng/kg	13SB040204	5/11	0.09 - 1.3	292	NA	NA C	NA	NA
	2,3,7,8-TCDD TEQ	0.41	9.7	ng/kg	13SB040204	11/11	---	9.7	NA	43 C	0.28	NA
Volatile Organics (ug/kg)												
78-93-3	2-BUTANONE	18	18	ug/kg	13SB150204	1/2	1	18	NA	24000000 sat	4400	35000
108-10-1	4-METHYL-2-PENTANONE	3 J	3 J	ug/kg	13SB150204	1/2	1	3	NA	2700000 sat	620	20000
67-64-1	ACETONE	89 J	89 J	ug/kg	13SB150204	1/2	1	89	NA	NA N	6600	3800
75-71-8	DICHLORODIFLUOROMETHANE	7 J	7 J	ug/kg	13SB150204	1/2	1	7	NA	25000 N	28000	NA
75-69-4	TRICHLOROFLUOROMETHANE	2 J	3 J	ug/kg	13SB150204	2/2	---	3	NA	110000 N	8000	NA
Semivolatile Organics (ug/kg)												
TTNUS042	3&4-METHYLPHENOL	560	560	ug/kg	13SB090204	1/11	3.8 - 4	560	NA	NA C	66	1100
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	90 J	130 J	ug/kg	13SB050204	6/11	78 - 190	130	NA	NA C	180000	3600000
218-01-9	CHRYSENE	4 J	4 J	ug/kg	13SB020204	1/11	3.8 - 4	4	NA	NA C	160	25000
206-44-0	FLUORANTHENE	7 J	7 J	ug/kg	13SB020204	1/11	3.8 - 4	7	NA	NA N	310000	880000
85-01-8	PHENANTHRENE	6 J	6 J	ug/kg	13SB020204	1/11	3.8 - 4.2	6	NA	NA N	230000	13000
108-95-2	PHENOL	110 J	110 J	ug/kg	13SB090204	1/11	3.8 - 4.9	110	NA	NA N	2800	56000
129-00-0	PYRENE	13	13	ug/kg	13SB020204	1/11	3.8 - 4	13	NA	NA N	230000	570000
Pesticides PCBs (ug/kg)												
12672296	AROCLOR-1248	42	160000	ug/kg	13SS100002	26/35	8.8 - 20	160000	NA	NA C	NA	6200
Herbicides												
87-86-5	PENTACHLOROPHENOL	0.67 J	0.85 J	ug/kg	13SB010204	2/11	8.8 - 20	0.85	NA	NA C	1.4	28
Miscellaneous Parameters												
TTNUS014	CATION EXCHANGE CAPACITY (MEQ/1)	14	15	mg/kg	13SS080002	2/2	---	15	NA	NA	NA	NA
TTNUS002	PH (S.U.)	5.1	7.4	mg/kg	13SS070002	2/2	---	7.4	NA	NA	NA	NA

TABLE 2.4
COMPARISON OF SUBSURFACE SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA .

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Subsurface Soil

CAS Number	Chemical	Minimum Concentration(1)	Maximum Concentration(1)	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects(2)	Concentration Used for Screening(3)	Concentration above Background ?(4)	U.S. EPA Generic SSL for Soil to Air(5)	U.S. EPA Generic SSL for Migration to Groundwater(5)	IDEM Closure Level for Migration to Groundwater(6)

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Not applicable (no metals data).
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - Screening values for dioxins/furans are based on the value for 2,3,7,8-TCDD and adjusted for the TEFs discussed in Section 7.4.1.3.

Definitions:
C = Carcinogen
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
sat = soil saturation concentration

Associated Samples

13SB010204	13SB110204	13SB210204-D	13SB300204-D	13SB390204
13SB020204	13SB120204	13SB220204	13SB310406	13SB400204
13SB030204	13SB130204	13SB230204	13SB310406-D	13SB410406
13SB040204	13SB140204	13SB240203	13SB310608	13SB410608
13SB050204	13SB160204	13SB250204	13SB320204	13SB420406
13SB060204	13SB170204	13SB260204	13SB330204	13SB420608
13SB070810	13SB180204	13SB270204	13SB340204	13SB430406
13SB080608	13SB180204-D	13SB280204	13SB350204	13SB440406
13SB090204	13SB190203	13SB280406	13SB360204	13SB450406
13SB150204	13SB200204	13SB290204	13SB370204	13SB460406
13SB100204	13SB210204	13SB300204	13SB380204	13SB470406

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE / SUBSURFACE SOIL - DIRECT CONTACT - HISTORICAL DATA
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]		Maximum Concentration[1]		Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	EPA Region 9 PRG (Residential)[5]		Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Energetics (mg/kg)																	
99-35-4	1,3,5-Trinitrobenzene	0.121	J	2.2		mg/kg	Bldg 166, Grid 103	8/637	0.1085 - 1.23	2.2	NA	180	N	NA	IDEM	No	BSL
118-96-7	2,4,6-Trinitrotoluene	0.035	J	57		mg/kg	Bldg 166, Grid 271	286/632	0.217 - 1.18	57	NA	3.1	N	NA	IDEM	Yes	ASL
121-14-2	2,4-Dinitrotoluene	0.1	J	0.1	J	mg/kg	Bldg 166, Side 181/231	1/637	0.217 - 1.23	0.1	NA	12	N	NA	IDEM	No	BSL
1321-12-6	2-Amino-4,6-dinitrotoluene	0.052	J	150	J	mg/kg	Bldg 165, Grid 20	73/637	0.217 - 2.5	150	NA	1.2	N	NA	IDEM	Yes	ASL
99-08-1	2-Nitrotoluene	0.43		0.43		mg/kg	Bldg 165, Grid 12	1/637	0.217 - 1.23	0.43	NA	0.88	C	NA	IDEM	No	BSL
1321-12-6	4-Amino-2,6-dinitrotoluene	0.045	J	303		mg/kg	Bldg 171, Grid 129	94/637	0.045 - 2	303	NA	1.2	N	NA	IDEM	Yes	ASL
2691-41-0	HMX	0.081	J	5390		mg/kg	Bldg 171, Grid 125	481/633	0.476 - 2.2	5390	NA	310	N	NA	IDEM	Yes	ASL
78-11-5	PETN	470		470		mg/kg	Bldg 171, Grid 217	1/636	0.1085 - 3.08	470	NA	NA		NA	IDEM	No	NTX
121-82-4	RDX	0.039	J	290		mg/kg	Bldg 171, Grid 178	464/634	0.476 - 1	290	NA	4.4	C	NA	IDEM	Yes	ASL
Inorganics (mg/kg)																	
7429-90-5	Aluminum	4050		58500		mg/kg	Bldg 171, Side 138/239	496/496	---	58500	NA	7600	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	1.2		64.7		mg/kg	Bldg 171, Grid 173	360/496	10.3 - 25.9	64.7	NA	0.39	C	3.9	IDEM	Yes	ASL
7440-39-3	Barium	10.5		1160	J	mg/kg	Bldg 165, Grid 23	496/496	---	1160	NA	540	N	23000	IDEM	Yes	ASL
7440-43-9	Cadmium	0.05		1.7		mg/kg	Bldg 165, Grid 99	77/496	0.03 - 1.3	1.7	NA	3.7	N	12	IDEM	No	BSL
18540-29-9	Chromium	5.7		95.8		mg/kg	Bldg 171, Grid 212	496/496	---	95.8	NA	210	C	430	IDEM	No	BSL
7439-92-1	Lead	5.82		275	J	mg/kg	Bldg 168, Grid 39	487/487	---	275	NA	400	N	400	IDEM	No	BSL
7487-94-7	Mercury	0.0058	J	8.9		mg/kg	Bldg 171, Grid 133	377/492	0.02 - 0.15	8.9	NA	2.3	N	100	IDEM	Yes	ASL
7782-49-2	Selenium	0.51	B	12.4	J	mg/kg	Bldg 166, Side 256/257	122/496	0.36 - 51.8	12.4	NA	39	N	1700	IDEM	No	BSL
7440-22-4	Silver	0.25	J	0.95	J	mg/kg	Bldg 173, Grid 232	12/496	0.13 - 2.6	0.95	NA	39	N	1700	IDEM	No	BSL
Volatile Organics (ug/kg)																	
67-64-1	Acetone	5	J	15000	B	ug/kg	Bldg 173, Grid 166	265/366	4 - 123	15000	NA	1400000	N	4800000	IDEM	No	BSL
78-93-3	2-Butanone	5	J	85		ug/kg	Bldg 171, Grid 174	46/366	4 - 616	85	NA	2200000	N	44000000	IDEM	No	BSL
75-09-2	Methylene Chloride	1	J	35		ug/kg	Bldg 171, Grid 133	39/366	4 - 308	35	NA	9100	C	120000	IDEM	No	BSL
108-10-1	4-Methyl-2-pentanone	14		14		ug/kg	Bldg 165, Grid 99	1/366	4 - 308	14	NA	530000	N	12000000	IDEM	No	BSL
108-88-3	Toluene	1	J	30		ug/kg	Bldg 174, Grid 281	27/366	4 - 6200	30	NA	520000	sat	1700000	IDEM	No	BSL
1330-20-7	Xylenes	1	J	1300		ug/kg	Bldg 173, Side 188/197	16/366	4 - 810	1300	NA	27000	N	690000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - A discusstion of metals concentrations in histiorical samples relative to Crane background levels is presented in Section 5.2.4.
5 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
B = compound was found in the associated blank
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
PRG = Preliminary Remediation Goal
sat = soil saturation concentration

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BSL = Below Screening Level
NTX = No Toxicity Data

TABLE 2.6
COMPARISON OF SOIL CONCENTRATIONS TO CRITERIA FOR MIGRATION FROM SOIL-TO-AIR AND SOIL-TO-GROUNDWATER - HISTORICAL SURFACE / SUBSURFACE SOIL DATA
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil

CAS Number	Chemical	Minimum Concentration[1]		Maximum Concentration[1]		Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Concentration above Background ?[4]	U.S. EPA Generic SSL for Soil to Air[5]		U.S. EPA Generic SSL for Migration to Groundwater[5]	IDEM Closure Level for Migration to Groundwater[6]
Explosives (mg/kg)															
99-35-4	1,3,5-Trinitrobenzene	0.121	J	2.2		mg/kg	Bldg 166, Grid 103	8/637	0.1085 - 1.23	2.2	NA	NA	N	0.25	NA
118-96-7	2,4,6-Trinitrotoluene	0.035	J	57		mg/kg	Bldg 166, Grid 271	286/632	0.217 - 1.18	57	NA	NA	N	0.00057	NA
121-14-2	2,4-Dinitrotoluene	0.1	J	0.1	J	mg/kg	Bldg 166, Side 181/231	1/637	0.217 - 1.23	0.1	NA	NA	N	0.000049	NA
1321-12-6	2-Amino-4,6-dinitrotoluene	0.052	J	150	J	mg/kg	Bldg 165, Grid 20	73/637	0.217 - 2.5	150	NA	NA	N	NA	NA
88-72-2	2-Nitrotoluene	0.43		0.43		mg/kg	Bldg 165, Grid 12	1/637	0.217 - 1.23	0.43	NA	NA	C	0.00015	NA
1321-12-6	4-Amino-2,6-dinitrotoluene	0.045	J	303		mg/kg	Bldg 171, Grid 129	94/637	0.045 - 2	303	NA	NA	N	NA	NA
2691-41-0	HMX	0.081	J	5390		mg/kg	Bldg 171, Grid 125	481/633	0.476 - 2.2	5390	NA	NA	N	NA	NA
78-11-5	PETN	470		470		mg/kg	Bldg 171, Grid 217	1/636	0.1085 - 3.08	470	NA	NA		NA	NA
121-82-4	RDX	0.039	J	290		mg/kg	Bldg 171, Grid 178	464/634	0.476 - 1	290	NA	NA	C	NA	NA
Inorganics (mg/kg)															
7429-90-5	Aluminum	4050		58500		mg/kg	Bldg 171, Side 138/239	496/496	---	58500	NA	686000	N	8.3	NA
7440-38-2	Arsenic	1.2		64.7		mg/kg	Bldg 171, Grid 173	360/496	10.3 - 25.9	64.7	NA	745	C	0.29	3.9
7440-39-3	Barium	10.5		1160	J	mg/kg	Bldg 165, Grid 23	496/496	---	1160	NA	68600	N	82	1600
7440-43-9	Cadmium	0.05		1.7		mg/kg	Bldg 165, Grid 99	77/496	0.03 - 1.3	1.7	NA	1780	C	0.38	7.5
18540-29-9	Chromium	5.7		95.8		mg/kg	Bldg 171, Grid 212	496/496	---	95.8	NA	267	C	2.1	38
7439-92-1	Lead	5.82		275	J	mg/kg	Bldg 168, Grid 39	487/487	---	275	NA	NA	N	NA	81
7487-94-7	Mercury	0.0058	J	8.9		mg/kg	Bldg 171, Grid 133	377/492	0.02 - 0.15	8.9	NA	NA	N	NA	2.1
7782-49-2	Selenium	0.51	B	12.4	J	mg/kg	Bldg 166, Side 256/257	122/496	0.36 - 51.8	12.4	NA	NA	N	0.26	5.2
7440-22-4	Silver	0.25	J	0.95	J	mg/kg	Bldg 173, Grid 232	12/496	0.13 - 2.6	0.95	NA	NA	N	1.6	31
Volatile Organics (ug/kg)															
67-64-1	Acetone	5	J	15000	B	ug/kg	Bldg 173, Grid 166	265/366	4 - 123	15000	NA	NA	N	6600	3800
78-93-3	2-Butanone	5	J	85		ug/kg	Bldg 171, Grid 174	46/366	4 - 616	85	NA	24000000	sat	4400	35000
75-09-2	Methylene Chloride	1	J	35		ug/kg	Bldg 171, Grid 133	39/366	4 - 308	35	NA	13000	C	1.2	23
108-10-1	4-Methyl-2-pentanone	14		14		ug/kg	Bldg 165, Grid 99	1/366	4 - 308	14	NA	2700000	sat	620	20000
108-88-3	Toluene	1	J	30		ug/kg	Bldg 174, Grid 281	27/366	4 - 6200	30	NA	650000	sat	590	12000
1330-20-7	Xylenes	1	J	1300		ug/kg	Bldg 173, Side 188/197	16/366	4 - 810	1300	NA	71000	N	7100	170000

Shaded cell indicates that the maximum concentration exceeds the specified criterion.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - A discusstion of metals concentrations in histiorical samples relative to Crane background levels is presented in Section 5.2.4.
5 - U.S. EPA Soil Screening Levels calculated on the EPA Internet Site at http://risk.lsd.ornl.gov/calc_start.htm. The Soil to air SSLs for noncarcinogens are divided by 10. The migration to groundwater value represents a dilution and attenuation factor (DAF) of 1.
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).

Definitions:
B = compound was found in the associated blank
C = Carcinogen
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
sat = soil saturation concentration

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Volatile Organic Compounds														
79-01-6	Trichloroethene	1 J	1 J	ug/L	13GWT2001	1/2	0.3	1	NA	1.4 C	5 5	FED-MCL IDEM	No	BSL
Energetics														
99-35-4	1,3,5-Trinitrobenzene	0.4 J	1.3	ug/L	13GWT0903, 13GWT2102	4/124	0.039 - 0.65	1.3	NA	110 N	NA NA	NA NA	No	BSL
99-65-0	1,3-Dinitrobenzene	0.3 J	2.4	ug/L	13GWT0903	8/124	0.039 - 0.65	2.4	NA	0.36 N	NA NA	NA NA	Yes	ASL
118-96-7	2,4,6-Trinitrotoluene	1.6	69 J	ug/L	13GWT2102	12/124	0.039 - 0.65	69	NA	1.8 N[8]	NA NA	NA NA	Yes	ASL
6629-29-4	2,4-Diamino-6-Nitrotoluene	0.77 J	3.9	ug/L	13GWT0903	4/47	0.236 - 0.301	3.9	NA	NA	NA NA	NA NA	No	NTX
121-14-2	2,4-Dinitrotoluene	0.48 J	1.6	ug/L	13GWT1103	7/124	0.039 - 0.65	1.6	NA	7.3 N	NA NA	NA NA	No	BSL
59229-75-3	2,6-Diamino-4-Nitrotoluene	1.8 J	1.8 J	ug/L	13GWT1102	1/47	0.236 - 0.301	1.8	NA	NA	NA NA	NA NA	No	NTX
606-20-2	2,6-Dinitrotoluene	1 J	9.9	ug/L	13GWT0903	7/124	0.039 - 0.65	9.9	NA	3.6 N	NA NA	NA NA	Yes	ASL
35572-78-2	2-Amino-4,6-Dinitrotoluene	0.28 J	15 J	ug/L	13GWT0904	15/124	0.039 - 0.65	15	NA	0.73 N[9]	NA NA	NA NA	Yes	ASL
88-72-2	2-Nitrotoluene	0.37 J	1	ug/L	13GWT2403	3/124	0.039 - 0.65	1	NA	0.049 C	NA NA	NA NA	Yes	ASL
99-08-1	3-Nitrotoluene	0.34 J	0.58 J	ug/L	13GWT1103	2/124	0.039 - 0.65	0.58	NA	12 N	NA NA	NA NA	No	BSL
19406-51-0	4-Amino-2,6-Dinitrotoluene	0.12 J	19	ug/L	13GWT0904, 13GWT1101	22/124	0.039 - 0.65	19	NA	0.73 N[9]	NA NA	NA NA	Yes	ASL
99-99-0	4-Nitrotoluene	0.5 J	0.5 J	ug/L	13GWT2101	1/124	0.039 - 0.65	0.5	NA	0.66 C	NA NA	NA NA	No	BSL
TTNUS498	DNX	0.31 J	50 J	ug/L	13GWT2102	10/47	0.236 - 0.301	50	NA	NA	NA NA	NA NA	No	NTX
2691-41-0	HMX	0.29 J	640	ug/L	13GWT2102	88/124	0.236 - 0.6	640	NA	180 N	NA NA	NA NA	Yes	ASL
TTNUS232	MNX	0.32 J	11	ug/L	13GWT1702	13/47	0.236 - 0.291	11	NA	NA	NA NA	NA NA	No	NTX
121-82-4	RDX	0.27 J	7700	ug/L	13GWT2102	90/124	0.236 - 0.465	7700	NA	0.61 C	NA NA	NA NA	Yes	ASL
TTNUS337	TNX	0.31 J	2.4	ug/L	13GWT3901	6/47	0.236 - 0.301	2.4	NA	NA	NA NA	NA NA	No	NTX
Total Metals														
7429-90-5	Aluminum	93.9 J	139000 J	ug/L	13GWT0502	67/82	8.35 - 332	139000	NA	3600 N	NA NA	NA NA	Yes	ASL
7440-36-0	Antimony	2.9 J	6.7 J	ug/L	13GWT3501	4/82	0.02 - 1.5	6.7	NA	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
7440-38-2	Arsenic	0.65 J	24.5 J	ug/L	13GWT3801	32/82	0.07 - 1.4	24.5	NA	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
7440-39-3	Barium	10.4 J	727 J	ug/L	13GWT0502	82/82	---	727	NA	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
7440-41-7	Beryllium	2.1 J	12.8 J	ug/L	13GWT4701	22/82	0.02 - 2.1	12.8	NA	7.3 N	4 4	FED-MCL IDEM	Yes	ASL
7440-43-9	Cadmium	2.7 J	2.7 J	ug/L	13GWT2501, 13GWT2502	2/82	0.039 - 1.9	2.7	NA	1.8 N	5 5	FED-MCL IDEM	Yes	ASL
7440-70-2	Calcium	1720 J	148000 J	ug/L	13GWT4801	81/82	2580	148000	NA	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium	0.76 J	145 J	ug/L	13GWT0502	32/82	0.02 - 2.2	145	NA	11 N[10]	100 100	FED-MCL IDEM[10]	Yes	ASL
7440-48-4	Cobalt	1.1 J	249 J	ug/L	13GWT4702	73/82	0.36 - 14.8	249	NA	73 N	NA NA	NA NA	Yes	ASL
7440-50-8	Copper	0.83 J	89.5 J	ug/L	13GWT2501	46/82	0.19 - 6.9	89.5	NA	150 N	1300 1300	FED-MCL[11] IDEM	No	BSL
7439-89-6	Iron	92.9 J	143000 J	ug/L	13GWT2001	65/82	25 - 440	143000	NA	1100 N	NA NA	NA NA	Yes	ASL

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
7439-92-1	Lead	1.1 J	54.3 J	ug/L	13GWT2501	31/82	0.04 - 2.5	54.3	NA	NA	15 15	FED-MCL[11] IDEM	Yes	ASL
7439-93-2	Lithium	2.3 J	340 J	ug/L	13GWT2001	26/26	---	340	NA	73 N	NA NA	NA NA	Yes	ASL
7439-95-4	Magnesium	1040 J	70300 J	ug/L	13GWT2001	82/82	---	70300	NA	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese	33.6 J	11600 J	ug/L	13GWT2001	72/82	48.3 - 566	11600	NA	88 N	NA NA	NA NA	Yes	ASL
7439-97-6	Mercury	0.007 J	0.39	ug/L	13GWT0102	14/82	0.007 - 0.2	0.39	NA	1.1 N	2 2	FED-MCL IDEM	No	BSL
7440-02-0	Nickel	2.2 J	477 J	ug/L	13GWT2001	81/82	1.4	477	NA	73 N	NA NA	NA NA	Yes	ASL
7440-09-7	Potassium	240 J	27500 J	ug/L	13GWT0502	82/82	---	27500	NA	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium	1.8 J	6 J	ug/L	13GWT5001	5/82	0.04 - 2.2	6	NA	18 N	50 50	FED-MCL IDEM	No	BSL
7440-23-5	Sodium	6030 J	166000 J	ug/L	13GWT3501	82/82	---	166000	NA	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium	14.5 J	396 J	ug/L	13GWT0201	26/26	---	396	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium	2.5 J	659 J	ug/L	13GWT0502	52/73	0.13 - 2.2	659	NA	15000 N	NA NA	NA NA	No	BSL
7440-62-2	Vanadium	0.63 J	135 J	ug/L	13GWT0502	29/82	0.05 - 1.4	135	NA	3.6 N	NA NA	NA NA	Yes	ASL
7440-66-6	Zinc	0.5 J	1220 J	ug/L	13GWT4702	73/82	1.8 - 12.4	1220	NA	1100 N	NA 11000	NA IDEM	Yes	ASL
Dissolved Metals														
7429-90-5	Aluminum, Filtered	124 J	11800 J	ug/L	13GWT2001-F	13/26	6.4 - 164	11800	NA	3600 N	NA NA	NA NA	Yes	ASL
7440-36-0	Antimony	3 J	7.3 J	ug/L	13GWT3501-F	4/26	0.02 - 1	7.3	NA	1.5 N	6 6	FED-MCL IDEM	Yes	ASL
7440-38-2	Arsenic, Filtered	0.8 J	21.3 J	ug/L	13GWT3801-F	9/26	0.11 - 1.4	21.3	NA	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
7440-39-3	Barium, Filtered	9.6 J	93.6 J	ug/L	13GWT3901-F	26/26	---	93.6	NA	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-41-7	Beryllium, Filtered	2 J	5.6 J	ug/L	13GWT2001-F	4/26	0.03 - 1.5	5.6	NA	7.3 N	4 4	FED-MCL IDEM	Yes	ASL
7440-70-2	Calcium, Filtered	2250 J	70900 J	ug/L	13GWT2001-F	26/26	---	70900	NA	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	1.3 J	2.7 J	ug/L	13GWT2001-F	4/26	0.13 - 1.4	2.7	NA	11 N[10]	100 100	FED-MCL IDEM[10]	No	BSL
7440-48-4	Cobalt, Filtered	1.3 J	230 J	ug/L	13GWT2001-F	23/26	0.11 - 1.5	230	NA	73 N	NA NA	NA NA	Yes	ASL
7440-50-8	Copper, Filtered	2.5 J	13.1 J	ug/L	13GWT2503-F	10/26	0.35 - 5.2	13.1	NA	150 N	1300 1300	FED-MCL[11] IDEM	No	BSL
7439-89-6	Iron, Filtered	93.8 J	142000 J	ug/L	13GWT2001-F	13/26	17.2 - 219	142000	NA	1100 N	NA NA	NA NA	Yes	ASL
7439-92-1	Lead, Filtered	11.5 J	35.7 J	ug/L	13GWT1502-F	2/26	0.04 - 1.3	35.7	NA	15	15 15	FED-MCL[11] IDEM	Yes	ASL
7439-93-2	Lithium, Filtered	9.7 J	322 J	ug/L	13GWT2001-F	7/7	---	322	NA	73 N	NA NA	NA NA	Yes	ASL
7439-95-4	Magnesium, Filtered	1800 J	67900 J	ug/L	13GWT2001-F	25/26	140	67900	NA	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese, Filtered	9 J	11500 J	ug/L	13GWT2001-F	23/26	3.7 - 30.9	11500	NA	88 N	NA NA	NA NA	Yes	ASL
7440-02-0	Nickel, Filtered	2.6 J	470 J	ug/L	13GWT2001-F	22/26	0.48 - 1.6	470	NA	73 N	NA NA	NA NA	Yes	ASL
7440-09-7	Potassium, Filtered	366 J	20800 J	ug/L	13GWT5101-F	25/26	151	20800	NA	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium, Filtered	2 J	4.2 J	ug/L	13GWT4101-F	4/26	0.04 - 2.4	4.2	NA	18 N	NA 50	NA IDEM	No	BSL

TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Background Concentration[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
7440-23-5	Sodium, Filtered	7100 J	161000 J	ug/L	13GWT3501-F	26/26	---	161000	NA	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium, Filtered	13.6 J	188 J	ug/L	13GWT0501-F	7/7	---	188	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium, Filtered	2.6 J	9.3 J	ug/L	13GWT0601-F	7/22	0.42 - 3.8	9.3	NA	15000 N	NA NA	NA NA	No	BSL
7440-62-2	Vanadium, Filtered	1.1 J	7 J	ug/L	13GWT3801-F	4/26	0.05 - 0.8	7	NA	3.6 N	NA NA	NA NA	Yes	BSL
7440-66-6	Zinc, Filtered	2.1 J	695	ug/L	13GWT2001-F	24/26	1.7 - 3.5	695	NA	1100 N	NA 11000	NA IDEM	No	BSL
Miscellaneous Parameters (mg/L)														
	Ammonia-N	0.01	3.4	mg/L	13GWT0903	54/73	0.005 - 0.01	3.4	NA	NA	NA NA	NA NA	No	NTX
	Nitrite/Nitrate-N	0.03	92	mg/L	13GWT0901	49/73	0.02 - 0.05	92	NA	1 N	1 NA	FED-MCL[12] NA	Yes	ASL
	Total Organic Carbon	1	1.1	mg/L	13GWT1502	2/3	0.5	1.1	NA	NA	NA NA	NA NA	No	NTX

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - There are no background or upgradient monitoring wells at SWMU 13.
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
9 - Values are for aminodinitrotoluene.
10 - Values are for hexavalent chromium.
11 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.
12 - The MCL for Nitrite (as N) is presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal
SMCL = Secondary Maximum Contaminant Level

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

Associated Samples

13GWT0101	13GWT0503-F	13GWT0902	13GWT1401	13GWT1803	13GWT2401	13GWT3102	13GWT4002
13GWT0102	13GWT0601	13GWT0902-D	13GWT1402	13GWT1901	13GWT2402	13GWT3201	13GWT4201
13GWT0103	13GWT0601-F	13GWT0903	13GWT1403	13GWT1902	13GWT2403	13GWT3202	13GWT4201-F
13GWT0201	13GWT0602	13GWT0903-D	13GWT1501	13GWT1903	13GWT2501	13GWT3301	13GWT4202
13GWT0202	13GWT0602-F	13GWT0904	13GWT1502	13GWT2001	13GWT2501-F	13GWT3301-F	13GWT4301
13GWT0203	13GWT0603	13GWT1001	13GWT1502-D	13GWT2001-F	13GWT2502	13GWT3302	13GWT4302
13GWT0301	13GWT0701	13GWT1002	13GWT1502-F	13GWT2002	13GWT2502-F	13GWT3302-F	13GWT4701
13GWT0301-F	13GWT0702	13GWT1003	13GWT1503	13GWT2003	13GWT2503	13GWT3401	13GWT4702
13GWT0302	13GWT0702-D	13GWT1101	13GWT1601	13GWT2004	13GWT2503-F	13GWT3402	
13GWT0302-F	13GWT0703	13GWT1102	13GWT1602	13GWT2101	13GWT2601	13GWT3601	
13GWT0303	13GWT0703-D	13GWT1103	13GWT1603	13GWT2101-D	13GWT2602	13GWT3601-D	
13GWT0401	13GWT0801	13GWT1201	13GWT1701	13GWT2102	13GWT2603	13GWT3602	
13GWT0402	13GWT0802	13GWT1201-F	13GWT1702	13GWT2103	13GWT2701	13GWT3701	
13GWT0403	13GWT0802-D	13GWT1202	13GWT1702-D	13GWT2201	13GWT2702	13GWT3702	
13GWT0501	13GWT0802-F	13GWT1203	13GWT1703	13GWT2202	13GWT2901	13GWT3702-D	
13GWT0501-F	13GWT0802-F-D	13GWT1301	13GWT1801	13GWT2203	13GWT2902	13GWT3901	
13GWT0502	13GWT0803	13GWT1301-D	13GWT1801-F	13GWT2301	13GWT3001	13GWT3901-F	
13GWT0502-F	13GWT0901	13GWT1302	13GWT1802	13GWT2302	13GWT3002	13GWT3902	
13GWT0503	13GWT0901-D	13GWT1303	13GWT1802-F	13GWT2303	13GWT3101	13GWT4001	

TABLE 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Mainstream Surface Water

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Energetics														
2691-41-0	HMX	1.4	3.2 J	ug/L	13SW3001	4/5	0.264	3.2	NA	180 N	NA NA	NA NA	No	BSL
TTNUS232	MNX	0.28 J	0.31 J	ug/L	13SW3002	2/5	0.25 - 0.264	0.31	NA	NA	NA NA	NA NA	No	NTX
121-82-4	RDX	1.3	9.9	ug/L	13SW3002	4/5	0.264	9.9	NA	0.61 C	NA NA	NA NA	Yes	ASL
Total Metals														
7440-39-3	Barium	54.1 J	57.8 J	ug/L	13SW3002	2/2	---	57.8	53.7 J - 62.7 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-70-2	Calcium	50000 J	54800 J	ug/L	13SW3001	2/2	---	54800	55700 J - 65300 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium	0.68 J	0.68 J	ug/L	13SW3002	1/2	0.84	0.68	3.8 J	11 N	100 100	FED-MCL IDEM	No	BSL
7440-50-8	Copper	1.3 J	1.4 J	ug/L	13SW3001	2/2	---	1.4	1.1 J - 5.5	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	Iron	175 J	175 J	ug/L	13SW3001	1/2	70.1	175	2460	1100 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium	8780 J	9770 J	ug/L	13SW3001	2/2	---	9770	9090 J - 14500 J	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese	7.9 J	7.9 J	ug/L	13SW3001	1/2	5.3	7.9	23	88 N	NA NA	NA NA	No	BSL
7440-02-0	Nickel	0.45 J	0.45 J	ug/L	13SW3001	1/2	0.93	0.45	0.77 J - 6.9	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium	4850 J	6690 J	ug/L	13SW3002	2/2	---	6690	2560 J - 3860 J	NA	NA NA	NA NA	No	NUT
7440-23-5	Sodium	18400 J	25600 J	ug/L	13SW3001	2/2	---	25600	29900 J - 34300 J	NA	NA NA	NA NA	No	NUT
7440-32-6	Titanium	2.3 J	2.3 J	ug/L	13SW3001	1/1	---	2.3	0.31 J	15000 N	NA NA	NA NA	No	BSL
Dissolved Metals														
7440-39-3	Barium, Filtered	81.6 J	280 J	ug/L	13SW3002-F	2/2	---	280	52.7 J - 56 J	260 N	2000 2000	FED-MCL IDEM	Yes	ASL
7440-70-2	Calcium, Filtered	29000 J	52400 J	ug/L	13SW3002-F	2/2	---	52400	54900 J - 75800 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	0.6 J	0.6 J	ug/L	13SW3002-F	1/2	0.3	0.6	ND	11 N	100 100	FED-MCL IDEM	No	BSL
7440-48-4	Cobalt, Filtered	2.8 J	2.8 J	ug/L	13SW3001-F	1/2	0.088	2.8	0.16 J - 3.2 J	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper, Filtered	1.2 J	1.5 J	ug/L	13SW3001-F	2/2	---	1.5	1 J - 1.6 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-95-4	Magnesium, Filtered	8840 J	9090 J	ug/L	13SW3001-F	2/2	---	9090	9630 J - 15700	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese, Filtered	23 J	23 J	ug/L	13SW3001-F	1/2	3	23	4.9 J - 6.1 J	88 N	NA NA	NA NA	No	BSL
7440-02-0	Nickel, Filtered	1.4	1.4	ug/L	13SW3001-F	1/2	0.84	1.4	0.87 J - 1.8	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium, Filtered	6780 J	15100 J	ug/L	13SW3001-F	2/2	---	15100	2470 J - 3550 J	NA	NA NA	NA NA	No	NUT
7440-23-5	Sodium, Filtered	9830 J	18700 J	ug/L	13SW3002-F	2/2	---	18700	33800 J - 35700 J	NA	NA NA	NA NA	No	NUT
7440-32-6	Titanium, Filtered	0.6 J	0.6 J	ug/L	13SW3001-F	1/1	---	0.6	0.22 J	15000 N	NA NA	NA NA	No	BSL

TABLE 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Mainstream Surface Water

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Miscellaneous Parameters (mg/L)														
	Nitrite/Nitrate-N	0.26	0.28	mg/L	13SW3301	2/5	0.025	0.28	ND	1 N	1	FED-MCL[8]	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD31 (samples 13SW3101 and 13SW3102).
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) is presented.
9 - The MCL for Nitrite (as N) is presented.

Associated Samples

13SW3001	13SW3301
13SW3001-F	13SW3401
13SW3002	13SW3501
13SW3002-F	13SW3501-D

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Semivolatile Organic Compounds														
79-01-6	Benzo(a)anthracene	0.2 J	0.22	ug/L	13SW0601	2/5	0.049 - 0.05	0.22	NA	0.092 C	1.2	NA	Yes	ASL
												NA		
99-35-4	Benzo(a)pyrene	0.26	0.27 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.27	NA	0.0092 C	0.2	FED-MCL	Yes	ASL
												IDEM		
99-65-0	Benzo(b)fluoranthene	0.38	0.4 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.4	NA	0.092 C	1.2	NA	Yes	ASL
												NA		
118-96-7	Benzo(g,h,i)perylene	0.22 J	0.23	ug/L	13SW0601	2/5	0.049 - 0.05	0.23	NA	18 N	0.26	NA	No	BSL
												NA		
6629-29-4	Benzo(k)fluoranthene	0.19 J	0.2	ug/L	13SW0601	2/5	0.049 - 0.05	0.2	NA	0.92 C	0.8	NA	No	BSL
												NA		
121-14-2	Chrysene	0.33 J	0.35	ug/L	13SW0601	2/5	0.049 - 0.05	0.35	NA	9.2 C	1.6	NA	No	BSL
												NA		
59229-75-3	Fluoranthene	0.77 J	0.96	ug/L	13SW0601	2/5	0.049 - 0.05	0.96	NA	150 N	210	NA	No	BSL
												NA		
606-20-2	Indeno(1,2,3-cd)pyrene	0.2	0.21 J	ug/L	13SW3201	2/5	0.049 - 0.05	0.21	NA	0.092 C	0.022	NA	Yes	ASL
35572-78-2	Phenanthrene	0.32 J	0.51	ug/L	13SW0601	2/5	0.049 - 0.05	0.51	NA	18 N	23	NA	No	BSL
												NA		
35572-78-2	Pyrene	0.58 J	0.65	ug/L	13SW0601	2/5	0.049 - 0.05	0.65	NA	18 N	140	NA	No	BSL
												NA		
Energetics														
118-96-7	2,4,6-Trinitrotoluene	0.42 J	6.8	ug/L	13SW1301	5/34	0.21 - 0.65	6.8	NA	1.8 N	NA	NA	Yes	ASL
											NA	NA		
6629-29-4	2,4-Diamino-6-Nitrotoluene	0.44 J	0.44 J	ug/L	13SW1302	1/21	0.24 - 0.287	0.44	NA	NA	NA	NA	No	NTX
											NA	NA		
35572-78-2	2-Amino-4,6-Dinitrotoluene	0.26 J	8.3 J	ug/L	13SW1302	11/33	0.24 - 0.65	8.3	NA	0.73 N	NA	NA	Yes	ASL
											NA	NA		
99-08-1	3-Nitrotoluene	0.29 J	0.31 J	ug/L	13SW1302	2/34	0.21 - 0.65	0.31	NA	12 N	NA	NA	No	BSL
											NA	NA		
19406-51-0	4-Amino-2,6-Dinitrotoluene	0.46 J	21 J	ug/L	13SW1302	14/34	0.24 - 0.65	21	NA	0.73 N	NA	NA	Yes	ASL
											NA	NA		
TTNUS498	DNX	0.59 J	35	ug/L	13SW1102	10/21	0.24 - 0.27	35	NA	NA	NA	NA	No	NTX
											NA	NA		
2691-41-0	HMX	0.67	730	ug/L	13SW1102	21/34	0.24 - 0.65	730	NA	180 N	NA	NA	Yes	ASL
											NA	NA		
TTNUS232	MNX	1.2	72	ug/L	13SW1102	10/21	0.24 - 0.27	72	NA	NA	NA	NA	No	NTX
											NA	NA		
121-82-4	RDX	0.29 J	5500	ug/L	13SW1102	25/34	0.24 - 0.6	5500	NA	0.61 C	NA	NA	Yes	ASL
											NA	NA		
TTNUS337	TNX	0.48 J	4	ug/L	13SW1102, 13SW1501	7/21	0.24 - 0.27	4	NA	NA	NA	NA	No	NTX
											NA	NA		
Herbicides (ug/L)														
87-66-5	Pentachlorophenol	0.025 J	0.091	ug/L	13SW0401	2/3	0.013	0.091	NA	0.56 C	1	FED-MCL	No	BSL
											1	IDEM		

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[5]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Total Metals														
7429-90-5	Aluminum	108 J	19100 J	ug/L	13SW0701	28/33	41.9 - 106	19100	486 J - 1770 J	3600 N	NA NA	NA NA	Yes	ASL
7440-38-2	Arsenic	0.85 J	35.7 J	ug/L	13SW1101	15/33	0.11 - 0.97	35.7	0.8 J	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
7440-39-3	Barium	25.3 J	247 J	ug/L	13SW0701	33/33	---	247	58.1 J - 58.2 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-43-9	Cadmium	1.3 J	1.3 J	ug/L	13SW0102	1/33	0.039 - 0.56	1.3	ND	1.8 N	5 5	FED-MCL IDEM	No	BSL
7440-70-2	Calcium	3040 J	133000 J	ug/L	13SW0701	33/33	---	133000	5060 J - 6550 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium	1 J	20.5 J	ug/L	13SW0701	17/33	0.19 - 1	20.5	0.82 J - 2.2 J	11 N	100 100	FED-MCL IDEM	Yes	ASL
7440-48-4	Cobalt	0.47 J	9.4 J	ug/L	13SW1101	18/33	0.07 - 0.72	9.4	ND	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper	0.89 J	27.1 J	ug/L	13SW1101	30/33	0.38 - 0.89	27.1	1.3 J - 2.2 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	Iron	152 J	16200 J	ug/L	13SW0701	26/33	34.7 - 162	16200	415 J - 1600 J	1100 N	NA NA	NA NA	Yes	ASL
7439-92-1	Lead	1.3 J	137 J	ug/L	13SW0102	14/33	0.07 - 1.6	137	ND	NA	15 15	FED-MCL[8] IDEM	Yes	ASL
7439-93-2	Lithium	2.8 J	14.3 J	ug/L	13SW0701	8/13	1.3 - 2.2	14.3	NA	73 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium	836 J	92200 J	ug/L	13SW1101	32/33	14200	92200	2830 J - 3600 J	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese	7.5 J	3190 J	ug/L	13SW0802	32/33	9.4	3190	60.1 J - 122 J	88 N	NA NA	NA NA	Yes	ASL
7439-97-6	Mercury	0.047 J	0.047 J	ug/L	13SW1501	1/33	0.007 - 0.2	0.047	ND	1.1 N	2 2	FED-MCL IDEM	No	BSL
7440-02-0	Nickel	0.67 J	22 J	ug/L	13SW1501	32/33	2	22	2.3 J	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium	621 J	690000 J	ug/L	13SW1101	33/33	---	690000	1800 J - 2920 J	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium	2 J	2 J	ug/L	13SW1101	1/33	0.04 - 0.62	2	ND	18 N	50 50	FED-MCL IDEM	No	BSL
7440-23-5	Sodium	2260 J	325000 J	ug/L	13SW0701	33/33	---	325000	1540 J	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium	48 J	245 J	ug/L	13SW0701	13/13	---	245	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium	1.3 J	356 J	ug/L	13SW0701	30/31	0.73	356	10.1 J	15000 N	NA NA	NA NA	No	BSL
7440-62-2	Vanadium	0.42 J	43.5 J	ug/L	13SW1101	25/33	0.11 - 0.61	43.5	0.89 J - 2.9	3.6 N	NA NA	NA NA	Yes	ASL
7440-66-6	Zinc	6.8 J	269 J	ug/L	13SW0102	25/33	2.1 - 13.1	269	8.8 J	1100 N	NA 11000	NA IDEM	No	BSL

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Dissolved Metals														
7429-90-5	Aluminum, Filtered	52.7 J	822	ug/L	13SW0901-F	18/33	7.6 - 52.8	822	254 J - 938 J	3600 N	NA NA	NA NA	No	BSL
7440-38-2	Arsenic, Filtered	0.64 J	35.3 J	ug/L	13SW1101-F	8/33	0.09 - 0.73	35.3	ND	0.045 C	10 50	FED-MCL IDEM	Yes	ASL
7440-39-3	Barium, Filtered	10.1 J	149 J	ug/L	13SW0701-F	33/33	---	149	51.7 J - 54.1 J	260 N	2000 2000	FED-MCL IDEM	No	BSL
7440-70-2	Calcium, Filtered	5660 J	121000 J	ug/L	13SW0701-F	33/33	---	121000	5120 J - 6680 J	NA	NA NA	NA NA	No	NUT
7440-47-3	Chromium, Filtered	2 J	2 J	ug/L	13SW1101-F	1/33	0.13 - 1.5	2	1 J	11 N	100 100	FED-MCL IDEM[10]	No	BSL
7440-48-4	Cobalt, Filtered	0.6 J	8.8 J	ug/L	13SW1101-F	20/33	0.088 - 0.7	8.8	0.79 J	73 N	NA NA	NA NA	No	BSL
7440-50-8	Copper, Filtered	0.57 J	26.4 J	ug/L	13SW1101-F	28/33	0.3 - 1.2	26.4	1.5 J	150 N	1300 1300	FED-MCL[8] IDEM	No	BSL
7439-89-6	Iron, Filtered	35.7 J	1120 J	ug/L	13SW0802-F	15/33	6.15 - 122	1120	155 J - 645 J	1100 N	NA NA	NA NA	Yes	ASL
7439-92-1	Lead, Filtered	1.1 J	1.1 J	ug/L	13SW0102-F	1/33	0.02 - 0.38	1.1	ND	15	15 15	FED-MCL[8] IDEM	No	BSL
7439-93-2	Lithium, Filtered	3.1 J	5.5 J	ug/L	13SW1001-F	3/13	0.37 - 1.5	5.5	NA	73 N	NA NA	NA NA	No	BSL
7439-95-4	Magnesium, Filtered	3440 J	92900 J	ug/L	13SW1101-F	32/33	13700	92900	2740 J - 3770 J	NA	NA NA	NA NA	No	NUT
7439-96-5	Manganese, Filtered	2.9 J	3110 J	ug/L	13SW0802-F	30/33	2.1 - 10.7	3110	112 J	88 N	NA NA	NA NA	Yes	ASL
7440-02-0	Nickel, Filtered	0.58 J	18.6 J	ug/L	13SW1101-F	28/33	0.55 - 1.5	18.6	1.8 J	73 N	NA NA	NA NA	No	BSL
7440-09-7	Potassium, Filtered	600 J	700000 J	ug/L	13SW1101-F	33/33	---	700000	1850 J - 2700 J	NA	NA NA	NA NA	No	NUT
7782-49-2	Selenium, Filtered	2.2 J	2.2 J	ug/L	13SW1101-F	1/33	0.04 - 0.59	2.2	ND	18 N	NA 50	NA IDEM	No	BSL
7440-23-5	Sodium, Filtered	2920 J	311000 J	ug/L	13SW0701-F	33/33	---	311000	1660 J	NA	NA NA	NA NA	No	NUT
7440-24-6	Strontium, Filtered	45.5 J	219 J	ug/L	13SW0701-F	13/13	---	219	NA	2200 N	NA NA	NA NA	No	BSL
7440-32-6	Titanium, Filtered	0.1 J	19.5 J	ug/L	13SW0901-F	26/31	0.34 - 1.1	19.5	5.3 J	15000 N	NA NA	NA NA	No	BSL
7440-62-2	Vanadium, Filtered	0.44 J	38.5 J	ug/L	13SW1101-F	9/33	0.06 - 1.14	38.5	ND	3.6 N	NA NA	NA NA	Yes	ASL
7440-66-6	Zinc, Filtered	3.4 J	54.5 J	ug/L	13SW0902-F	18/33	2.1 - 16	54.5	18.6 J	1100 N	NA 11000	NA IDEM	No	BSL

TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SURFACE WATER
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations[4]	Screening Toxicity Value[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Miscellaneous Parameters (mg/L)														
	Ammonia-N	0.01	3.4	mg/L	13SW1101	18/31	0.005 - 0.01	3.4	ND	NA	NA NA	NA NA	No	NTX
	Nitrite/Nitrate-N	0.14	200	mg/L	13SW2401	23/34	0.02 - 0.13	200	4	1 N	1 NA	FED-MCL[8] NA	Yes	ASL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD28 (samples 13SW2801 and 13SW2802).
5 - The USEPA Region IX tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region IX, October 2004).
6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004).
Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for groundwater (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and its respective site background value. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) is presented.
9 - The MCL for Nitrite (as N) is presented.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient
NTX = No Toxicity Data

Associated Samples

13SW0101	13SW0701-F	13SW1002	13SW1401-F-D	13SW2201-F	13SW1101
13SW0101-F	13SW0702	13SW1002-F	13SW1402	13SW2202	13SW1101-F
13SW0102	13SW0702-F	13SW1201	13SW1501	13SW2202-F	13SW1102
13SW0102-F	13SW0801	13SW1201-F	13SW1501-F	13SW2401	13SW1102-F
13SW0201	13SW0801-F	13SW1202	13SW1502	13SW2401-F	13SW3001
13SW0201-F	13SW0802	13SW1202-F	13SW1601	13SW2501	13SW3001-F
13SW0301	13SW0802-F	13SW1301	13SW1601-F	13SW2501-D	13SW3002
13SW0301-F	13SW0901	13SW1301-F	13SW1602	13SW2501-F	13SW3002-F
13SW0401	13SW0901-F	13SW1302	13SW1801	13SW2501-F-D	13SW3301
13SW0401-F	13SW0902	13SW1302-D	13SW1801-F	13SW2601	13SW3401
13SW0501	13SW0902-F	13SW1302-F	13SW1901	13SW2601-F	13SW3501
13SW0501-F	13SW1001	13SW1302-F-D	13SW1901-F	13SW2701	13SW3501-D
13SW0601	13SW1001-D	13SW1401	13SW2001	13SW2701-F	
13SW0601-F	13SW1001-F	13SW1401-D	13SW2001-F	13SW2901	
13SW0701	13SW1001-F-D	13SW1401-F	13SW2201	13SW3201	

TABLE 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - MAINSTREAM SEDIMENT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Mainstream Sediment

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations[4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Inorganics														
7429-90-5	Aluminum	11500 J	13700 J	mg/kg	13SD3501	5/5	---	13700	14400 J - 22100 J	7600 N	NA	NA	Yes	ASL
7440-36-0	Antimony	1.9 J	4.7 J	mg/kg	13SD3001	5/5	---	4.7	1.8 J - 2.1 J	3.1 N	140	IDEM	Yes	ASL
7440-38-2	Arsenic	23.9 J	56.9 J	mg/kg	13SD3001	5/5	---	56.9	25.6 J - 33.3 J	0.39 C	3.9	IDEM	Yes	ASL
7440-39-3	Barium	77.4 J	207 J	mg/kg	13SD3002	5/5	---	207	90.8 J - 137 J	540 N	23000	IDEM	No	BSL
7440-41-7	Beryllium	1.9 J	3.7 J	mg/kg	13SD3001	5/5	---	3.7	2 J - 2.3 J	15 N	680	IDEM	No	BSL
7440-43-9	Cadmium	9.4 J	17.1 J	mg/kg	13SD3001	5/5	---	17.1	1.8 J - 4.3 J	3.7 N	12	IDEM	Yes	ASL
7440-70-2	Calcium	1290 J	12200 J	mg/kg	13SD3501	5/5	---	12200	2010 J - 2500 J	NA	NA	NA	No	NUT
7440-47-3	Chromium	51.7 J	192 J	mg/kg	13SD3001	5/5	---	192	49.1 J - 77.2 J	210 C	430[8]	IDEM	No	BSL
7440-48-4	Cobalt	19 J	29.9 J	mg/kg	13SD3501	5/5	---	29.9	20.4 J - 27.5 J	140 N[9]	NA	NA	No	BSL
7440-50-8	Copper	16.4 J	18.4 J	mg/kg	13SD3002	5/5	---	18.4	18.4 J - 22 J	310 N	13000	IDEM	No	BSL
7439-89-6	Iron	89600 J	299000 J	mg/kg	13SD3001	5/5	---	299000	120000 J - 121000 J	2300 N	NA	NA	Yes	ASL
7439-92-1	Lead	25.6 J	45.6 J	mg/kg	13SD3001	5/5	---	45.6	20.6 J - 25.2 J	400	400	IDEM	No	BSL
7439-95-4	Magnesium	610 J	2110 J	mg/kg	13SD3501	5/5	---	2110	1490 J - 1940 J	NA	NA	NA	No	NUT
7439-96-5	Manganese	1450 J	3960 J	mg/kg	13SD3002	5/5	---	3960	1250 J - 1330 J	180 N	NA	NA	Yes	ASL
7439-97-6	Mercury	0.016 J	0.016 J	mg/kg	13SD3001	1/5	0.026 - 0.044	0.016	0.021 J	2.3 N	100	IDEM	No	BSL
7440-02-0	Nickel	35.8 J	47.8 J	mg/kg	13SD3002	5/5	---	47.8	41.5 J - 54.1 J	160 N	6900	IDEM	No	BSL
7440-09-7	Potassium	452 J	1680 J	mg/kg	13SD3501	5/5	---	1680	2080 J - 3190 J	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.62 J	1.5 J	mg/kg	13SD3401	5/5	---	1.5	0.48 J - 0.85 J	39 N	1700	IDEM	No	BSL
7440-23-5	Sodium	91.1 J	298 J	mg/kg	13SD3301	3/5	28.4 - 77.4	298	92.3 J - 126 J	NA	NA	NA	No	NUT
7440-32-6	Titanium	65.6 J	65.6 J	mg/kg	13SD3001	1/1	---	65.6	26.4 J	31000 N[10]	NA	NA	No	BSL
7440-62-2	Vanadium	48.3 J	101 J	mg/kg	13SD3001	5/5	---	101	47.6 J - 61.6 J	7.8 N	NA	NA	Yes	ASL
7440-66-6	Zinc	121 J	195 J	mg/kg	13SD3301	5/5	---	195	73.1 J - 98.3 J	2300 N	100000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

Footnotes

1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD31 (samples 13SD3101 and 13SD3102).
3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The PRG for residential land use for total chromium is presented.
9 - Value is for hexavalent chromium.
10 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG. The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

13SD3001	13SD3501
13SD3002	13SD3101
13SD3301	13SD3102
13SD3401	

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:

For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient

TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SEDIMENT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]
Semi-Volatile Organic Compounds														
91-57-6	2-Methylnaphthalene	6 J	6 J	ug/kg	13SD2501	1/5	3.9 - 4.4	6	NA	5600 N[8]	3200000	IDEM	No	BSL
83-32-9	Acenaphthene	24	43 J	ug/kg	13SD0501	2/5	4.1 - 4.4	43	NA	370000 N	9500000	IDEM	No	BSL
120-12-7	Anthracene	72	88	ug/kg	13SD0501	2/5	4.1 - 4.4	88	NA	2200000 N	47000000	IDEM	No	BSL
56-55-3	Benzo(a)anthracene	10	330	ug/kg	13SD0501	5/5	---	330	NA	620 C	5000	IDEM	No	BSL
50-32-8	Benzo(a)pyrene	12	390 J	ug/kg	13SD0601	5/5	---	390	NA	62 C	500	IDEM	Yes	ASL
205-99-2	Benzo(b)fluoranthene	18	460 J	ug/kg	13SD0601	5/5	---	460	NA	620 C	5000	IDEM	No	BSL
191-24-2	Benzo(g,h,i)perylene	10	380 J	ug/kg	13SD0601	5/5	---	380	NA	230000 N[9]	50000	IDEM	No	BSL
207-08-9	Benzo(k)fluoranthene	7 J	250 J	ug/kg	13SD0501	5/5	---	250	NA	6200 C	50000	IDEM	No	BSL
218-01-9	Chrysene	15	430 J	ug/kg	13SD0601	5/5	---	430	NA	62000 C	500000	IDEM	No	BSL
84-74-2	di-n-Butyl Phthalate	86 J	86 J	ug/kg	13SD0601	1/3	83 - 87	86	NA	610000 N	18000000	IDEM	No	BSL
117-84-0	di-n-Octyl Phthalate	100 J	100 J	ug/kg	13SD0601	1/3	83 - 87	100	NA	240000 N	3700000	IDEM	No	BSL
53-70-3	Dibenzo(a,h)anthracene	66 J	74 J	ug/kg	13SD0601	2/5	4.1 - 4.4	74	NA	62 C	500	IDEM	Yes	ASL
206-44-0	Fluoranthene	29	860	ug/kg	13SD0501	5/5	---	860	NA	230000 N	6300000	IDEM	No	BSL
86-73-7	Fluorene	33	42 J	ug/kg	13SD0501	2/5	4.1 - 4.4	42	NA	270000 N	6300000	IDEM	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	8 J	290 J	ug/kg	13SD0601	5/5	---	290	NA	620 C	5000	IDEM	No	BSL
91-20-3	Naphthalene	6 J	6 J	ug/kg	13SD0501, 13SD0601	2/5	4.1 - 4.4	6	NA	5600 N	3200000	IDEM	No	BSL
85-01-8	Phenanthrene	17	620	ug/kg	13SD0601	5/5	---	620	NA	230000 N[9]	470000	IDEM	No	BSL
129-00-0	Pyrene	25	1300 J	ug/kg	13SD0601	5/5	---	1300	NA	230000 N	4700000	IDEM	No	BSL
Energetics														
2691-41-0	HMX	0.8 J	1.9 J	mg/kg	13SD1101	2/28	0.25	1.9	NA	310 N	NA	NA	No	BSL
121-82-4	RDX	0.44 J	2.2	mg/kg	13SD1101	3/28	0.25	2.2	NA	4.4 C	NA	NA	No	BSL
Herbicides														
87-86-5	Pentachlorophenol	2.1 J	2.1 J	ug/kg	13SD0601	1/3	0.56 - 0.58	2.1	NA	3000 C	20000	IDEM	No	BSL
Inorganics														
7429-90-5	Aluminum	1480	18500	mg/kg	13SD2201	30/30	---	18500	13400 J - 17100 J	7600 N	NA	NA	Yes	ASL
7440-36-0	Antimony	0.8 J	2.3 J	mg/kg	13SD2401	10/30	0.13 - 0.55	2.3	0.98 J - 1.1 J	3.1 N	140	IDEM	No	BSL
7440-38-2	Arsenic	3.7 J	58.2 J	mg/kg	13SD2401	29/30	0.53	58.2	22.2 J - 28.7 J	0.39 C	3.9	IDEM	Yes	ASL
7440-39-3	Barium	28.5 J	693 J	mg/kg	13SD0102	30/30	---	693	129 J - 199 J	540 N	23000	IDEM	Yes	ASL
7440-41-7	Beryllium	0.53 J	4.3 J	mg/kg	13SD2201	26/30	0.18 - 0.65	4.3	2 J - 2.1 J	15 N	680	IDEM	No	BSL
7440-43-9	Cadmium	0.41 J	4.1 J	mg/kg	13SD1301	20/30	0.17 - 0.45	4.1	0.59 J - 0.63 J	3.7 N	12	IDEM	Yes	ASL
7440-70-2	Calcium	766 J	89700 J	mg/kg	13SD1301	30/30	---	89700	799 J - 845 J	NA	NA	NA	No	NUT
7440-47-3	Chromium	7.9 J	228 J	mg/kg	13SD2401	30/30	---	228	38.7 J - 55 J	210 C[10]	430[11]	IDEM	Yes	ASL
7440-48-4	Cobalt	1.8 J	107 J	mg/kg	13SD1901	30/30	---	107	31.3 J - 40.7 J	140 N[12]	NA	NA	No	BSL
7440-50-8	Copper	7 J	52.1 J	mg/kg	13SD0101	30/30	---	52.1	17.3 J - 27.8 J	310 N	13000	IDEM	No	BSL
7439-89-6	Iron	1990 J	195000 J	mg/kg	13SD2401	30/30	---	195000	93700 J - 112000 J	2300 N	NA	NA	Yes	ASL
7439-92-1	Lead	4.2 J	521 J	mg/kg	13SD0102	30/30	---	521	35.7 J - 37.2 J	400	400	IDEM	Yes	ASL
7439-93-2	Lithium	2.1 J	38.8 J	mg/kg	13SD1901	23/23	---	38.8	NA	160 N	NA	NA	No	BSL
7439-95-4	Magnesium	292 J	7540 J	mg/kg	13SD0701	30/30	---	7540	1470 J - 1580 J	NA	NA	NA	No	NUT
7439-96-5	Manganese	65.3 J	6130 J	mg/kg	13SD1201	30/30	---	6130	2570 J - 3240 J	180 N	NA	NA	Yes	ASL
7439-97-6	Mercury	0.013 J	0.16 J	mg/kg	13SD0101	19/30	0.01 - 0.076	0.16	0.026 J	2.3 N	100	IDEM	No	BSL
7440-02-0	Nickel	7.9 J	83.9 J	mg/kg	13SD2201	30/30	---	83.9	33.5 J - 36.6 J	160 N	6900	IDEM	No	BSL
7440-09-7	Potassium	252 J	2390 J	mg/kg	13SD1501	30/30	---	2390	1340 J - 2000 J	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.18 J	1.1 J	mg/kg	13SD2401	22/30	0.02 - 0.37	1.1	0.56 J - 0.61 J	39 N	1700	IDEM	No	BSL
7440-23-5	Sodium	31.7 J	334 J	mg/kg	13SD0701	5/30	21.8 - 126	334	31.6 J - 183 J	NA	NA	NA	No	NUT
7440-24-6	Strontium	4.1 J	77.1 J	mg/kg	13SD1101	23/23	---	77.1	NA	4700 N	NA	NA	No	BSL
7440-31-5	Tin	0.52 J	12 J	mg/kg	13SD1201	9/30	0.3 - 0.64	12	ND	4700 N	NA	NA	No	BSL
7440-32-6	Titanium	13.8 J	164 J	mg/kg	13SD2401	28/28	---	164	40.9 J	31000 N[13]	NA	NA	No	BSL
7440-62-2	Vanadium	11.8 J	144 J	mg/kg	13SD2401	30/30	---	144	46.2 J - 53.8 J	7.8 N	NA	NA	Yes	ASL
7440-66-6	Zinc	7.9 J	541 J	mg/kg	13SD0101	25/30	33.4 - 386	541	72.8 J - 79.7 J	2300 N	100000	IDEM	No	BSL

Shaded cell indicates that the maximum concentration exceeds the specified criterion or that the chemical is selected as a COPC.

TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GULLY SEDIMENT
SWMU 13 (MINE FIELD B)
NSWC CRANE
CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment in Gullies

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Location of Maximum Concentration	Frequency of Detection	Range of Nondects[2]	Concentration Used for Screening[3]	Upgradient Sample Concentrations [4]	EPA Region 9 PRG (Residential)[5]	Potential ARAR/TBC[6]	Potential ARAR/TBC Source[6]	COPC Flag	Rationale for Contaminant Deletion or Selection[7]

Footnotes
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Concentrations at upgradient location 13SW/SD28 (samples 13SD2801 and 13SD2802).
3 - USEPA Region IX Preliminary Remediation Goal (PRG). The noncarcinogenic values (denoted with a "N" flag) are the PRG divided by 10 to correspond to a target hazard quotient of 0.1. Carcinogenic values represent an incremental cancer risk of 1.0E-06 (carcinogens denoted with a "C" flag) (USEPA Region IX, October 2004, Updated December 28, 2004).
6 - Indiana Department of Environmental Management, Risk Integrated System of Closure (RISC) residential closure levels for soil (IDEM, January 2004).
7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level and is statistically determined to be above site background. Chemicals selected as COPCs are indicated by shaded chemical names.
8 - The value for naphthalene is used as a surrogate for 2-methylnaphthalene.
9 - The value for pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
10 - The PRG for residential land use for total chromium is presented.
11 - Value is for hexavalent chromium.
12 - One tenth of the noncarcinogenic PRG is less than the carcinogenic PRG, therefore the one tenth noncarcinogenic PRG is presented.
13 - The printed PRG table lists a ceiling limit of 100,000 mg/kg as the PRG.
The value presented is 1/10 of the actual risk-based PRG presented in the electronic version of the PRG table.

Associated Samples

13SD0101	13SD0901	13SD1801	13SD2701
13SD0102	13SD1001	13SD1901	13SD2901
13SD0201	13SD1101	13SD2001	13SD2901-D
13SD0301	13SD1201	13SD2101	13SD3201
13SD0401	13SD1301	13SD2201	
13SD0501	13SD1401	13SD2202	
13SD0501-D	13SD1501	13SD2301	
13SD0601	13SD1601	13SD2401	
13SD0701	13SD1701	13SD2501	
13SD0801	13SD1701-D	13SD2601	

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available
ND = Not detected.
PRG = Preliminary Remediation Goal

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level

For elimination as a COPC:
BKG = Below Background
BSL = Below Screening Level
NUT = Essential Nutrient

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE SOIL - BUILDING 166 AREA
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,3,7,8-TCDD TEQ	mg/kg	2.86E-06	NA	6.93E-06		mg/kg	6.93E-06	Maximum	N < 10 (1)	6.93E-06	Maximum	N < 10 (1)
Benzo(a)anthracene	mg/kg	1.00E-02	NA	3.20E-02		mg/kg	3.20E-02	Maximum	N < 10	3.20E-02	Maximum	N < 10
Benzo(a)pyrene	mg/kg	1.29E-02	NA	4.20E-02		mg/kg	4.20E-02	Maximum	N < 10	4.20E-02	Maximum	N < 10
Benzo(b)fluoranthene	mg/kg	1.80E-02	NA	5.80E-02		mg/kg	5.80E-02	Maximum	N < 10	5.80E-02	Maximum	N < 10
Indeno(1,2,3-cd)pyrene	mg/kg	8.38E-03	NA	2.60E-02		mg/kg	2.60E-02	Maximum	N < 10	2.60E-02	Maximum	N < 10
Aroclor-1248	mg/kg	4.72E+00	NA	4.60E+01	J	mg/kg	4.60E+01	Maximum	N < 10	4.60E+01	Maximum	N < 10

1 - Dataset consists of less than 10 samples. Therefore, the maximum concentration is used as the EPC.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE/SUBSURFACE SOIL - BUILDING 166 AREA
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,3,7,8-TCDD TEQ	mg/kg	2.55E-06	4.13E-06	9.74E-06		mg/kg	6.03E-06	95% UCL-CMV	ProUCL (1)	6.03E-06	95% UCL-CMV	ProUCL (1)
Benzo(a)anthracene	mg/kg	6.02E-03	1.10E-02	3.20E-02		mg/kg	1.82E-02	95% UCL-CMS	ProUCL	1.82E-02	95% UCL-CMS	ProUCL
Benzo(a)pyrene	mg/kg	7.44E-03	1.42E-02	4.20E-02		mg/kg	4.20E-02	Maximum	(2)	4.20E-02	Maximum	(2)
Benzo(b)fluoranthene	mg/kg	9.98E-03	1.94E-02	5.80E-02		mg/kg	5.80E-02	Maximum	(2)	5.80E-02	Maximum	(2)
Indeno(1,2,3-cd)pyrene	mg/kg	5.19E-03	9.17E-03	2.60E-02		mg/kg	1.49E-02	95% UCL-CMS	ProUCL	1.49E-02	95% UCL-CMS	ProUCL
Aroclor-1248	mg/kg	3.90E+00	7.18E+00	4.60E+01	J	mg/kg	2.31E+01	99% UCL-CMS	ProUCL	2.31E+01	99% UCL-CMS	ProUCL

Definitions:
95 % UCL-CMV = 95% Chebyshev (MVUE) UCL (lognormal).
95 % UCL-CMS = 95% Chebyshev (Mean, Std) UCL (non-parametric).
99 % UCL-CMS = 99% Chebyshev (Mean, Std) UCL (non-parametric).

1 - EPC statistic is recommended by U.S. EPA's ProUCL software.
2 - UCL is greater than the maximum concentration. Therefore, the maximum concentration is used as the EPC.

TABLE 3.3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE/SUBSURFACE SOIL - BUILDING 166 - HISTORICAL DATA

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / SubSurface Soil
Exposure Point: Building 166

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,4,6-Trinitrotoluene	mg/kg	1.89E+00	NA	5.70E+01	D	mg/kg	1.89E+00	Average	(1)	1.89E+00	Average	(1)
2-Amino-4,6-dinitrotoluene	mg/kg	4.00E-01	NA	1.50E+02	J	mg/kg	4.00E-01	Average	(1)	4.00E-01	Average	(1)
4-Amino-2,6-dinitrotoluene	mg/kg	4.49E-01	NA	3.03E+02		mg/kg	4.49E-01	Average	(1)	4.49E-01	Average	(1)
HMX	mg/kg	1.44E+00	NA	5.39E+03		mg/kg	1.44E+00	Average	(1)	1.44E+00	Average	(1)
RDX	mg/kg	1.96E+00	NA	2.90E+02		mg/kg	1.96E+00	Average	(1)	1.96E+00	Average	(1)
Aluminum	mg/kg	1.43E+04	NA	5.85E+04		mg/kg	1.43E+04	Average	(1)	1.43E+04	Average	(1)
Arsenic	mg/kg	7.44E+00	NA	6.47E+01		mg/kg	7.44E+00	Average	(1)	7.44E+00	Average	(1)
Barium	mg/kg	7.49E+01	NA	1.16E+03	J	mg/kg	7.49E+01	Average	(1)	7.49E+01	Average	(1)
Mercury	mg/kg	2.11E-01	NA	8.90E+00		mg/kg	2.11E-01	Average	(1)	2.11E-01	Average	(1)

1 - Weighted average was used as the EPC for historical and bioremediated samples (See Section 7.3.3 of text).

TABLE 3.4
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE SOIL - BUILDING 171 AREA
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,3,7,8-TCDD TEQ	mg/kg	3.56E-06	NA	1.51E-05		mg/kg	1.51E-05	Maximum	N < 10 (1)	1.51E-05	Maximum	N < 10 (1)
Benzo(a)anthracene	mg/kg	1.88E-01	NA	1.10E+00	J	mg/kg	1.10E+00	Maximum	N < 10	1.10E+00	Maximum	N < 10
Benzo(a)pyrene	mg/kg	1.71E-01	NA	1.00E+00	J	mg/kg	1.00E+00	Maximum	N < 10	1.00E+00	Maximum	N < 10
Benzo(b)fluoranthene	mg/kg	1.90E-01	NA	1.10E+00	J	mg/kg	1.10E+00	Maximum	N < 10	1.10E+00	Maximum	N < 10
Dibenzo(a,h)anthracene	mg/kg	3.50E-02	NA	2.00E-01	J	mg/kg	2.00E-01	Maximum	N < 10	2.00E-01	Maximum	N < 10
Indeno(1,2,3-cd)pyrene	mg/kg	1.12E-01	NA	6.50E-01	J	mg/kg	6.50E-01	Maximum	N < 10	6.50E-01	Maximum	N < 10
Aroclor-1248	mg/kg	2.41E+01	NA	1.60E+02		mg/kg	1.60E+02	Maximum	N < 10	1.60E+02	Maximum	N < 10

1 - Dataset consists of less than 10 samples. Therefore, the maximum concentration is used as the EPC.

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE/SUBSURFACE SOIL - BUILDING 171 AREA
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,3,7,8-TCDD TEQ	mg/kg	2.67E-06	5.01E-06	1.51E-05		mg/kg	5.35E-06	95% UCL-CMV	ProUCL (1)	5.35E-06	95% UCL-CMV	ProUCL (1)
Benzo(a)anthracene	mg/kg	1.03E-01	2.84E-01	1.10E+00	J	mg/kg	1.10E+00	99% UCL-CMS	ProUCL	1.10E+00	99% UCL-CMS	ProUCL
Benzo(a)pyrene	mg/kg	9.42E-02	2.58E-01	1.00E+00	J	mg/kg	9.95E-01	99% UCL-CMS	ProUCL	9.95E-01	99% UCL-CMS	ProUCL
Benzo(b)fluoranthene	mg/kg	1.05E-01	2.85E-01	1.10E+00	J	mg/kg	1.10E+00	99% UCL-CMS	ProUCL	1.10E+00	99% UCL-CMS	ProUCL
Dibenzo(a,h)anthracene	mg/kg	2.00E-02	5.26E-02	2.00E-01	J	mg/kg	1.99E-01	99% UCL-CMS	ProUCL	1.99E-01	99% UCL-CMS	ProUCL
Indeno(1,2,3-cd)pyrene	mg/kg	6.20E-02	1.69E-01	6.50E-01	J	mg/kg	6.47E-01	99% UCL-CMS	ProUCL	6.47E-01	99% UCL-CMS	ProUCL
Aroclor-1248	mg/kg	1.52E+01	2.56E+01	2.10E+02		mg/kg	7.71E+01	99% UCL-CMS	ProUCL	7.71E+01	99% UCL-CMS	ProUCL

Definitions:
95 % UCL-CMV = 95% Chebyshev (MVUE) UCL (lognormal).
99 % UCL-CMS = 99% Chebyshev (Mean, Std) UCL (non-parametric).

1 - EPC statistic is recommended by U.S. EPA's ProUCL software.
2 - UCL is greater than the maximum concentration. Therefore, the maximum concentration is used as the EPC.

TABLE 3.6

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SURFACE/SUBSURFACE SOIL - BUILDING 171 - HISTORICAL DATA

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface / Subsurface Soil
Exposure Medium: Surface / SubSurface Soil
Exposure Point: Building 171

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2,4,6-Trinitrotoluene	mg/kg	5.32E-01	NA	5.70E+01	D	mg/kg	5.32E-01	Average	(1)	5.32E-01	Average	(1)
2-Amino-4,6-dinitrotoluene	mg/kg	3.68E-01	NA	1.50E+02	J	mg/kg	3.68E-01	Average	(1)	3.68E-01	Average	(1)
4-Amino-2,6-dinitrotoluene	mg/kg	5.52E+00	NA	3.03E+02		mg/kg	5.52E+00	Average	(1)	5.52E+00	Average	(1)
HMX	mg/kg	1.91E+02	NA	5.39E+03		mg/kg	1.91E+02	Average	(1)	1.91E+02	Average	(1)
RDX	mg/kg	3.89E+00	NA	2.90E+02		mg/kg	3.89E+00	Average	(1)	3.89E+00	Average	(1)
Aluminum	mg/kg	1.58E+04	NA	5.85E+04		mg/kg	1.58E+04	Average	(1)	1.58E+04	Average	(1)
Arsenic	mg/kg	8.10E+00	NA	6.47E+01		mg/kg	8.10E+00	Average	(1)	8.10E+00	Average	(1)
Barium	mg/kg	6.56E+01	NA	1.16E+03	J	mg/kg	6.56E+01	Average	(1)	6.56E+01	Average	(1)
Mercury	mg/kg	3.26E-01	NA	8.90E+00		mg/kg	3.26E-01	Average	(1)	3.26E-01	Average	(1)

1 - Weighted average was used as the EPC for historical and bioremediated samples (See Section 7.3.3 of text).

TABLE 3.7

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,3-Dinitrobenzene	mg/L	2.36E-04	NA	2.40E-03		mg/L	2.36E-04	Average	(1)	2.36E-04	Average	(1)
2,4,6-Trinitrotoluene	mg/L	6.92E-03	NA	6.90E-02	J	mg/L	6.92E-03	Average	(1)	6.92E-03	Average	(1)
2,6-Dinitrotoluene	mg/L	9.88E-04	NA	9.90E-03		mg/L	9.88E-04	Average	(1)	9.88E-04	Average	(1)
2-Amino-4,6-Dinitrotoluene	mg/L	2.01E-03	NA	1.50E-02	J	mg/L	2.01E-03	Average	(1)	2.01E-03	Average	(1)
2-Nitrotoluene	mg/L	1.35E-04	NA	1.00E-03		mg/L	1.35E-04	Average	(1)	1.35E-04	Average	(1)
4-Amino-2,6-Dinitrotoluene	mg/L	3.43E-03	NA	1.90E-02		mg/L	3.43E-03	Average	(1)	3.43E-03	Average	(1)
HMX	mg/L	7.86E-02	NA	6.40E-01		mg/L	7.86E-02	Average	(1)	7.86E-02	Average	(1)
RDX	mg/L	6.69E-01	NA	7.70E+00		mg/L	6.69E-01	Average	(1)	6.69E-01	Average	(1)
Aluminum	mg/L	2.80E+00	NA	1.39E+02	J	mg/L	2.80E+00	Average	(1)	2.80E+00	Average	(1)
Antimony	mg/L	3.71E-05	NA	6.70E-03	J	mg/L	3.71E-05	Average	(1)	3.71E-05	Average	(1)
Arsenic	mg/L	1.25E-03	NA	2.45E-02	J	mg/L	1.25E-03	Average	(1)	1.25E-03	Average	(1)
Barium	mg/L	4.79E-02	NA	7.27E-01	J	mg/L	4.79E-02	Average	(1)	4.79E-02	Average	(1)
Beryllium	mg/L	1.63E-03	NA	1.28E-02	J	mg/L	1.63E-03	Average	(1)	1.63E-03	Average	(1)
Cadmium	mg/L	1.34E-04	NA	2.70E-03	J	mg/L	1.34E-04	Average	(1)	1.34E-04	Average	(1)
Chromium	mg/L	2.18E-03	NA	1.45E-01	J	mg/L	2.18E-03	Average	(1)	2.18E-03	Average	(1)
Cobalt	mg/L	4.94E-02	NA	2.49E-01	J	mg/L	4.94E-02	Average	(1)	4.94E-02	Average	(1)
Iron	mg/L	2.19E+01	NA	1.43E+02	J	mg/L	2.19E+01	Average	(1)	2.19E+01	Average	(1)
Lead	mg/L	4.53E-03	NA	5.43E-02	J	mg/L	4.53E-03	Average	(1)	4.53E-03	Average	(1)
Lithium	mg/L	8.50E-02	NA	3.40E-01	J	mg/L	8.50E-02	Average	(1)	8.50E-02	Average	(1)
Manganese	mg/L	1.79E+00	NA	1.16E+01	J	mg/L	1.79E+00	Average	(1)	1.79E+00	Average	(1)
Nickel	mg/L	1.06E-01	NA	4.77E-01	J	mg/L	1.06E-01	Average	(1)	1.06E-01	Average	(1)
Vanadium	mg/L	1.78E-03	NA	1.35E-01	J	mg/L	1.78E-03	Average	(1)	1.78E-03	Average	(1)
Zinc	mg/L	1.35E-01	NA	1.22E+00	J	mg/L	1.35E-01	Average	(1)	1.35E-01	Average	(1)
Nitrite/Nitrate-N	mg/L	6.73E+00	NA	9.20E+01		mg/L	6.73E+00	Average	(1)	6.73E+00	Average	(1)

1 - The EPC for groundwater is the arithmetic average of samples in the most highly contaminated area of the plume (See Section 7.3.3 of text).

TABLE 3.8

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gullies

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)anthracene	mg/L	9.89E-05	1.96E-04	2.20E-04		mg/L	2.20E-04	Maximum	(1)	2.20E-04	Maximum	(1)
Benzo(a)pyrene	mg/L	1.21E-04	2.46E-04	2.70E-04	J	mg/L	2.70E-04	Maximum	(1)	2.70E-04	Maximum	(1)
Benzo(b)fluoranthene	mg/L	1.71E-04	3.62E-04	4.00E-04	J	mg/L	4.00E-04	Maximum	(1)	4.00E-04	Maximum	(1)
Indeno(1,2,3-cd)pyrene	mg/L	9.69E-05	1.91E-04	2.10E-04	J	mg/L	2.10E-04	Maximum	(1)	2.10E-04	Maximum	(1)
2,4,6-Trinitrotoluene	mg/L	4.80E-04	8.32E-04	6.80E-03		mg/L	1.39E-03	95% UCL-C	ProUCL (2)	1.39E-03	95% UCL-C	ProUCL (2)
2-Amino-4,6-Dinitrotoluene	mg/L	6.06E-04	1.03E-03	8.30E-03	J	mg/L	3.09E-03	99% UCL-C	ProUCL	3.09E-03	99% UCL-C	ProUCL
4-Amino-2,6-Dinitrotoluene	mg/L	1.39E-03	2.45E-03	2.10E-02	J	mg/L	7.60E-03	99% UCL-C	ProUCL	7.60E-03	99% UCL-C	ProUCL
HMX	mg/L	4.13E-02	7.91E-02	7.30E-01		mg/L	2.63E-01	99% UCL-C	ProUCL	2.63E-01	99% UCL-C	ProUCL
RDX	mg/L	2.76E-01	5.59E-01	5.50E+00		mg/L	1.94E+00	99% UCL-C	ProUCL	1.94E+00	99% UCL-C	ProUCL
Aluminum	mg/L	2.33E+00	3.46E+00	1.91E+01	J	mg/L	3.71E+00	Gamma	ProUCL	3.71E+00	Gamma	ProUCL
Arsenic	mg/L	2.38E-03	4.23E-03	3.57E-02	J	mg/L	6.26E-03	97.5% UCL-C	ProUCL	6.26E-03	97.5% UCL-C	ProUCL
Chromium	mg/L	3.34E-03	4.87E-03	2.05E-02	J	mg/L	1.23E-02	99% UCL-C	ProUCL	1.23E-02	99% UCL-C	ProUCL
Iron	mg/L	2.14E+00	3.11E+00	1.62E+01	J	mg/L	3.37E+00	Gamma	ProUCL	3.37E+00	Gamma	ProUCL
Lead	mg/L	6.42E-03	NA	1.37E-01	J	mg/L	6.42E-03	Average	(3)	6.42E-03	Average	(3)
Manganese	mg/L	2.44E-01	4.28E-01	3.19E+00	J	mg/L	4.18E-01	95% UCL-T	W - Test (4)	4.18E-01	95% UCL-T	W - Test (4)
Vanadium	mg/L	5.92E-03	8.91E-03	4.35E-02	J	mg/L	9.75E-03	Gamma	ProUCL	9.75E-03	Gamma	ProUCL
Nitrite/Nitrate-N	mg/L	7.65E+00	1.76E+01	2.00E+02		mg/L	2.24E+01	97.5% UCL-C	ProUCL	2.24E+01	97.5% UCL-C	ProUCL

Definitions:

95 % UCL-C = 95% Chebyshev UCL (non-parametric).
99 % UCL-C = 99% Chebyshev UCL (non-parametric).
Gamma = Approximate Gamma 95% UCL.
97.5 % UCL-C = 97.5% Chebyshev UCL (log-normal).
95 % UCL-T = 95% UCL of Log-transformed Data.

1 - UCL is greater than the maximum concentration. Therefore, the maximum concentration is used as the EPC.
2 - EPC statistic is recommended by U.S. EPA's ProUCL software.
3 - The EPC for lead is the arithmetic average, as recommended by U.S. EPA guidance (U.S. EPA, 1999c).
4 - Shapiro-Wilk W Test indicates data are log-normally distributed.

TABLE 3.9

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
RDX	mg/L	5.23E-03	NA	9.90E-03		mg/L	9.90E-03	Maximum	N < 10 (1)	9.90E-03	Maximum	N < 10 (1)
Barium	mg/L	1.81E-01	NA	2.80E-01	J	mg/L	2.80E-01	Maximum	N < 10	2.80E-01	Maximum	N < 10

(1) Dataset consists of less than 10 samples. Therefore, the maximum concentration is used as the EPC.

TABLE 3.10
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gullies

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)pyrene	mg/kg	1.60E-01	3.47E-01	3.90E-01	J	mg/kg	3.90E-01	Maximum	(1)	3.90E-01	Maximum	(1)
Dibenzo(a,h)anthracene	mg/kg	2.93E-02	6.48E-02	7.40E-02	J	mg/kg	7.40E-02	Maximum	(1)	7.40E-02	Maximum	(1)
Aluminum	mg/kg	8.94E+03	1.02E+04	1.85E+04		mg/kg	1.02E+04	95% UCL-N	W - Test (2)	1.02E+04	95% UCL-N	W - Test (2)
Arsenic	mg/kg	1.50E+01	1.90E+01	5.82E+01	J	mg/kg	2.54E+01	95% UCL-C	ProUCL (3)	2.54E+01	95% UCL-C	ProUCL (3)
Barium	mg/kg	1.36E+02	1.75E+02	6.93E+02	J	mg/kg	1.70E+02	Gamma	ProUCL	1.70E+02	Gamma	ProUCL
Cadmium	mg/kg	8.68E-01	1.20E+00	4.10E+00	J	mg/kg	1.34E+00	95% UCL-T	W - Test (4)	1.34E+00	95% UCL-T	W - Test (4)
Chromium	mg/kg	4.44E+01	6.16E+01	2.28E+02	J	mg/kg	8.85E+01	95% UCL-C	ProUCL	8.85E+01	95% UCL-C	ProUCL
Iron	mg/kg	4.89E+04	6.38E+04	1.95E+05	J	mg/kg	7.65E+04	95% UCL-T	W - Test (4)	7.65E+04	95% UCL-T	W - Test (4)
Lead	mg/kg	5.90E+01	9.63E+01	5.21E+02	J	mg/kg	5.90E+01	Average	(5)	5.90E+01	Average	(5)
Manganese	mg/kg	1.68E+03	2.18E+03	6.13E+03	J	mg/kg	2.39E+03	Gamma	ProUCL	2.39E+03	Gamma	ProUCL
Vanadium	mg/kg	3.49E+01	4.40E+01	1.44E+02	J	mg/kg	5.83E+01	95% UCL-C	ProUCL	5.83E+01	95% UCL-C	ProUCL

Definitions:

95 % UCL-N = 95% UCL of Normal Data.
95 % UCL-C = 95% Chebyshev UCL (non-parametric).
Gamma = Approximate Gamma 95% UCL.
95 % UCL-T = 95% UCL of Log-transformed Data.

1 - UCL is greater than the maximum concentration. Therefore, the maximum concentration is used as the EPC.
2 - Shapiro-Wilk W Test indicates data are normally distributed.
3 - EPC statistic is recommended by U.S. EPA's ProUCL software.
4 - Shapiro-Wilk W Test indicates data are log-normally distributed.
5 - The EPC for lead is the arithmetic average, as recommended by U.S. EPA guidance (U.S. EPA, 1999c).

TABLE 3.11
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	1.23E+04	NA	1.37E+04	J	mg/kg	1.37E+04	Maximum	N < 10 (1)	1.37E+04	Maximum	N < 10 (1)
Antimony	mg/kg	2.58E+00	NA	4.70E+00	J	mg/kg	4.70E+00	Maximum	N < 10	4.70E+00	Maximum	N < 10
Arsenic	mg/kg	4.06E+01	NA	5.69E+01	J	mg/kg	5.69E+01	Maximum	N < 10	5.69E+01	Maximum	N < 10
Cadmium	mg/kg	1.24E+01	NA	1.71E+01	J	mg/kg	1.71E+01	Maximum	N < 10	1.71E+01	Maximum	N < 10
Iron	mg/kg	2.09E+05	NA	2.99E+05	J	mg/kg	2.99E+05	Maximum	N < 10	2.99E+05	Maximum	N < 10
Manganese	mg/kg	2.34E+03	NA	3.96E+03	J	mg/kg	3.96E+03	Maximum	N < 10	3.96E+03	Maximum	N < 10
Vanadium	mg/kg	7.35E+01	NA	1.01E+02	J	mg/kg	1.01E+02	Maximum	N < 10	1.01E+02	Maximum	N < 10

(1) Dataset consists of less than 10 samples. Therefore, the maximum concentration is used as the EPC.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 13
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Energetics										
1,3-Dinitrobenzene	Chronic	1.0E-04	mg/kg/day	1	1.0E-04	mg/kg/day	Spleen	3000/1	IRIS	3/01/2005
2,4,6-Trinitrotoluene	Chronic	5.0E-04	mg/kg/day	1	5.0E-04	mg/kg/day	Liver	1000/1	IRIS	3/01/2005
2,6-Dinitrotoluene	Chronic	1.0E-03	mg/kg/day	1	1.0E-03	mg/kg/day	CNS, Blood, Kidney	3000/1	HEAST	7/1997
2-Amino-4,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10//2004
2-Nitrotoluene	Chronic	1.0E-02	mg/kg/day	1	1.0E-02	mg/kg/day	Spleen	10000/1	HEAST	7/1997
4-Amino-2,6-Dinitrotoluene	Chronic	2.00E-04	mg/kg/day	1	2.0E-04	mg/kg/day	Liver	NA	NCEA	10//2004
HMX	Chronic	5.0E-02	mg/kg/day	1	5.0E-02	mg/kg/day	Liver, Blood	1000/1	IRIS	3/01/2005
RDX	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Prostate	100/1	IRIS	3/01/2005
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	CNS	100	NCEA	10/19/2004
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	3/01/2005
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	3/01/2005
Barium	Chronic	7.0E-02	mg/kg/day	0.07	4.9E-03	mg/kg/day	Kidney	3/1	IRIS	3/01/2005
Beryllium	Chronic	2.0E-03	mg/kg/day	0.007	1.4E-05	mg/kg/day	GS	300/1	IRIS	3/01/2005
Cadmium[3]	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	3/01/2005
Chromium III	Chronic	1.5E+00	mg/kg/day	0.013	2.0E-02	mg/kg/day	NOEL	100/10	IRIS	3/01/2005
Chromium VI	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	Fetotoxicity/GS/Bone	300/3	IRIS	3/01/2005
Cobalt	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	NA	NA	EPA 9	10//2004
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/1997
Iron	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	NA	1	NCEA	10//2004
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lithium	Chronic	2.0E-03	mg/kg/day	1	2.0E-03	mg/kg/day	NA	NA	NCEA	10//2004
Manganese (Soil)	Chronic	7.0E-02	mg/kg/day	0.04	2.8E-03	mg/kg/day	CNS	1/1	IRIS	3/01/2005
Manganese (Water)	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	3/1	IRIS	3/01/2005
Mercury[4]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	CNS	1000/1	IRIS	3/01/2005
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	3/01/2005
Selenium	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	NOEL	3/1	IRIS	3/01/2005
Vanadium	Chronic	1.0E-03	mg/kg/day	0.026	2.6E-05	mg/kg/day	Kidney	300	NCEA	10/19/2004
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	3/01/2005
Nitrate	Chronic	1.6E+00	mg/kg/day	1	1.6E+00	mg/kg/day	Blood	1/1	IRIS	3/01/2005
Nitrite	Chronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	Blood	1/10	IRIS	3/01/2005

Notes:

1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.

3 - Water value for cadmium is listed.

4 - Values are for mercuric chloride.

Definitions:

CNS = Central Nervous System

CVS = Cardiovascular system

EPA 9 = U.S. EPA Region 9 PRG Table, October, 2004, updated December 25, 2004.

GS = Gastrointestinal System

HEAST= Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not Applicable

NOEL = No Observed Effect Level

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 13
NSWC CRANE, CRANE, INDIANA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Semivolatile Organic Compounds								
Benzo(a)anthracene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Benzo(a)pyrene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/01/2005
Benzo(b)fluoranthene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg/day)^{-1}$	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Indeno(1,2,3-cd)pyrene	7.3E-01	$(mg/kg/day)^{-1}$	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA(1)	7/1993
Dioxins/Furans								
2,3,7,8-TCDD	1.5E+05	$(mg/kg/day)^{-1}$	1	1.5E+05	$(mg/kg/day)^{-1}$	B2	HEAST	7/1997
PCBs								
PCBs	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2	IRIS	3/01/2005
Energetics								
2,4,6-Trinitrotoluene	3.0E-02	$(mg/kg/day)^{-1}$	1	3.0E-02	$(mg/kg/day)^{-1}$	C	IRIS	3/01/2005
RDX	1.1E-01	$(mg/kg/day)^{-1}$	1	1.1E-01	$(mg/kg/day)^{-1}$	C	IRIS	3/01/2005
2-Nitrotoluene	2.3E-01	$(mg/kg/day)^{-1}$	1	2.3E-01	$(mg/kg/day)^{-1}$	NA	EPA 9	10//2004
Metals								
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	1	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	3/01/2005

Notes:

1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor x Oral Absorption Efficiency for Dermal.

IRIS = Integrated Risk Information System.

HEAST= Health Effects Assessment Summary Tables.

EPA Group:

A - Human carcinogen.

B1 - Probable human carcinogen - indicates that limited human data are available.

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans .

C - Possible human carcinogen.

D - Not classifiable as a human carcinogen.

E - Evidence of noncarcinogenicity.

EPA(1) = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July 1993, EPA/600/R-93/089.

EPA 9 = U.S. EPA Region 9 PRG Table, October, 2004, updated December 25, 2004.

NA = Not Available.

TABLE 4.1
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.1 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	6.5E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.1 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.3E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.5E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.8E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	8.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.4E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-06
	(total)										**3.1E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	4.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.9E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	9.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.7E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.8E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	7.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.5E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.4E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	(total)										**2.9E-06**
										Total Risk Across All Exposure Routes/Pathways	**6.0E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.1a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.6E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	7.5E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.9E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.1E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	6.4E-15	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.3E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.3E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.1a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.1E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	9.7E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.3E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	7.9E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-11
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.4E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	(total)										**2.8E-07**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	8.3E-16	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-10
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.7E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.2E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.0E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-11
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.3E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.8E-12
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.6E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-08
	(total)										**5.2E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.3E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.2
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.2 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	6.8E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.2 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.4E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.6E-07
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.1E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.2E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	9.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.6E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-05
	(total)										**3.3E-05**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	4.8E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.2E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	9.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.0E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.2E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	7.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.5E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-05
	(total)										**3.0E-05**
										Total Risk Across All Exposure Routes/Pathways	**6.3E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.2a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.0E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.0E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.2E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.2a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.8E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.7E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-06
	(total)										**5.1E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.4E-07
	(total)										**9.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.3
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	$\frac{Csoil \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csoil \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.3 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.1E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	5.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	9.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	7.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	4.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	8.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	7.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.3 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.8E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	8.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.1E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.9E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.2E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-06
	(total)										**2.4E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.3E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	7.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.3E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.4E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	5.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06
	(total)										**2.2E-06**
										Total Risk Across All Exposure Routes/Pathways	**4.6E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.3a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.9E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.9E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.1E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	4.3E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.6E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.7E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.5E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	6.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.3a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	4.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.8E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.7E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-07
	(total)										**6.1E-07**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.4E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.0E-10
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	6.7E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.9E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	8.8E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.9E-11
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	5.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-11
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07
	(total)										**2.1E-07**
										Total Risk Across All Exposure Routes/Pathways	**8.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.4
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging TIme (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.4 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	6.6E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.0E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.4 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	5.6E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	8.5E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.7E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-06
	(total)										**7.6E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.1E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-06
	(total)										**7.0E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.5E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.4a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.6E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	7.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.4a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	4.7E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.1E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.8E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.2E-07
	(total)										**6.3E-07**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.7E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.6E-10
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	7.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.8E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.1E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.9E-11
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.1E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-11
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
	(total)										**2.3E-07**
										Total Risk Across All Exposure Routes/Pathways	**8.7E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.5
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.5 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	7.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.7E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	5.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	9.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	4.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	8.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.5 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.6E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.2E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	9.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.6E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.6E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-06
	(total)										**3.3E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	9.2E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.9E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-06
	(total)										**5.7E-06**
										Total Risk Across All Exposure Routes/Pathways	**9.0E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.5a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.8E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	8.1E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.6E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.9E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.8E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.1E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	5.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.5a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.8E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.6E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	8.1E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.8E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.6E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-11
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
	(total)										**2.4E-07**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.9E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.8E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.0E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.0E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-11
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.1E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-11
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	5.9E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	(total)										**1.2E-07**
										Total Risk Across All Exposure Routes/Pathways	**3.6E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.6
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration In Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.6 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	8.9E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	4.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	5.9E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	7.4E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.3E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.6 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	7.6E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	6.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	2.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	5.0E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-04
	(total)										**1.0E-04**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	6.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	9.6E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.3E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.0E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-05
	(total)										**4.0E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.4E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.6a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.0E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.0E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.0E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.6a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	8.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-07
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	3.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	5.6E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	(total)										**1.1E-05**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	2.8E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.3E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	5.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	4.6E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	8.8E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06
	(total)										**1.8E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.3E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.7
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	FI	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.7 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	9.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	3.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	6.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.1E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.7 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.3E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.9E-07
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.9E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.2E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-05
	(total)										**4.4E-05**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.8E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	7.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	6.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	1.2E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-05
	(total)										**2.4E-05**
										Total Risk Across All Exposure Routes/Pathways	**6.8E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.7a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.2E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.7a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	3.2E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.8E-08
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.7E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	2.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-06
	(total)										**4.3E-06**
Dermal	2,3,7,8-TCDD TEQ	6.93E-06	mg/kg	6.93E-06	mg/kg	M	1.1E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Benzo(a)anthracene	3.20E-02	mg/kg	3.20E-02	mg/kg	M	2.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Indeno(1,2,3-cd)pyrene	2.60E-02	mg/kg	2.60E-02	mg/kg	M	1.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	Aroclor-1248	4.60E+01	mg/kg	4.60E+01	mg/kg	M	3.4E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-07
	(total)										**6.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**5.0E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.8
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	330	U.S. EPA, December 2002	165	Professional Judgement	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	U.S. EPA, July 2004	0.1	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

TABLE 7.8 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.2E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	3.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	4.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.1E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.8 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.7E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.5E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	5.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.5E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	4.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	6.4E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
	(total)										**1.3E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	6.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.6E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.4E-07
	(total)										**5.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.9E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.8a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.8E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.5E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	6.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.8a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	8.3E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.8E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	8.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-07
	(total)										**6.6E-07**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.0E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	6.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	5.3E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.9E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	9.0E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	(total)										**1.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**8.4E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.9
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.7E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.9 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.0E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	6.1E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	5.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.6E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	7.8E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	(total)										**1.6E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	4.0E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.0E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	5.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.8E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	4.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	7.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06
	(total)										**1.5E-06**
										Total Risk Across All Exposure Routes/Pathways	**3.0E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.9a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.4E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.3E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.9E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.5E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.6E-15	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	7.3E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.3E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.0E-11	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.9a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.8E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.7E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	5.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.3E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	4.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	7.0E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	(total)										**1.4E-07**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	7.2E-16	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-10
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	9.4E-12	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.9E-12
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.2E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.0E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-11
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	7.7E-12	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-12
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.3E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	(total)										**2.6E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.7E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.10
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.10 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.9E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.2E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.10 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.1E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	6.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	5.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	8.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-05
	(total)										**1.7E-05**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	4.2E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.3E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	5.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.2E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	4.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	7.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-05
	(total)										**1.5E-05**
										Total Risk Across All Exposure Routes/Pathways	**3.2E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.10a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.6E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	7.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	9.9E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.0E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.10a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.3E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.0E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.3E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	8.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.3E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-06
	(total)										**2.6E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.3E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.4E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.4E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.7E-07
	(total)										**4.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**3.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.11
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.11 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.0E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	3.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	9.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.0E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	8.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.11 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.6E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.4E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.9E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	6.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06
	(total)										**1.2E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.1E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.3E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.4E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.5E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	(total)										**1.1E-06**
										Total Risk Across All Exposure Routes/Pathways	**2.4E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.11a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.5E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	7.5E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.2E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	9.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.9E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.4E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.6E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.7E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.11a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.9E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.9E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.6E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.7E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	9.7E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.5E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-07
	(total)										**3.1E-07**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.9E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.4E-10
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	3.8E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	8.8E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.4E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.9E-11
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.1E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.2E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	(total)										**1.1E-07**
										Total Risk Across All Exposure Routes/Pathways	**4.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.12
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	$\frac{Csoil \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csoil \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.12 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.7E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.1E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.0E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.12 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	4.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.4E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.9E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-06
	(total)										**3.9E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	9.7E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.3E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.7E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-06
	(total)										**3.5E-06**
										Total Risk Across All Exposure Routes/Pathways	**7.4E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.12a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.4E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.12a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	4.1E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.1E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.0E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.8E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.4E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.6E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-07
	(total)										**3.2E-07**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.2E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.9E-10
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.2E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	9.8E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.1E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.9E-11
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.5E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.8E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	(total)										**1.2E-07**
										Total Risk Across All Exposure Routes/Pathways	**4.4E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.13
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.13 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	6.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	5.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	3.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	9.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	4.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.13 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.1E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	6.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	5.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	8.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	(total)										**1.7E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	8.0E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.7E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	8.6E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.2E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.4E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	(total)										**2.9E-06**
										Total Risk Across All Exposure Routes/Pathways	**4.6E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.13a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.5E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.6E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.8E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.7E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.2E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.8E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.13a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.3E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.6E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.1E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.8E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.5E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.8E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	5.9E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	(total)										**1.2E-07**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	1.7E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.5E-10
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.2E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.0E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-10
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.0E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-11
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.8E-11	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.0E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-08
	(total)										**6.1E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.8E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.14
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.14 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	7.7E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.0E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	6.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	8.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.2E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.14 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	6.6E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	9.9E-07
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	4.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	6.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.5E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-05
	(total)										**5.2E-05**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	5.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	8.3E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	7.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.3E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	5.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.3E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	9.9E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-05
	(total)										**2.0E-05**
										Total Risk Across All Exposure Routes/Pathways	**7.2E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.14a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.6E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	7.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	9.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	8.7E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	9.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.14a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	7.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-07
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	2.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-06
	(total)										**5.8E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.7E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	3.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	7.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.6E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	4.4E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.9E-07
	(total)										**9.0E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.7E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.15
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.15 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	8.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	5.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	7.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	2.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	3.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	9.9E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	3.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.15 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.8E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.2E-07
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	8.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.2E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	7.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.1E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-05
	(total)										**2.2E-05**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	3.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.1E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	4.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	3.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-09
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	6.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-05
	(total)										**1.2E-05**
										Total Risk Across All Exposure Routes/Pathways	**3.5E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.15a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference. Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.8E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	8.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	9.4E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.15a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	2.8E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.1E-08
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	8.3E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.1E-10
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	1.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	2.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	6.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.0E-10
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-06
	(total)										**2.2E-06**
Dermal	2,3,7,8-TCDD TEQ	6.03E-06	mg/kg	6.03E-06	mg/kg	M	9.4E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Benzo(a)anthracene	1.82E-02	mg/kg	1.82E-02	mg/kg	M	1.2E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.0E-11
	Benzo(a)pyrene	4.20E-02	mg/kg	4.20E-02	mg/kg	M	2.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(b)fluoranthene	5.80E-02	mg/kg	5.80E-02	mg/kg	M	3.9E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-10
	Indeno(1,2,3-cd)pyrene	1.49E-02	mg/kg	1.49E-02	mg/kg	M	1.0E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.4E-11
	Aroclor-1248	2.31E+01	mg/kg	2.31E+01	mg/kg	M	1.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-07
	(total)										**3.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**2.5E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.16
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	330	U.S. EPA, December 2002	165	Professional Judgement	Csoil x IR x Fi x EF x ED x CF
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	BW x AT
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	U.S. EPA, July 2004	0.1	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

TABLE 7.16 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.7E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.3E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	7.8E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.9E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	8.7E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.3E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.8E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	5.6E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	3.8E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-03
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	2.8E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.8E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.8E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.5E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.1E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	4.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.4E-03
	(total)												**9.6E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.5E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.0E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.0E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.3E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.0E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.0E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.7E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.7E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.3E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.3E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.0E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.16 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	5.2E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.4E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	4.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	2.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	5.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.2E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	5.0E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	3.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	7.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.4E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.4E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.16a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.8E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.7E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.9E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.9E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.3E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.2E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.4E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.8E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.9E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.3E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.4E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.4E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	7.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.4E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	7.3E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.0E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.8E-04
	(total)												**4.8E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.7E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.3E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	7.8E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.9E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.7E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.3E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.7E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.9E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.4E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**1.8E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.0E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.16a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.6E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	7.8E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	5.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	6.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.7E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	2.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.6E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.7E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	5.0E-11
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	6.6E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.1E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	8.2E-10	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	9.0E-11
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	6.2E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-09
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**9.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**1.7E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.17
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	BW x AT
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.17 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.8E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.5E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.8E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.9E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.2E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.1E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.4E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.7E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.8E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.1E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.3E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	7.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.3E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	7.0E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.0E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.0E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.6E-05
	(total)												**4.7E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.7E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.5E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.5E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.4E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.5E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.3E-09	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.1E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.8E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.1E-06
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.6E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.6E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.2E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.17 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	6.3E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	6.6E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	4.8E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	2.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	7.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.8E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.3E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.0E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	5.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	8.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	6.5E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.4E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.5E-08**
										Total Risk Across All Exposure Routes/Pathways	**4.6E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.17a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.9E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	9.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.7E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.3E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.4E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	6.8E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	4.6E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.5E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.4E-04
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.8E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.8E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.5E-05
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	4.9E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.6E-05
	(total)												**1.2E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.9E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.7E-06
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	7.4E-11	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.7E-07
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.3E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.3E-07
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.7E-10	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	5.3E-09
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	9.1E-10	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.0E-07
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	6.9E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.3E-05
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**2.8E-05**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.2E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.17a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	5.7E-09	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	1.7E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.3E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.9E-09	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	6.5E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	4.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.2E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	3.4E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	2.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	6.4E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**3.5E-08**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.4E-10	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	7.2E-12
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	9.6E-12	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.6E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.4E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.2E-10	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	1.3E-11
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	8.9E-10	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.3E-09
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**3.6E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.18
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.18 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.8E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.7E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.9E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.0E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.4E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.2E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.4E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.8E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.9E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.4E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.4E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.4E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	7.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.4E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	7.3E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.0E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.9E-04
	(total)												**4.9E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.9E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.8E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.8E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.6E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.1E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.9E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.3E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.8E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.9E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**5.4E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.18 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	6.6E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	6.9E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-08
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	5.0E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.6E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-06
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	2.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	7.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.0E-06**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.4E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.2E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	5.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	9.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	6.8E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	5.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.7E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**4.8E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.18a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.6E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.7E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	8.6E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.9E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	9.6E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.2E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.2E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	8.4E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.8E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	6.1E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.1E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.2E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.6E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	9.0E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.0E-04
	(total)												**2.1E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.8E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.8E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.3E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.9E-09	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.8E-08
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.7E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.6E-06
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.2E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.1E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**2.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.18a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.0E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	7.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.1E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	7.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.1E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	4.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.3E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.4E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.3E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.7E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.1E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.6E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.5E-08**
										Total Risk Across All Exposure Routes/Pathways	**6.5E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.19
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) = Csoil x IR x Fi x EF x ED x CF / BW x AT U.S. EPA, December 1989
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	
	FI	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) = Csoil x CF x SA x AF x ABS x EF x ED / BW x AT U.S. EPA, December 1989
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.19 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE /SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.3E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	6.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.3E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	7.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.7E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.4E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	4.8E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	3.3E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.1E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.4E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.1E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.2E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.8E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	3.5E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.2E-04
	(total)												**8.2E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	6.6E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.3E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.6E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.2E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	9.4E-09	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.9E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	3.2E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.1E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.1E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**9.9E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**9.2E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.19 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.9E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.1E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	3.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	5.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.0E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.0E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.1E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	6.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.0E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.5E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.6E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.19a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE /SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	7.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.6E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.7E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	8.3E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.9E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	9.3E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.0E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.2E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	8.1E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.7E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	5.9E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	5.9E-04
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.1E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.4E-05
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	8.7E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.9E-05
	(total)												**2.1E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	6.2E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.2E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.5E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.2E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.1E-06
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	8.9E-10	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.8E-08
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	3.0E-09	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.0E-06
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.3E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.6E-05
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**9.3E-05**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.1E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.19a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.2E-08	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	3.7E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.6E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.9E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	9.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.3E-08	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	1.4E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	9.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.8E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	7.3E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	4.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	1.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**7.4E-08**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	9.7E-10	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	2.9E-11
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.9E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	6.5E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.4E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	4.8E-10	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	5.2E-11
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.6E-09	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	5.4E-09
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**5.5E-09**
										Total Risk Across All Exposure Routes/Pathways	**8.0E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.20
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.20 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.8E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.6E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.8E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.9E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.3E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.1E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.4E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.7E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.9E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.2E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.4E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.4E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	7.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.4E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	7.1E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.0E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.7E-04
	(total)												**4.7E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.8E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.6E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.5E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.5E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.5E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.4E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.1E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.8E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.2E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.7E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.7E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**5.3E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.20 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.5E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	3.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.6E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.2E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	6.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.1E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	6.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	1.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**9.3E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.2E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	9.7E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.6E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.20a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.5E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	9.0E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	9.5E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.8E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.1E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.3E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.4E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	6.8E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	4.7E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.6E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	3.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.4E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.9E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.8E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.5E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	5.0E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.7E-04
	(total)												**1.2E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.6E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.5E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.5E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.5E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.4E-09	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.1E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.8E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.2E-06
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.7E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.7E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.20a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.3E-08	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	3.8E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.7E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	3.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	9.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.3E-08	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	1.5E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	9.7E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	5.0E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	7.6E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	5.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	1.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**7.8E-08**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.1E-09	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	3.2E-11
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.3E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	7.2E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.5E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.3E-10	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	5.8E-11
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.0E-09	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	6.0E-09
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**6.1E-09**
										Total Risk Across All Exposure Routes/Pathways	**8.4E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.21
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.21 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.9E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.8E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.0E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.3E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.5E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.9E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.0E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.7E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.5E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	7.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.5E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	7.6E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.1E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.1E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.1E-05
	(total)												**5.0E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	7.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.6E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.1E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.6E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	5.2E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.6E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.1E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.2E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	3.8E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.9E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	9.6E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**1.2E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**6.2E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.21 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	6.6E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	5.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	6.9E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	7.5E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	5.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	2.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	7.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.0E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.7E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	8.0E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.3E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	9.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-07**
										Total Risk Across All Exposure Routes/Pathways	**5.5E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.21a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	9.6E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.0E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.1E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.7E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.7E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	7.3E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.0E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.7E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	3.6E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.6E-04
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.3E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.9E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.7E-05
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	5.4E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-05
	(total)												**1.3E-03**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	5.6E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.1E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.2E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	3.7E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.9E-06
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	8.0E-10	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.6E-08
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.7E-09	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	9.1E-07
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.1E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.9E-05
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**8.4E-05**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.3E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.21a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	4.8E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.0E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.5E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	3.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	5.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.9E-08**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	5.6E-10	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.7E-11
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	2.2E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	3.7E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	8.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.7E-10	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-11
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	2.1E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.1E-09**
										Total Risk Across All Exposure Routes/Pathways	**3.2E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.22
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.22 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.4E-05	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.8E-02
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	5.1E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.6E-02
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	5.7E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.9E-02
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.8E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.7E-04
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.5E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	8.4E-03
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.8E-01	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.8E-01
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	9.5E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.2E-01
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	9.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.4E-02
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	9.0E-03
	(total)												**6.3E-01**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.2E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.3E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	8.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.3E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.4E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.2E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	3.1E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	6.2E-06
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.5E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	8.0E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.7E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**3.2E-02**
										Total Hazard Index Across All Exposure Routes/Pathways			**6.7E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.22 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.1E-06	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	6.2E-08
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	4.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.2E-06	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.6E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	8.2E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-05
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	8.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.3E-05**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.9E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	7.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	9.0E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	9.9E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	6.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.0E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.4E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.22a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.1E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.6E-02
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.7E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	8.6E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.9E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	9.6E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.1E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.2E-04
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	8.4E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.8E-03
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	6.1E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.1E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.2E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-01
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.2E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.6E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	9.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.0E-03
	(total)												**2.1E-01**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.9E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	5.8E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.2E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.8E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	1.9E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	9.7E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.1E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	8.3E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.4E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	4.7E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.6E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**4.3E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.2E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.22a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.3E-07	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	6.9E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.9E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	5.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.8E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.4E-07	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	2.6E-08
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	1.7E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	9.1E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.4E-06
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	9.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.4E-06**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.3E-09	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	2.5E-10
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	3.3E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	5.5E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	4.0E-09	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	4.4E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.1E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	4.6E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**4.6E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.4E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.23
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.23 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	2.6E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	5.2E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	5.5E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.7E-03
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	6.2E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.1E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	2.0E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.9E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	2.7E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	9.0E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	2.0E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.0E-02
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.0E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.4E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	1.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.5E-03
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	2.9E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	9.6E-04
	(total)												**6.8E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.6E-04
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.3E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.6E-05
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.2E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-04
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.7E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.4E-07
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.6E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.4E-05
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.1E-03
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.0E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**7.3E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.23 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.9E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	9.2E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	6.7E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-06
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	9.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.4E-06**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	1.1E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	4.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	7.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	1.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	5.5E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	6.1E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	4.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.0E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.23a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.6E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.7E-03
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.8E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	9.2E-04
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.1E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.0E-03
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.6E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.3E-05
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	9.0E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.0E-04
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	6.6E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.6E-03
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-02
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.4E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.9E-04
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	9.6E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.2E-04
	(total)												**2.3E-02**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.3E-05
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.3E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.3E-06
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.1E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-05
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.5E-09	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.0E-08
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.5E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.1E-06
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.2E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.9E-04
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**4.7E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.3E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.23a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 166
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	8.6E-08	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	2.6E-09
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	6.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	9.0E-08	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	9.9E-09
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M	6.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	3.4E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	5.1E-07
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M	3.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M	9.6E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**5.2E-07**
Dermal	2,4,6-Trinitrotoluene	1.89E+00	mg/kg	1.89E+00	mg/kg	M	3.2E-09	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	9.5E-11
	2-Amino-4,6-dinitrotoluene	4.00E-01	mg/kg	4.00E-01	mg/kg	M	1.3E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	4.49E-01	mg/kg	4.49E-01	mg/kg	M	2.1E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.44E+00	mg/kg	1.44E+00	mg/kg	M	4.5E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.96E+00	mg/kg	1.96E+00	mg/kg	M	1.5E-09	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	1.7E-10
	Aluminum	1.43E+04	mg/kg	1.43E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	7.44E+00	mg/kg	7.44E+00	mg/kg	M	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	1.7E-08
	Barium	7.49E+01	mg/kg	7.49E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	2.11E-01	mg/kg	2.11E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**5.4E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.24
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.24 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.4E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	9.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	6.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.8E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	5.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.24 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	5.1E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.6E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	3.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	6.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	5.4E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	(total)										**1.1E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	5.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	5.0E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-06
	(total)										**1.0E-05**
										Total Risk Across All Exposure Routes/Pathways	**2.1E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.24a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.5E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	3.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.4E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	8.1E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	6.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.24a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	4.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.8E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	3.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	6.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.8E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-07
	(total)										**1.0E-06**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.8E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.7E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-10
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	5.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-09
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-10
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-10
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.4E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-10
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	8.9E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	(total)										**1.8E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.2E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.25
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.25 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.5E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	9.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	6.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.6E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.9E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	8.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	5.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.4E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.25 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	5.3E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.9E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	3.5E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	7.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	5.6E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-04
	(total)										**1.2E-04**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.0E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.6E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	3.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	6.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.9E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	5.2E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-04
	(total)										**1.1E-04**
										Total Risk Across All Exposure Routes/Pathways	**2.2E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.25a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	8.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	6.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.6E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	7.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.25a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	8.3E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.1E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	5.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.1E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	8.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-05
	(total)										**1.8E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.3E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.9E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	9.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	6.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.6E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-06
	(total)										**3.4E-06**
										Total Risk Across All Exposure Routes/Pathways	**2.2E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.26
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.26 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.7E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	4.9E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	9.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.26 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.9E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	5.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.2E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.3E-06
	(total)										**8.7E-06**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	7.7E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	3.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.7E-06
	(total)										**7.9E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.7E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.26a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	8.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	6.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	4.7E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	8.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.26a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	9.8E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	6.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.5E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.0E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-06
	(total)										**2.2E-06**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	7.3E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	3.6E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.2E-07
	(total)										**7.5E-07**
										Total Risk Across All Exposure Routes/Pathways	**2.9E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.27
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.27 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.4E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	9.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	6.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.5E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.8E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	8.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	5.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.4E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.27 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.2E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	8.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	5.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.9E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.3E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-05
	(total)										**2.7E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	7.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.2E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-05
	(total)										**2.5E-05**
										Total Risk Across All Exposure Routes/Pathways	**5.2E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.27a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.6E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	3.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.8E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	5.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.27a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	6.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06
	(total)										**2.3E-06**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	8.1E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.7E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-07
	(total)										**8.3E-07**
										Total Risk Across All Exposure Routes/Pathways	**3.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.28
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.28 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Bullding 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	6.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	5.9E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	3.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.28 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	5.3E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.9E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	3.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	7.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	5.6E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	(total)										**1.2E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.0E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	5.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.4E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	9.9E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-05
	(total)										**2.1E-05**
										Total Risk Across All Exposure Routes/Pathways	**3.2E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.28a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.8E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	5.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	4.2E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	7.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.28a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	3.8E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.8E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	5.1E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-07
	(total)										**8.5E-07**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	4.2E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.3E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.6E-10
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.8E-09
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.6E-10
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.4E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	7.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-10
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.1E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-07
	(total)										**4.3E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.3E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.29
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	$\frac{Csoil \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csoil \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.29 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.9E-10	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	8.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.0E-03	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.6E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	9.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	8.0E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.29 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.7E-11	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.5E-06
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.1E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	7.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.8E-04	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-04
	(total)										**3.7E-04**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.4E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.1E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	8.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.8E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.6E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	6.9E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-04
	(total)										**1.4E-04**
										Total Risk Across All Exposure Routes/Pathways	**5.1E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.29a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.5E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	8.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	2.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	6.8E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.2E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	6.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.1E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.29a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	1.8E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.8E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.8E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	7.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.8E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.0E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-05
	(total)										**4.1E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.2E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	9.3E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	3.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	3.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.1E-06
	(total)										**6.3E-06**
										Total Risk Across All Exposure Routes/Pathways	**4.7E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.30
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.30 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.1E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	2.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	8.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	2.2E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	7.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.2E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.30 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	7.1E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.2E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.7E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.2E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	9.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	7.5E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-04
	(total)										**1.6E-04**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	8.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	2.4E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	4.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-07
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	1.6E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	4.2E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.4E-05
	(total)										**8.7E-05**
										Total Risk Across All Exposure Routes/Pathways	**2.4E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.30a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.9E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	9.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	7.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.4E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	6.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.30a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	6.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	4.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	9.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-08
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	3.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	7.3E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-05
	(total)										**1.5E-05**
Dermal	2,3,7,8-TCDD TEQ	1.51E-05	mg/kg	1.51E-05	mg/kg	M	2.4E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.5E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Benzo(a)pyrene	1.00E+00	mg/kg	1.00E+00	mg/kg	M	6.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Dibenzo(a,h)anthracene	2.00E-01	mg/kg	2.00E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-09
	Indeno(1,2,3-cd)pyrene	6.50E-01	mg/kg	6.50E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	Aroclor-1248	1.60E+02	mg/kg	1.60E+02	mg/kg	M	1.2E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-06
	(total)										**2.4E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.8E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.31
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	330	U.S. EPA, December 2002	165	Professional Judgement	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	U.S. EPA, July 2004	0.1	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

TABLE 7.31 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.0E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.9E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	3.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.5E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	9.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	7.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.31 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.3E-06
	(total)										**4.6E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.3E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.6E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.8E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.6E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	7.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	9.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06
	(total)										**1.9E-06**
										Total Risk Across All Exposure Routes/Pathways	**6.5E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.31a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.2E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	9.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.31a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	7.4E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	9.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.1E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-06
	(total)										**2.3E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	4.4E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.7E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	7.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-07
	(total)										**6.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**2.9E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.32
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.32 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.0E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	9.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.0E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	8.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	5.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.32 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.8E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	6.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.6E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-06
	(total)										**5.6E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.3E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.4E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-06
	(total)										**5.1E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.32a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.3E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.0E-15	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	8.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.32a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	6.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.0E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.3E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.7E-07
	(total)										**5.0E-07**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	6.4E-16	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	9.6E-11
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.1E-10
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	5.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-09
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.7E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.1E-10
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.5E-10
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.4E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-10
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	4.3E-08	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.6E-08
	(total)										**9.2E-08**
										Total Risk Across All Exposure Routes/Pathways	**5.9E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.33
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.33 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.2E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	9.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.0E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	8.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	9.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	5.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.0E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.33 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.9E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.5E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	7.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.7E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.4E-05
	(total)										**5.8E-05**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.7E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	6.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.9E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.5E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-05
	(total)										**5.3E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.33a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	8.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	9.1E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	7.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.33a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	5.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	4.2E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	8.5E-06
	(total)										**9.1E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.2E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	9.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.8E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	(total)										**1.7E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.34
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	BW x AT
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.34 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	8.9E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.7E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	9.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.34 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.0E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-06
	(total)										**4.3E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.7E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.1E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-06
	(total)										**3.9E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.2E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.34a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.2E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	8.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.6E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	8.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.34a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.5E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	6.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.7E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.5E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.2E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
	(total)										**1.1E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.6E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.9E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.9E-10
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.7E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-07
	(total)										**3.7E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.4E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.35
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.35 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.1E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	9.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.0E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	8.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	5.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.35 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	4.4E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	8.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	5.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.3E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-05
	(total)										**1.3E-05**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	8.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	7.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-05
	(total)										**1.2E-05**
										Total Risk Across All Exposure Routes/Pathways	**2.6E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.35a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.0E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	8.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	5.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	6.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.35a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.6E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	6.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.2E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-06
	(total)										**1.1E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.9E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.3E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.6E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.9E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-07
	(total)										**4.1E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.5E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.36 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.4E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	6.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	7.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.1E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.36 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	3.5E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	6.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.7E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	5.4E-06
	(total)										**5.8E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	7.1E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	5.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.4E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	4.8E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-06
	(total)										**1.0E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.6E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.36
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.36a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.4E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.5E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.4E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	7.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03

PAHs - 0.13

PCBS - 0.14

TABLE 8.36a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.4E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	5.1E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.6E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-07
	(total)										**4.2E-07**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	1.5E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	2.2E-10
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.6E-10
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.7E-09
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.6E-10
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.4E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	7.8E-10	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-10
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.0E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	(total)										**2.1E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.3E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.37 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	6.8E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.3E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	8.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	9.9E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.8E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	9.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.9E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.37 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	5.9E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.1E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.2E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	7.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	8.4E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-04
	(total)										**1.8E-04**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	4.9E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	7.4E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	7.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.8E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.6E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.3E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-05
	(total)										**7.1E-05**
										Total Risk Across All Exposure Routes/Pathways	**2.5E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.37
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.37a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium:- Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.3E-11	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	8.5E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	2.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.3E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	7.7E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	6.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	6.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.37a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	6.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	9.8E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.8E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.9E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	9.8E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	7.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.8E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	9.4E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-05
	(total)										**2.0E-05**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.2E-14	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.3E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	3.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-06
	(total)										**3.1E-06**
										Total Risk Across All Exposure Routes/Pathways	**2.3E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.38
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.38 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	7.3E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	2.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	8.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	1.1E-04	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	8.8E-13	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	7.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.8E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.4E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
										Total Hazard Index Across All Exposure Routes/Pathways			

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.38 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.5E-12	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.8E-07
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.7E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	9.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.0E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.6E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.2E-05
	(total)										**7.8E-05**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	3.0E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	4.5E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	2.4E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-06
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	4.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.5E-07
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	1.6E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	2.0E-05	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-05
	(total)										**4.3E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.2E-04**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 7.38a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.5E-12	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	9.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	8.4E-14	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	6.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.4E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 8.38a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface / Subsurface Soil
Exposure Point: Area near Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	2.5E-13	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	4.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-07
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	9.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-08
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	3.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	3.5E-06	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	7.1E-06
	(total)										**7.6E-06**
Dermal	2,3,7,8-TCDD TEQ	5.35E-06	mg/kg	5.35E-06	mg/kg	M	8.4E-15	mg/kg-day	1.5E+05	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Benzo(a)anthracene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Benzo(a)pyrene	9.95E-01	mg/kg	9.95E-01	mg/kg	M	6.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-08
	Benzo(b)fluoranthene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-09
	Dibenzo(a,h)anthracene	1.99E-01	mg/kg	1.99E-01	mg/kg	M	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-09
	Indeno(1,2,3-cd)pyrene	6.47E-01	mg/kg	6.47E-01	mg/kg	M	4.4E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-09
	Aroclor-1248	7.71E+01	mg/kg	7.71E+01	mg/kg	M	5.6E-07	mg/kg-day	2.0E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	(total)										**1.2E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.8E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,3,7,8-TCDD - 0.03
PAHs - 0.13
PCBS - 0.14

TABLE 4.39
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	330	U.S. EPA, December 2002	165	Professional Judgement	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	U.S. EPA, July 2004	0.1	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.77E-08
Noncancer Ingestion Intake - RME = 1.94E-06

Cancer Ingestion Intake - CTE = 1.38E-08
Noncancer Ingestion Intake - CTE = 9.69E-07

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

Cancer Dermal Intake - CTE = 2.77E-08
Noncancer Dermal Intake - CTE = 1.94E-06

TABLE 7.39 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.0E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.1E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	7.1E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.6E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.1E-05	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.3E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	3.7E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	7.4E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	7.5E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.5E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	3.1E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.1E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.2E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.3E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.8E-03
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	6.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.1E-03
	(total)												**1.6E-01**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	9.9E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.0E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.3E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.4E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.9E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.4E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.7E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.3E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.4E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.1E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.7E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**6.7E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.6E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.39 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.5E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.4E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	5.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.1E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	4.4E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	9.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.5E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.4E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.2E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	4.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	9.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.8E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.3E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.0E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.1E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.8E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.39a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.0E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.6E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.8E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.3E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.7E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.9E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.7E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.8E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.5E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	6.4E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	9.1E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.2E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-03
	(total)												**7.8E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.3E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.6E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.3E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.1E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	9.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.8E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.2E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	4.4E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.1E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.8E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	4.7E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.6E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**2.2E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**8.0E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.39a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	7.4E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.2E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	5.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	7.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.4E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	2.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	9.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	4.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.7E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	4.7E-10	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	6.1E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	3.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.6E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	6.7E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.0E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.8E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.40
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgement	12	Professional Judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.40 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.0E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.0E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.5E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.7E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.2E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.6E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.8E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.6E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.7E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.2E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.5E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.5E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	6.2E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.8E-05
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.1E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-04
	(total)												**7.6E-03**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.1E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.8E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.5E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	7.1E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.4E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.6E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.2E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.0E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**7.1E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**8.3E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.40 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.8E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	5.4E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.3E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	5.3E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.2E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.8E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.3E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	5.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.2E-08**
										Total Risk Across All Exposure Routes/Pathways	**5.0E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.40a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.5E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	8.6E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.3E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.3E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.5E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.5E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.0E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.1E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.0E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	3.7E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.7E-04
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.3E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.5E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.2E-05
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	7.7E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-05
	(total)												**1.9E-03**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.3E-10	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.1E-06
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	6.8E-11	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.4E-07
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.5E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.7E-06
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	3.6E-08	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	7.1E-07
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.8E-09	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.0E-07
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.5E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.5E-05
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**3.6E-05**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.9E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.40a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.6E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.8E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	5.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.2E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	4.8E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	9.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.8E-08**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	6.8E-11	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-12
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	8.8E-12	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.3E-10	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-11
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	9.7E-10	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-09**
										Total Risk Across All Exposure Routes/Pathways	**3.9E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.41
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	$\frac{Csoil \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csoil \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-07
Noncancer Ingestion Intake - RME = 9.78E-07

Cancer Ingestion Intake - CTE = 5.51E-08
Noncancer Ingestion Intake - CTE = 4.29E-07

Cancer Dermal Intake - RME = 2.31E-06
Noncancer Dermal Intake - RME = 6.46E-06

Cancer Dermal Intake - CTE = 7.27E-08
Noncancer Dermal Intake - CTE = 5.66E-07

TABLE 7.41 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.0E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.6E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.8E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.4E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.7E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.9E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.7E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.8E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.5E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.9E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	6.4E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	9.2E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.2E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-03
	(total)												**7.9E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.2E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.1E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.2E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.6E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	7.4E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.5E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.8E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.2E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**7.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**8.6E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.41 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.9E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.7E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.4E-06	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-07
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	5.5E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.8E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-06
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.4E-06**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.9E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	5.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.3E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	5.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.4E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.6E-07**
										Total Risk Across All Exposure Routes/Pathways	**5.3E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.41a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.6E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.6E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.9E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.4E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	8.2E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.6E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.7E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.6E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	6.8E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.8E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.5E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.2E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.8E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.0E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.7E-04
	(total)												**3.4E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	9.6E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.9E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.2E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.8E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.4E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.5E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.3E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.3E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.1E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.6E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**6.5E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.5E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.41a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.9E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	8.8E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.1E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	8.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	4.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.7E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	3.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.9E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.2E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	3.7E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.6E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	8.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.2E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	4.7E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.7E-08**
										Total Risk Across All Exposure Routes/Pathways	**7.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.42
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 6.51E-09
Noncancer Ingestion Intake - CTE = 4.14E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.42 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE /SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	8.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.8E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	6.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.0E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	9.1E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.6E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	3.2E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	6.3E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	6.4E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.1E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	2.6E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.6E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.1E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.6E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	5.4E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-04
	(total)												**1.3E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.9E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.7E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.7E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.2E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.5E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	6.3E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.1E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.8E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**1.2E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.5E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.42 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.4E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.2E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	9.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	5.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.0E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	4.1E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	8.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.3E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.9E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	8.7E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	8.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.0E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	4.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.2E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.3E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.9E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.42a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE /SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.4E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.5E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.6E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.3E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	7.9E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.6E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.6E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.4E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	6.6E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.6E-04
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.4E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.7E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.9E-05
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.3E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-05
	(total)												**3.3E-03**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.7E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.5E-06
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.3E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.1E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.1E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.6E-05
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.2E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.4E-06
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	6.0E-09	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.0E-06
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.5E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.3E-05
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												1.2E-04
												Total Hazard Index Across All Exposure Routes/Pathways	**3.5E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.42a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO SURFACE/SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.5E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.0E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.5E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	5.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.9E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	4.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	2.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.2E-08**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.7E-10	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	8.2E-12
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.6E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	8.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.4E-10	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.9E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-09
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.0E-09**
										Total Risk Across All Exposure Routes/Pathways	**8.8E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.43
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.43 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.0E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.5E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.7E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.2E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.6E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.8E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.6E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.7E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.2E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.5E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.7E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	6.2E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.9E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-03
	(total)												**7.6E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.1E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.9E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.1E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.6E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	7.2E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.4E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.7E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.2E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.1E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**7.2E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**8.4E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.43 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	4.3E-08	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	1.3E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	4.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.2E-07	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	3.5E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	6.6E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	9.9E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	5.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	2.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.0E-06**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	9.2E-09	mg/kg-day	3.0E-02	$(mg/kg-day)^{-1}$	2.7E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.1E-08	mg/kg-day	1.1E-01	$(mg/kg-day)^{-1}$	3.5E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.3E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.0E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**2.0E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.2E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.43a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.5E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	8.7E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.4E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.3E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.6E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.5E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.1E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.2E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.1E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	3.8E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.8E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.4E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.6E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.2E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	7.7E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-04
	(total)												**1.9E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.1E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.9E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.6E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	7.2E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.4E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.7E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.2E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.1E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**7.2E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.0E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.43a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.6E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	3.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.6E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.1E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	5.5E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	4.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	2.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.5E-08**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.1E-10	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	9.2E-12
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	8.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.0E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	4.4E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-09
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.7E-09**
										Total Risk Across All Exposure Routes/Pathways	**9.2E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.44
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.44 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.1E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.7E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.9E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	5.6E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.8E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.9E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.9E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.0E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.3E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.6E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.6E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	8.2E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.7E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	6.7E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	9.5E-05
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.3E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.1E-04
	(total)												**8.2E-03**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.4E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.9E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.4E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	6.4E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.2E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.5E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	3.0E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	7.5E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.5E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.0E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**1.5E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**9.7E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.44 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.9E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	5.6E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.4E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	5.5E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.2E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.4E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	7.5E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	2.3E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	9.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	5.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.6E-08	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.6E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.0E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 7.44a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.7E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	9.4E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.7E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.4E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.0E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.9E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	9.7E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.9E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.3E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	4.0E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	4.0E-04
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.9E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.7E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.4E-05
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	8.3E-09	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.8E-05
	(total)												**2.0E-03**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.6E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.1E-06
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.0E-10	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.0E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	4.6E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.3E-05
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.1E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	2.1E-06
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.4E-09	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.8E-06
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.2E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.5E-05
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**1.1E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.2E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.44a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.4E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.1E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	9.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	9.9E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	4.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	1.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	8.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.2E-08**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	1.6E-10	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	4.7E-12
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	2.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	4.6E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.4E-10	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-11
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	2.2E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**3.5E-08**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.45
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 1.10E-06
Noncancer Ingestion Intake - RME = 1.28E-05

Cancer Ingestion Intake - CTE = 1.22E-07
Noncancer Ingestion Intake - CTE = 4.27E-06

Cancer Dermal Intake - RME = 3.07E-06
Noncancer Dermal Intake - RME = 3.58E-05

Cancer Dermal Intake - CTE = 1.37E-07
Noncancer Dermal Intake - CTE = 4.79E-06

TABLE 7.45 - REASONABLE MAXIMUM EXPOSURE (RME)

SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	6.8E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.4E-02
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.7E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.4E-02
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	7.1E-05	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.5E-01
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.4E-03	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	4.9E-02
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.0E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.7E-02
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	2.0E-01	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.0E-01
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.0E-04	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.5E-01
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	8.4E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.2E-02
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	4.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.4E-02
	(total)												**1.0E+00**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	6.1E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.2E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	7.9E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	4.0E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.8E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	8.9E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	4.1E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	8.2E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.1E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	7.0E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	8.7E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.9E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**4.1E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.1E+00**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.45 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.8E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	6.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.1E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.3E-06	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	4.7E-07
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.7E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	8.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-05
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	7.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	3.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-05**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	5.2E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	6.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	3.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.8E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	7.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.1E-06**
										Total Risk Across All Exposure Routes/Pathways	**1.5E-05**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.45a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.3E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.5E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.6E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	7.9E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.4E-05	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-01
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	8.2E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.6E-02
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.7E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.5E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	6.8E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	6.8E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.5E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.2E-01
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	2.8E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.0E-03
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.6E-03
	(total)												**3.4E-01**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	8.2E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.6E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.1E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.3E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.4E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.2E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	5.5E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.1E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	2.8E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	9.3E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.9E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**5.5E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**3.5E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.45a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	6.5E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	6.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	4.8E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	5.2E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	1.9E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	9.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-06
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	8.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	4.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-06**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.3E-09	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	7.0E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	3.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	6.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	8.0E-09	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.0E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.1E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.6E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.46 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	7.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.5E-03
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	5.0E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	2.5E-03
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	7.6E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	3.8E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.6E-04	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	5.2E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	5.3E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.8E-03
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	2.2E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.2E-02
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.7E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	9.0E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.3E-03
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	4.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.5E-03
	(total)												**1.1E-01**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	9.3E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.9E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	6.0E-05
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.7E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.4E-03
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.3E-06	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.3E-04
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.2E-07	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.1E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.4E-03
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**6.3E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.2E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032	HMX - 0.006
2-Amino-4,6-dinitrotoluene - 0.006	RDX - 0.015
4-Amino-2,6-dinitrotoluene - 0.009	Arsenic - 0.03
	Other Metals - not evaluated for dermal contact with soil.

TABLE 8.46 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.5E-07	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	7.5E-09
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	9.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.8E-06	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	7.4E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.8E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-06
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	3.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.9E-06**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	3.2E-08	mg/kg-day	3.0E-02	$(mg/kg\text{-}day)^{-1}$	9.6E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	4.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	9.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	2.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.1E-07	mg/kg-day	1.1E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	4.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.8E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.0E-07**
										Total Risk Across All Exposure Routes/Pathways	**6.6E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.46
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Soil	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csoil x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 4.70E-07
Noncancer Ingestion Intake - RME = 1.37E-06

Cancer Ingestion Intake - CTE = 4.58E-08
Noncancer Ingestion Intake - CTE = 4.58E-07

Cancer Dermal Intake - RME = 1.87E-06
Noncancer Dermal Intake - RME = 5.47E-06

Cancer Dermal Intake - CTE = 5.22E-08
Noncancer Dermal Intake - CTE = 5.22E-07

TABLE 7.46a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.4E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.9E-04
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.7E-07	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	8.4E-04
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.5E-06	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-02
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	8.8E-05	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.8E-03
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	5.9E-04
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	7.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	7.3E-03
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.7E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.2E-02
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	3.0E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.3E-04
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.0E-04
	(total)												**3.7E-02**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	8.9E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	1.8E-05
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-09	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	5.8E-06
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.6E-08	mg/kg-day	2.0E-04	mg/kg-day	NA	NA	1.3E-04
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.0E-07	mg/kg-day	5.0E-02	mg/kg-day	NA	NA	1.2E-05
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.0E-08	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	1.0E-05
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.2E-04
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	(total)												**6.0E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**3.7E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.46a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SURFACE / SUBSURFACE SOIL
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Surface and Subsurface Soil
Exposure Medium: Surface and Subsurface Soil
Exposure Point: Building 171
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	2.4E-08	mg/kg-day	3.0E-02	(mg/kg-day)$^{-1}$	7.3E-10
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.7E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.5E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	8.8E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	1.8E-07	mg/kg-day	1.1E-01	(mg/kg-day)$^{-1}$	2.0E-08
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M	7.3E-04	mg/kg-day		(mg/kg-day)$^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	3.7E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	5.6E-07
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M	3.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M	1.5E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										**5.8E-07**
Dermal	2,4,6-Trinitrotoluene	5.32E-01	mg/kg	5.32E-01	mg/kg	M	8.9E-10	mg/kg-day	3.0E-02	(mg/kg-day)$^{-1}$	2.7E-11
	2-Amino-4,6-dinitrotoluene	3.68E-01	mg/kg	3.68E-01	mg/kg	M	1.2E-10	mg/kg-day		(mg/kg-day)$^{-1}$	
	4-Amino-2,6-dinitrotoluene	5.52E+00	mg/kg	5.52E+00	mg/kg	M	2.6E-09	mg/kg-day		(mg/kg-day)$^{-1}$	
	HMX	1.91E+02	mg/kg	1.91E+02	mg/kg	M	6.0E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	RDX	3.89E+00	mg/kg	3.89E+00	mg/kg	M	3.0E-09	mg/kg-day	1.1E-01	(mg/kg-day)$^{-1}$	3.4E-10
	Aluminum	1.58E+04	mg/kg	1.58E+04	mg/kg	M		mg/kg-day		(mg/kg-day)$^{-1}$	
	Arsenic	8.10E+00	mg/kg	8.10E+00	mg/kg	M	1.3E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	1.9E-08
	Barium	6.56E+01	mg/kg	6.56E+01	mg/kg	M		mg/kg-day		(mg/kg-day)$^{-1}$	
	Mercury	3.26E-01	mg/kg	3.26E-01	mg/kg	M		mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										**1.9E-08**
										Total Risk Across All Exposure Routes/Pathways	**6.0E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

2,4,6-Trinitrotoluene - 0.032
2-Amino-4,6-dinitrotoluene - 0.006
4-Amino-2,6-dinitrotoluene - 0.009
HMX - 0.006
RDX - 0.015
Arsenic - 0.03
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.47
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.01	U.S. EPA Region 4, May 2000	0.01	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	24	Professional judgement	12	Professional judgement	
	ED	Exposure Duration	(years)	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	2	Professional judgement	1	Professional judgement	
	BW	Body Weight	(kg)	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	9125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4.3 of the text.
	A	Skin Surface Area	cm^2	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional judgement	12	Professional judgement	
	t_{event}	Duration of Event	hour/event	2	Professional judgement	1	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	USEPA, December 1989	

1 - Professional judgment. Assumes two days a week in warm weather months for RME and one day a week for CTE.

Daily Intake Calculations

Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Dermal Intake(RME) = 1.11E+00
Noncancer Dermal Intake(RME) = 3.10E+00

Cancer Dermal Intake(CTE) = 1.99E-01
Noncancer Dermal Intake(CTE) = 1.55E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER
MAINTENANCE WORKERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.47 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	5.5E-08	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.8E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.7E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	3.5E-04
	(total)												**3.7E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.7E-04**

TABLE 8.47 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	6.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-09**
										Total Risk Across All Exposure Routes/Pathways	**2.2E-09**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER
MAINTENANCE WORKERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	1.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.26E-08
Barium	2.80E-01	i		1.00E+00		1.00E-03		1	2.80E-07

TABLE 7.47a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-08	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.5E-06
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	4.3E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	8.9E-05
	(total)												9.5E-05
												Total Hazard Index Across All Exposure Routes/Pathways	9.5E-05

TABLE 8.47a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.5E-09	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.8E-10**
										Total Risk Across All Exposure Routes/Pathways	**2.8E-10**

TABLE 4.48
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
ADOLESCENT TRESPASSERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	26	Professional judgement	13	Professional judgement	
	ED	Exposure Duration	(years)	11	6 - 17 years of age	11	6 - 17 years of age	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	4015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	of the text.
	EF	Exposure Frequency	days/year	26	Professional judgement	13	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 5.21E-05
Noncancer Ingestion Intake(RME) = 3.31E-04

Cancer Ingestion Intake(CTE) = 1.30E-05
Noncancer Ingestion Intake(CTE) = 8.28E-05

Cancer Dermal Intake(RME) = 8.54E-01
Noncancer Dermal Intake(RME) = 5.43E+00

Cancer Dermal Intake(CTE) = 4.03E-01
Noncancer Dermal Intake(CTE) = 2.57E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
ADOLESCENT TRESPASSERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.52E-08
Barium	2.80E-01	i		4.00E+00		1.00E-03		1	1.12E-06

TABLE 7.48 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	3.3E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.1E-03
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	9.3E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.3E-03
	(total)												**2.4E-03**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.4E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	4.6E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	6.1E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.2E-03
	(total)												**1.3E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.7E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.48 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	5.2E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	5.7E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.7E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.1E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.4E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	9.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**5.9E-08**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
ADOLESCENT TRESPASSERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.48a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	8.2E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.7E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.3E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	3.3E-04
	(total)												**6.0E-04**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	4.6E-08	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.5E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.4E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	2.9E-04
	(total)												**3.1E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**9.1E-04**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.48a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.3E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	7.2E-09	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	7.9E-10
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.9E-10**
										Total Risk Across All Exposure Routes/Pathways	**1.5E-08**

TABLE 4.49
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
CHILD RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	2190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
CHILD RECREATIONAL USERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.52E-08
Barium	2.80E-01	i		4.00E+00		1.00E-03		1	1.12E-06

TABLE 7.49 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.9E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.3E-03
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.3E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	7.6E-03
	(total)												**1.4E-02**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	7.9E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.6E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.5E-05	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	7.2E-03
	(total)												**7.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.1E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.49 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-07
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	4.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-07**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	6.8E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	7.4E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**1.8E-07**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
CHILD RECREATIONAL USERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.49a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	4.7E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.6E-03
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.3E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.9E-03
	(total)												**3.5E-03**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.8E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	9.3E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	8.8E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.8E-03
	(total)												**1.9E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.4E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.49a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.3E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	8.0E-09	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-10
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.8E-10**
										Total Risk Across All Exposure Routes/Pathways	**1.6E-08**

TABLE 4.50
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
ADULT RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.01	U.S. EPA Region 4, May 2000	0.01	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	8760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4.3 of the text. USEPA, July 2004
	A	Skin Surface Area	cm^2	9,070	USEPA, August 1997	9,070	USEPA, August 1997	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
ADULT RECREATIONAL USERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.52E-08
Barium	2.80E-01	i		4.00E+00		1.00E-03		1	1.12E-06

TABLE 7.50 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	8.1E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.7E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.3E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	3.3E-04
	(total)												**5.9E-04**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	4.6E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.5E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.1E-05	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	4.2E-03
	(total)												**4.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.0E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.50 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.8E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.0E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**4.8E-08**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
ADULT RECREATIONAL USERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.50a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.7E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.7E-06	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	8.1E-05
	(total)												**1.5E-04**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.5E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.2E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.1E-03
	(total)												**1.1E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.3E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.50a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-09**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-09**
										Total Risk Across All Exposure Routes/Pathways	**4.0E-09**

TABLE 4.51
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE CHILD RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	2190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004		U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
FUTURE CHILD RESIDENTS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x $(6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x $((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.52E-08
Barium	2.80E-01	i		4.00E+00		1.00E-03		1	1.12E-06

TABLE 7.51 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.9E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.3E-03
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.3E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	7.6E-03
	(total)												**1.4E-02**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	7.9E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.6E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.5E-05	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	7.2E-03
	(total)												**7.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.1E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.51 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	1.8E-07
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	4.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.8E-07**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	6.8E-08	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	7.4E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**7.4E-09**
										Total Risk Across All Exposure Routes/Pathways	**1.8E-07**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
FUTURE CHILD RESIDENTS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.51a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	4.7E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.6E-03
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	1.3E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.9E-03
	(total)												**3.5E-03**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.8E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	9.3E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	8.8E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.8E-03
	(total)												**1.9E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.4E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.51a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.3E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	3.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	8.0E-09	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-10
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.8E-10**
										Total Risk Across All Exposure Routes/Pathways	**1.6E-08**

TABLE 4.52
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE ADULT RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.01	U.S. EPA Region 4, May 2000	0.01	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	8760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4.3 of the text. USEPA, July 2004
	A	Skin Surface Area	cm^2	9,070	USEPA, August 1997	9,070	USEPA, August 1997	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
FUTURE ADULT RESIDENTS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.52E-08
Barium	2.80E-01	i		4.00E+00		1.00E-03		1	1.12E-06

TABLE 7.52 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	8.1E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.7E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.3E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	3.3E-04
	(total)												**5.9E-04**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	4.6E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.5E-04
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	2.1E-05	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	4.2E-03
	(total)												**4.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.0E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.52 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.8E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.0E-08**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	7.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**4.8E-08**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH MAINSTREAM SURFACE WATER
FUTURE ADULT RESIDENTS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
RDX	9.90E-03	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	1.78E-08
Barium	2.80E-01	i		2.00E+00		1.00E-03		1	5.60E-07

TABLE 7.52a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.7E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.7E-06	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	8.1E-05
	(total)												**1.5E-04**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.5E-05
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.2E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.1E-03
	(total)												**1.1E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.3E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.52a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO MAINSTREAM SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mainstream
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	2.0E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-09**
Dermal	RDX	9.90E-03	mg/L	9.90E-03	mg/L	M	1.6E-08	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Barium	2.80E-01	mg/L	2.80E-01	mg/L	M	5.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.8E-09**
										Total Risk Across All Exposure Routes/Pathways	**4.0E-09**

TABLE 4.53
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	BW x AT
	EF	Exposure Frequency	days/year	24	Professional Judgment	12	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgment	12	Professional Judgment	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.53 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.3E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	4.4E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.1E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.6E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.2E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.8E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	9.4E-02
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	3.7E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.3E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	9.5E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	9.5E-03
	(total)												**1.3E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.5E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.1E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.2E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**4.0E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.4E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.53 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	4.6E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.9E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	5.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	1.0E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.3E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	3.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.9E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	3.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	3.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.7E-07**
										Total Risk Across All Exposure Routes/Pathways	**3.4E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.53a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	4.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	5.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	9.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	3.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.6E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	6.8E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	6.8E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.0E-08**
										Total Risk Across All Exposure Routes/Pathways	**2.7E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.53a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.2E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.2E-04
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.1E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	2.8E-04
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.0E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.0E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.0E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.3E-02
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	9.3E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.3E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.4E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.4E-03
	(total)												**3.3E-02**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.3E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-04
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	5.3E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	2.1E-05
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**2.0E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.3E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 4.54
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) = Csed x IR x Fi x EF x ED x CF / BW x AT; U.S. EPA, December 1989
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	0.5	Professional Judgement	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) = Csed x CF x SA x AF x ABS x EF x ED / BW x AT; U.S. EPA, December 1989
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgment	13	Professional Judgment	
	ED	Exposure Duration	years	11	U.S. EPA, December 1989	11	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 3.25E-09
Noncancer Ingestion Intake - CTE = 2.07E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.54 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	2.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.3E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	7.8E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.9E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.1E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	2.8E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	5.7E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	5.0E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	1.7E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	6.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	9.4E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	1.7E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.7E-02
	(total)												**2.3E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	6.2E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.9E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	7.4E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**6.9E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.4E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.54 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.6E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.8E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	2.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**2.7E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.54a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	2.8E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.8E-04
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	9.7E-08	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	2.4E-04
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.9E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	3.5E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	7.1E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	6.2E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.1E-02
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	8.2E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.2E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.1E-03
	(total)												**2.9E-02**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.8E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.8E-04
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.8E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	7.0E-05
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**6.5E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**3.0E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.54a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	4.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	5.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	9.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	3.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.8E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	2.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.1E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.55
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.55 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.3E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.3E-02
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	4.5E-06	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.1E-02
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-01
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.6E-05	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.2E-02
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.8E-01	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	9.5E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	3.8E-03	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.4E-02
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	9.6E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	9.6E-02
	(total)												**1.3E+00**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.6E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.1E-07	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.3E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**4.0E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.4E+00**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.55 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.1E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	3.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	4.6E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.4E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	3.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	8.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.9E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	9.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.3E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.55a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.3E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	2.8E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.1E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.1E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.1E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.4E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	9.4E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.3E-02
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.4E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.4E-02
	(total)												**3.3E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.6E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.1E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.3E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**4.0E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.4E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.55a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	9.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	3.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	3.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.8E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.0E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	2.7E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	6.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.8E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	3.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.6E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	3.1E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.6E-08**
										Total Risk Across All Exposure Routes/Pathways	**6.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.56
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.56 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.4E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	4.8E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.2E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.9E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.7E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.5E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	3.0E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	1.0E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	4.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.8E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	1.0E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.0E-02
	(total)												**1.4E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.4E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	2.2E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	8.8E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**8.2E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.5E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.56 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	4.8E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	6.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	1.0E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.4E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	3.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.0E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	7.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	7.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.1E-06**
										Total Risk Across All Exposure Routes/Pathways	**4.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.56a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.5E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.5E-04
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.2E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	3.0E-04
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.8E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.4E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.7E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.6E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.5E-02
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.4E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.6E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.6E-03
	(total)												**3.6E-02**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	5.3E-04
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.6E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	6.3E-05
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**5.9E-04**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.6E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.56a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.6E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.6E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.6E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.4E-08**
										Total Risk Across All Exposure Routes/Pathways	**2.4E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.57 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.3E-02	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.3E-02
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	4.5E-06	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.1E-02
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-01
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.6E-05	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.2E-02
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.8E-01	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	9.5E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	3.8E-03	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.4E-02
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	9.6E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	9.6E-02
	(total)												**1.3E+00**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.0E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	9.1E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.6E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**3.4E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.4E+00**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.57 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.1E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	3.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	4.6E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.9E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.4E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	3.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	8.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.9E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	7.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	7.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.2E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.57
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	Professional Judgment	50	Professional Judgment	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 4.56E-07
Noncancer Dermal Intake - RME = 5.32E-06

Cancer Dermal Intake - CTE = 1.52E-08
Noncancer Dermal Intake - CTE = 5.32E-07

TABLE 7.57a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.3E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.3E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	2.8E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.5E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.1E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.1E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.1E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.4E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	9.4E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.3E-02
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.4E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.4E-02
	(total)												**3.3E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.1E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.0E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	9.1E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.6E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**3.4E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**3.4E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.57a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	9.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	3.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	3.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.8E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	2.0E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	2.7E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	6.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.8E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.6E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	2.6E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.9E-08**
										Total Risk Across All Exposure Routes/Pathways	**6.2E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.58
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO MAINSTREAM SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	50	Professional Judgment	25	Professional Judgment	$\frac{Csed \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csed \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 2.78E-07
Noncancer Dermal Intake - RME = 8.12E-07

Cancer Dermal Intake - CTE = 5.80E-09
Noncancer Dermal Intake - CTE = 5.80E-08

TABLE 7.58 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	1.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.4E-03
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	4.8E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	1.2E-03
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	5.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.9E-02
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.7E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.5E-03
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	3.0E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	1.0E-01
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	4.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.8E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	1.0E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.0E-02
	(total)												**1.4E-01**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.6E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	1.4E-08	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	5.6E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**5.2E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**1.5E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.58 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	4.8E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	2.0E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-06
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	6.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	1.0E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.4E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	3.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.0E-06**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	4.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.1E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										7.1E-07
										Total Risk Across All Exposure Routes/Pathways	**3.7E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.58a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.5E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	3.5E-04
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.2E-07	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	3.0E-04
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.8E-03
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.4E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	8.7E-04
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.6E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.5E-02
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	1.4E-03
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.6E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	2.6E-03
	(total)												**3.6E-02**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.9E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.3E-04
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	9.9E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.0E-05
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**3.7E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**3.6E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03

Cadmium - 0.001

Other Metals - not evaluated for dermal contact with soil.

TABLE 8.58a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mainstream Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M	3.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	1.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-07
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	4.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M	7.6E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M	1.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M	2.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.2E-07**
Dermal	Aluminum	1.37E+04	mg/kg	1.37E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	4.70E+00	mg/kg	4.70E+00	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	5.69E+01	mg/kg	5.69E+01	mg/kg	M	9.9E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Cadmium	1.71E+01	mg/kg	1.71E+01	mg/kg	M	9.9E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.99E+05	mg/kg	2.99E+05	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	3.96E+03	mg/kg	3.96E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.01E+02	mg/kg	1.01E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.5E-08**
										Total Risk Across All Exposure Routes/Pathways	**2.3E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.59
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
MAINTENANCE WORKERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	24	Professional judgement	12	Professional judgement	
	t_{event}	Duration of Event	hour/event	2	Professional judgement	1	Professional judgement	USEPA. July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	USEPA, December 1989	

Daily Intake Calculations

Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Dermal Intake(RME) = 1.11E+00
Noncancer Dermal Intake(RME) = 3.10E+00

Cancer Dermal Intake(CTE) = 1.99E-01
Noncancer Dermal Intake(CTE) = 1.55E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY MAINTENANCE WORKERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	2.00E+00	2.77E+00	7.02E-01	4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	2.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	2.00E+00	1.96E+00	9.64E-04	5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	2.20E-08
HMX	2.63E-01	o	1.15E+01	2.00E+00	4.78E+00	1.21E-04	8.01E-04	1	2.72E-07
RDX	1.94E+00	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	3.49E-06
Aluminum	3.71E+00	i		2.00E+00		1.00E-03		1	7.43E-06
Arsenic	6.26E-03	i		2.00E+00		1.00E-03		1	1.25E-08
Chromium	1.23E-02	i		2.00E+00		2.00E-03		1	4.93E-08
Iron	3.37E+00	i		2.00E+00		1.00E-03		1	6.74E-06
Lead	6.42E-03	i		2.00E+00		1.00E-03		1	1.28E-08
Manganese	4.18E-01	i		2.00E+00		1.00E-03		1	8.36E-07
Vanadium	9.75E-03	i		2.00E+00		1.00E-03		1	1.95E-08
Nitrite/Nitrate-N	2.24E+01	i		2.00E+00		1.00E-03		1	4.47E-05

TABLE 7.59 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	5.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	3.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.3E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	4.5E-05
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.8E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.4E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.8E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.4E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	8.4E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.7E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.6E-03
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	2.3E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.3E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	3.9E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.3E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.5E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.0E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.1E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.0E-05
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	4.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	2.6E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	2.7E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	6.0E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.3E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.4E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	8.7E-05
	(total)												1.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	**1.2E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.59 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	6.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.7E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.3E-06	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	9.8E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.0E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.1E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.1E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	8.1E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.4E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	9.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.9E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	8.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.4E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-08
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	5.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	7.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	9.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.3E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.3E-05**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY MAINTENANCE WORKERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	1.00E+00	2.03E+00	4.74E-01	2.75E+00	1	4.11E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	1.00E+00	2.69E+00	7.01E-01	4.27E+00	1	8.59E-07
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	1.00E+00	2.77E+00	7.02E-01	4.29E+00	1	1.29E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	1.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	7.05E-07
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	1.00E+00	1.96E+00	9.64E-04	5.59E-03	1	5.18E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	1.00E+00	1.34E+00	6.41E-04	3.46E-03	1	6.32E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	1.00E+00	1.34E+00	6.41E-04	3.46E-03	1	1.56E-08
HMX	2.63E-01	o	1.15E+01	1.00E+00	4.78E+00	1.21E-04	8.01E-04	1	1.92E-07
RDX	1.94E+00	o	4.42E+00	1.00E+00	1.84E+00	3.39E-04	1.94E-03	1	2.47E-06
Aluminum	3.71E+00	i		1.00E+00		1.00E-03		1	3.71E-06
Arsenic	6.26E-03	i		1.00E+00		1.00E-03		1	6.26E-09
Chromium	1.23E-02	i		1.00E+00		2.00E-03		1	2.47E-08
Iron	3.37E+00	i		1.00E+00		1.00E-03		1	3.37E-06
Lead	6.42E-03	i		1.00E+00		1.00E-03		1	6.42E-09
Manganese	4.18E-01	i		1.00E+00		1.00E-03		1	4.18E-07
Vanadium	9.75E-03	i		1.00E+00		1.00E-03		1	9.75E-09
Nitrite/Nitrate-N	2.24E+01	i		1.00E+00		1.00E-03		1	2.24E-05

TABLE 7.59a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	2.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	4.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.6E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.2E-05
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.0E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	9.8E-05
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	4.8E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.4E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	6.0E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.2E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	7.6E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.5E-03
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.2E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.2E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.9E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.5E-05
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	7.6E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.0E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.0E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.5E-05
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	2.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.3E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.4E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	3.0E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.2E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	6.9E-05	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	4.3E-05
	(total)												**6.6E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**6.6E-03**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.59a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	8.2E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-08
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.7E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.6E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.0E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	3.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	4.9E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-08
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-09
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	8.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.7E-06
										Total Risk Across All Exposure Routes/Pathways	**1.7E-06**

TABLE 4.60
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	26	Professional judgement	13	Professional judgement	
	ED	Exposure Duration	(years)	11	6 - 17 years of age	11	6 - 17 years of age	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	4015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	of the text.
	EF	Exposure Frequency	days/year	26	Professional judgement	13	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 5.21E-05
Noncancer Ingestion Intake(RME) = 3.31E-04

Cancer Ingestion Intake(CTE) = 1.30E-05
Noncancer Ingestion Intake(CTE) = 8.28E-05

Cancer Dermal Intake(RME) = 8.54E-01
Noncancer Dermal Intake(RME) = 5.43E+00

Cancer Dermal Intake(CTE) = 4.03E-01
Noncancer Dermal Intake(CTE) = 2.57E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
ADOLESCENT TRESPASSERS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	4.00E+00	2.03E+00	4.74E-01	2.75E+00	1	8.21E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	4.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.72E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	4.00E+00	2.77E+00	7.02E-01	4.29E+00	1	2.58E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	4.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	1.41E-06
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	4.00E+00	1.96E+00	9.64E-04	5.59E-03	1	1.04E-08
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	1.32E-08
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	3.25E-08
HMX	2.63E-01	o	1.15E+01	4.00E+00	4.78E+00	1.21E-04	8.01E-04	1	3.85E-07
RDX	1.94E+00	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	4.93E-06
Aluminum	3.71E+00	i		4.00E+00		1.00E-03		1	1.49E-05
Arsenic	6.26E-03	i		4.00E+00		1.00E-03		1	2.50E-08
Barium	8.67E-02	i		4.00E+00		1.00E-03		1	3.47E-07
Chromium	1.23E-02	i		4.00E+00		2.00E-03		1	9.87E-08
Iron	3.37E+00	i		4.00E+00		1.00E-03		1	1.35E-05
Lead	1.52E-02	i		4.00E+00		1.00E-03		1	6.07E-08
Manganese	4.18E-01	i		4.00E+00		1.00E-03		1	1.67E-06
Vanadium	9.75E-03	i		4.00E+00		1.00E-03		1	3.90E-08
Nitrite/Nitrate-N	2.24E+01	i		4.00E+00		1.00E-03		1	8.94E-05

TABLE 7.60 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	7.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	8.9E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	7.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	4.6E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	9.2E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.0E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	5.1E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.3E-02
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	8.7E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.7E-03
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	6.4E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.1E-01
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.2E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.2E-03
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	2.1E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.9E-03
	Barium	8.67E-02	mg/L	8.67E-02	mg/L	M	2.9E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	4.1E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.1E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.4E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.1E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.7E-03
	Lead	1.52E-02	mg/L	1.52E-02	mg/L	M	5.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.4E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	5.8E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	3.2E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	3.2E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	7.4E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	4.6E-03
	(total)												**2.6E-01**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	9.3E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	7.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	5.6E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.1E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	7.2E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.6E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.8E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	8.8E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.1E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.2E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	2.7E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	8.9E-03
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	8.1E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	8.1E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.4E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.5E-04
	Barium	8.67E-02	mg/L	8.67E-02	mg/L	M	1.9E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	3.8E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	5.4E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	7.2E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	7.3E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.4E-04
	Lead	1.52E-02	mg/L	1.52E-02	mg/L	M	3.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	9.1E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	9.5E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.1E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	8.2E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.9E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	3.0E-04
	(total)												3.7E-02
												Total Hazard Index Across All Exposure Routes/Pathways	**3.0E-01**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.60 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.1E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.4E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.4E-08	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.1E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-08
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.1E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.0E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	7.2E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	4.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.0E-04	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	3.3E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	4.9E-07
	Barium	8.67E-02	mg/L	8.67E-02	mg/L	M	4.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	6.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.8E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	1.52E-02	mg/L	1.52E-02	mg/L	M	7.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	2.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	5.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.2E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.2E-05
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	7.0E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.5E-06	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.2E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.2E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.8E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	8.8E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.7E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	4.2E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	4.6E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	2.1E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Barium	8.67E-02	mg/L	8.67E-02	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	8.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	1.52E-02	mg/L	1.52E-02	mg/L	M	5.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	3.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	7.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.4E-05
										Total Risk Across All Exposure Routes/Pathways	**2.6E-05**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
ADOLESCENT TRESPASSERS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	2.00E+00	2.77E+00	7.02E-01	4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	2.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	2.00E+00	1.96E+00	9.64E-04	5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	2.20E-08
HMX	2.63E-01	o	1.15E+01	2.00E+00	4.78E+00	1.21E-04	8.01E-04	1	2.72E-07
RDX	1.94E+00	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	3.49E-06
Aluminum	3.71E+00	i		2.00E+00		1.00E-03		1	7.43E-06
Arsenic	6.26E-03	i		2.00E+00		1.00E-03		1	1.25E-08
Chromium	1.23E-02	i		2.00E+00		2.00E-03		1	4.93E-08
Iron	3.37E+00	i		2.00E+00		1.00E-03		1	6.74E-06
Lead	6.42E-03	i		2.00E+00		1.00E-03		1	1.28E-08
Manganese	4.18E-01	i		2.00E+00		1.00E-03		1	8.36E-07
Vanadium	9.75E-03	i		2.00E+00		1.00E-03		1	1.95E-08
Nitrite/Nitrate-N	2.24E+01	i		2.00E+00		1.00E-03		1	4.47E-05

TABLE 7.60a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	2.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.6E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.3E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.3E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.1E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.2E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.4E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.6E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.4E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.1E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	3.1E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.2E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.7E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.0E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.4E-04
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.8E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	9.3E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.5E-05	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	1.4E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	8.1E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	8.1E-04
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.9E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.2E-03
	(total)												**6.5E-02**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	4.7E-06	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.6E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.9E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.8E-05
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.3E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.1E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	5.7E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.8E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	7.0E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.4E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	9.0E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.0E-03
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.9E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.9E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	3.2E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.1E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.3E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.7E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.7E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	5.8E-05
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	2.1E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	2.2E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	5.0E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.9E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.1E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	7.2E-05
	(total)												**9.5E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**7.5E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.60a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.5E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-08
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	5.2E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-09
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.7E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.8E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	5.4E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	9.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	2.5E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	4.8E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	8.1E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	4.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	8.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	5.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.9E-06**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.3E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	4.9E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	7.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.4E-07
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.0E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.0E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	8.9E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	3.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	8.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.4E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.5E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.0E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-09
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	7.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.8E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										4.7E-06
										Total Risk Across All Exposure Routes/Pathways	**7.7E-06**

TABLE 4.61
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
CHILD RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional Judgement	2	Professional judgement	
	BW	Body Weight	(kg)	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	2190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
CHILD RECREATIONAL USERS - REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	4.00E+00	2.03E+00	4.74E-01	2.75E+00	1	8.21E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	4.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.72E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	4.00E+00	2.77E+00	7.02E-01	4.29E+00	1	2.58E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	4.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	1.41E-06
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	4.00E+00	1.96E+00	9.64E-04	5.59E-03	1	1.04E-08
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	1.32E-08
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	3.25E-08
HMX	2.63E-01	o	1.15E+01	4.00E+00	4.78E+00	1.21E-04	8.01E-04	1	3.85E-07
RDX	1.94E+00	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	4.93E-06
Aluminum	3.71E+00	i		4.00E+00		1.00E-03		1	1.49E-05
Arsenic	6.26E-03	i		4.00E+00		1.00E-03		1	2.50E-08
Chromium	1.23E-02	i		4.00E+00		2.00E-03		1	9.87E-08
Iron	3.37E+00	i		4.00E+00		1.00E-03		1	1.35E-05
Lead	6.42E-03	i		4.00E+00		1.00E-03		1	2.57E-08
Manganese	4.18E-01	i		4.00E+00		1.00E-03		1	1.67E-06
Vanadium	9.75E-03	i		4.00E+00		1.00E-03		1	3.90E-08
Nitrite/Nitrate-N	2.24E+01	i		4.00E+00		1.00E-03		1	8.94E-05

TABLE 7.61 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	7.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.6E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.3E-03
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	5.9E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.9E-02
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.4E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.2E-02
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.0E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.0E-02
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.7E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.2E+00
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.1E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.1E-03
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.0E-02
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.3E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.8E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.4E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-02
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.9E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	3.3E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.9E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.9E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.2E-02	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.7E-02
	(total)												1.5E+00
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.2E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.5E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.1E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.0E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	5.1E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.4E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.5E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.2E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	4.7E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	4.7E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	7.8E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.6E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	3.1E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	4.1E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	4.2E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.4E-03
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	8.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	5.2E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	5.5E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.2E-06	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	4.7E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.8E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.8E-03
	(total)												2.1E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.7E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.61 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	3.6E-08	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	2.6E-08
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	4.4E-08	mg/kg-day	7.30E+00	(mg/kg-day)$^{-1}$	3.2E-07
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	6.5E-08	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	4.8E-08
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	3.4E-08	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	2.5E-08
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.3E-07	mg/kg-day	3.00E-02	(mg/kg-day)$^{-1}$	6.8E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	5.0E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.2E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	4.3E-05	mg/kg-day		(mg/kg-day)$^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-04	mg/kg-day	1.10E-01	(mg/kg-day)$^{-1}$	3.5E-05
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.0E-04	mg/kg-day		(mg/kg-day)$^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.0E-06	mg/kg-day	1.50E+00	(mg/kg-day)$^{-1}$	1.5E-06
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	5.5E-04	mg/kg-day		(mg/kg-day)$^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	6.8E-05	mg/kg-day		(mg/kg-day)$^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.6E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	3.6E-03	mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										**3.7E-05**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.2E-06	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	1.6E-06
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	4.6E-06	mg/kg-day	7.30E+00	(mg/kg-day)$^{-1}$	3.4E-05
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	6.9E-06	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	5.1E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	3.8E-06	mg/kg-day	7.30E-01	(mg/kg-day)$^{-1}$	2.8E-06
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-08	mg/kg-day	3.00E-02	(mg/kg-day)$^{-1}$	8.3E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	3.5E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	8.7E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.0E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.3E-05	mg/kg-day	1.10E-01	(mg/kg-day)$^{-1}$	1.5E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	4.0E-05	mg/kg-day		(mg/kg-day)$^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	6.7E-08	mg/kg-day	1.50E+00	(mg/kg-day)$^{-1}$	1.0E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.7E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	3.6E-05	mg/kg-day		(mg/kg-day)$^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	6.9E-08	mg/kg-day		(mg/kg-day)$^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	4.5E-06	mg/kg-day		(mg/kg-day)$^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.0E-07	mg/kg-day		(mg/kg-day)$^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.4E-04	mg/kg-day		(mg/kg-day)$^{-1}$	
	(total)										**4.5E-05**
										Total Risk Across All Exposure Routes/Pathways	**8.1E-05**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
CHILD RECREATIONAL USERS - CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)		ORGANIC OR INORGANIC?		t* (HR)	tevent	T (HR)		Kp (CM/HR)		B	FA	DAevent
Benzo(a)anthracene	2.20E-04		o		8.53E+00	2.00E+00	2.03E+00		4.74E-01		2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04		o		1.17E+01	2.00E+00	2.69E+00		7.01E-01		4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04		o		1.20E+01	2.00E+00	2.77E+00		7.02E-01		4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04		o		1.68E+01	2.00E+00	3.78E+00		1.04E+00		6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03		o		4.71E+00	2.00E+00	1.96E+00		9.64E-04		5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03		o		3.21E+00	2.00E+00	1.34E+00		6.41E-04		3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03		o		3.21E+00	2.00E+00	1.34E+00		6.41E-04		3.46E-03	1	2.20E-08
HMX	2.63E-01		o		1.15E+01	2.00E+00	4.78E+00		1.21E-04		8.01E-04	1	2.72E-07
RDX	1.94E+00		o		4.42E+00	2.00E+00	1.84E+00		3.39E-04		1.94E-03	1	3.49E-06
Aluminum	3.71E+00		i			2.00E+00			1.00E-03			1	7.43E-06
Arsenic	6.26E-03		i			2.00E+00			1.00E-03			1	1.25E-08
Chromium	1.23E-02		i			2.00E+00			2.00E-03			1	4.93E-08
Iron	3.37E+00		i			2.00E+00			1.00E-03			1	6.74E-06
Lead	6.42E-03		i			2.00E+00			1.00E-03			1	1.28E-08
Manganese	4.18E-01		i			2.00E+00			1.00E-03			1	8.36E-07
Vanadium	9.75E-03		i			2.00E+00			1.00E-03			1	1.95E-08
Nitrite/Nitrate-N	2.24E+01		i			2.00E+00			1.00E-03			1	4.47E-05

TABLE 7.61a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.6E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.3E-03
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.3E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	3.6E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.8E-02
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.5E-03
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	9.2E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.1E-01
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.8E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.8E-03
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	3.0E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	9.9E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	5.9E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.0E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.6E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	5.3E-03
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	3.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	2.0E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	8.3E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	4.6E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.6E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.1E-02	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	6.6E-03
	(total)												3.7E-01
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	9.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.0E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	3.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.7E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	4.3E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	8.5E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	5.5E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.8E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.2E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.2E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	2.0E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.5E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	7.7E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.0E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.1E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.5E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.3E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.4E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	3.1E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.2E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	7.0E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	4.4E-04
	(total)												5.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.61a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	3.0E-09	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	2.2E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.7E-09	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	2.7E-08
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	5.4E-09	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	4.0E-09
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.8E-09	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	2.1E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.9E-08	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	5.6E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	2.6E-05	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	2.9E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	5.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	8.5E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.3E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	4.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	8.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	5.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	3.0E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**3.1E-06**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.6E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	1.9E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.4E-07	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	4.0E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.2E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	6.0E-07
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.5E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	3.3E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.3E-09	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	9.8E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	9.9E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.6E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	1.7E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.6E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	8.4E-09
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	3.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.7E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	8.7E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**5.3E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.3E-06**

TABLE 4.62
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
ADULT RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.01	U.S. EPA Region 4, May 2000	0.01	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	8760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4.3 of the text. USEPA, July 2004
	A	Skin Surface Area	cm^2	9,070	USEPA, August 1997	9,070	USEPA, August 1997	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
ADULT RECREATIONAL USERS - REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	4.00E+00	2.03E+00	4.74E-01	2.75E+00	1	8.21E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	4.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.72E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	4.00E+00	2.77E+00	7.02E-01	4.29E+00	1	2.58E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	4.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	1.41E-06
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	4.00E+00	1.96E+00	9.64E-04	5.59E-03	1	1.04E-08
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	1.32E-08
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	3.25E-08
HMX	2.63E-01	o	1.15E+01	4.00E+00	4.78E+00	1.21E-04	8.01E-04	1	3.85E-07
RDX	1.94E+00	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	4.93E-06
Aluminum	3.71E+00	i		4.00E+00		1.00E-03		1	1.49E-05
Arsenic	6.26E-03	i		4.00E+00		1.00E-03		1	2.50E-08
Barium		i		4.00E+00		1.00E-03		1	0.00E+00
Chromium	1.23E-02	i		4.00E+00		2.00E-03		1	9.87E-08
Iron	3.37E+00	i		4.00E+00		1.00E-03		1	1.35E-05
Lead	6.42E-03	i		4.00E+00		1.00E-03		1	2.57E-08
Manganese	4.18E-01	i		4.00E+00		1.00E-03		1	1.67E-06
Vanadium	9.75E-03	i		4.00E+00		1.00E-03		1	3.90E-08
Nitrite/Nitrate-N	2.24E+01	i		4.00E+00		1.00E-03		1	8.94E-05

TABLE 7.62 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	2.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.5E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.3E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.2E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.1E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.1E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.3E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.6E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.3E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.0E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	3.0E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.1E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.7E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.0E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.3E-04
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.7E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	9.1E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.4E-05	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	1.4E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	7.9E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	7.9E-04
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.8E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.1E-03
	(total)												6.4E-02
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	4.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.9E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.8E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.2E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.0E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.0E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	7.1E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.4E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	9.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.0E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	2.7E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.7E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	4.6E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.5E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.8E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.4E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.5E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	8.3E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.1E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	3.2E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	7.2E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.8E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.7E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.0E-03
	(total)												1.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.62 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	6.1E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	7.5E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-08
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.1E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.2E-09
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	5.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.3E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.9E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	7.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	5.4E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.7E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	3.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	6.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										6.3E-06
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.2E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-06
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-05	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	7.9E-05
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.6E-05	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-05
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	8.9E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-06
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.6E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.1E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.6E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	6.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	8.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	5.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-04
										Total Risk Across All Exposure Routes/Pathways	**1.1E-04**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
ADULT RECREATIONAL USERS - CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	2.00E+00	2.77E+00	7.02E-01	4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	2.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	2.00E+00	1.96E+00	9.64E-04	5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	2.20E-08
HMX	2.63E-01	o	1.15E+01	2.00E+00	4.78E+00	1.21E-04	8.01E-04	1	2.72E-07
RDX	1.94E+00	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	3.49E-06
Aluminum	3.71E+00	i		2.00E+00		1.00E-03		1	7.43E-06
Arsenic	6.26E-03	i		2.00E+00		1.00E-03		1	1.25E-08
Chromium	1.23E-02	i		2.00E+00		2.00E-03		1	4.93E-08
Iron	3.37E+00	i		2.00E+00		1.00E-03		1	6.74E-06
Lead	6.42E-03	i		2.00E+00		1.00E-03		1	1.28E-08
Manganese	4.18E-01	i		2.00E+00		1.00E-03		1	8.36E-07
Vanadium	9.75E-03	i		2.00E+00		1.00E-03		1	1.95E-08
Nitrite/Nitrate-N	2.24E+01	i		2.00E+00		1.00E-03		1	4.47E-05

TABLE 7.62a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.6E-05
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	6.3E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.1E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.5E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.7E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.4E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.1E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.9E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.3E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.6E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.6E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.3E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.2E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.5E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	8.4E-05
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.9E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.3E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	8.5E-06	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	3.5E-04
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.0E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.0E-04
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.5E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.8E-04
	(total)												**1.6E-02**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.7E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	9.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.8E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.4E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.2E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.1E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.0E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.0E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.5E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	5.0E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.1E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.9E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	6.9E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	3.8E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.6E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	6.1E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.2E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.7E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	8.0E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.8E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	6.9E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.1E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.6E-04
	(total)												**3.4E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.0E-02**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.62a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.5E-10	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-10
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.5E-10	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-09
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-10	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-10
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.3E-10	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.1E-10
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	8.5E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	6.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.9E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	4.3E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.3E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	8.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.6E-07**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.4E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.9E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-06	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.7E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	9.2E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.7E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.8E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.1E-05**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-05**

TABLE 4.63
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.05	U.S. EPA Region 4, May 2000	0.05	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	2190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	1/2 total body area (EPA 200	3,300	1/2 total body area (EPA 200	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004		U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	water (DAD) are provided in Section 7.3.4.3
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 1.63E-04
Noncancer Ingestion Intake(RME) = 1.90E-03

Cancer Ingestion Intake(CTE) = 1.36E-05
Noncancer Ingestion Intake(CTE) = 4.75E-04

Cancer Dermal Intake(RME) = 2.69E+00
Noncancer Dermal Intake(RME) = 3.13E+01

Cancer Dermal Intake(CTE) = 4.48E-01
Noncancer Dermal Intake(CTE) = 1.57E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
FUTURE CHILD RESIDENTS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)		ORGANIC OR INORGANIC?		t* (HR)	tevent	T (HR)		Kp (CM/HR)		B	FA	DAevent
Benzo(a)anthracene	2.20E-04		o		8.53E+00	4.00E+00	2.03E+00		4.74E-01		2.75E+00	1	8.21E-07
Benzo(a)pyrene	2.70E-04		o		1.17E+01	4.00E+00	2.69E+00		7.01E-01		4.27E+00	1	1.72E-06
Benzo(b)fluoranthene	4.00E-04		o		1.20E+01	4.00E+00	2.77E+00		7.02E-01		4.29E+00	1	2.58E-06
Indeno(1,2,3-cd)pyrene	2.10E-04		o		1.68E+01	4.00E+00	3.78E+00		1.04E+00		6.65E+00	0.6	1.41E-06
2,4,6-Trinitrotoluene	1.39E-03		o		4.71E+00	4.00E+00	1.96E+00		9.64E-04		5.59E-03	1	1.04E-08
2-Amino-4,6-Dinitrotoluene	3.09E-03		o		3.21E+00	4.00E+00	1.34E+00		6.41E-04		3.46E-03	1	1.32E-08
4-Amino-2,6-Dinitrotoluene	7.60E-03		o		3.21E+00	4.00E+00	1.34E+00		6.41E-04		3.46E-03	1	3.25E-08
HMX	2.63E-01		o		1.15E+01	4.00E+00	4.78E+00		1.21E-04		8.01E-04	1	3.85E-07
RDX	1.94E+00		o		4.42E+00	4.00E+00	1.84E+00		3.39E-04		1.94E-03	1	4.93E-06
Aluminum	3.71E+00		i			4.00E+00			1.00E-03			1	1.49E-05
Arsenic	6.26E-03		i			4.00E+00			1.00E-03			1	2.50E-08
Chromium	1.23E-02		i			4.00E+00			2.00E-03			1	9.87E-08
Iron	3.37E+00		i			4.00E+00			1.00E-03			1	1.35E-05
Lead	6.42E-03		i			4.00E+00			1.00E-03			1	2.57E-08
Manganese	4.18E-01		i			4.00E+00			1.00E-03			1	1.67E-06
Vanadium	9.75E-03		i			4.00E+00			1.00E-03			1	3.90E-08
Nitrite/Nitrate-N	2.24E+01		i			4.00E+00			1.00E-03			1	8.94E-05

TABLE 7.63 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.1E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	7.6E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.6E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.3E-03
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	5.9E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.9E-02
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.4E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.2E-02
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.0E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.0E-02
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.7E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.2E+00
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.1E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.1E-03
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.0E-02
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.3E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.8E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.4E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-02
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.9E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	3.3E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.9E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.9E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.2E-02	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.7E-02
	(total)												1.5E+00
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.2E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.5E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.1E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.0E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	5.1E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.4E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.5E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.2E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	4.7E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	4.7E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	7.8E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.6E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	3.1E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	4.1E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	4.2E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.4E-03
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	8.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	5.2E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	5.5E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.2E-06	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	4.7E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.8E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.8E-03
	(total)												2.1E-01
												Total Hazard Index Across All Exposure Routes/Pathways	**1.7E+00**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.63 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	3.6E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	2.6E-08
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	4.4E-08	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	3.2E-07
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	6.5E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	4.8E-08
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	3.4E-08	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	2.5E-08
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.3E-07	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	6.8E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	5.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	4.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-04	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	3.5E-05
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.0E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.0E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.5E-06
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	5.5E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	6.8E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	3.6E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.7E-05
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.2E-06	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	1.6E-06
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	4.6E-06	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	3.4E-05
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	6.9E-06	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	5.1E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	3.8E-06	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	2.8E-06
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-08	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	8.3E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	3.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	8.7E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.3E-05	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	1.5E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	4.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	6.7E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.0E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	3.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	6.9E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	4.5E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										4.5E-05
										Total Risk Across All Exposure Routes/Pathways	**8.1E-05**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
FUTURE CHILD RESIDENTS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	2.00E+00	2.03E+00	4.74E-01	2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	2.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	2.00E+00	2.77E+00	7.02E-01	4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	2.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	2.00E+00	1.96E+00	9.64E-04	5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	1	2.20E-08
HMX	2.63E-01	o	1.15E+01	2.00E+00	4.78E+00	1.21E-04	8.01E-04	1	2.72E-07
RDX	1.94E+00	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1	3.49E-06
Aluminum	3.71E+00	i		2.00E+00		1.00E-03		1	7.43E-06
Arsenic	6.26E-03	i		2.00E+00		1.00E-03		1	1.25E-08
Chromium	1.23E-02	i		2.00E+00		2.00E-03		1	4.93E-08
Iron	3.37E+00	i		2.00E+00		1.00E-03		1	6.74E-06
Lead	6.42E-03	i		2.00E+00		1.00E-03		1	1.28E-08
Manganese	4.18E-01	i		2.00E+00		1.00E-03		1	8.36E-07
Vanadium	9.75E-03	i		2.00E+00		1.00E-03		1	1.95E-08
Nitrite/Nitrate-N	2.24E+01	i		2.00E+00		1.00E-03		1	4.47E-05

TABLE 7.63a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.9E-07	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.6E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.3E-03
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.3E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	3.6E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.8E-02
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.5E-03
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	9.2E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.1E-01
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.8E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.8E-03
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	3.0E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	9.9E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	5.9E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.0E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.6E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	5.3E-03
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	3.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	2.0E-04	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	8.3E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	4.6E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.6E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.1E-02	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	6.6E-03
	(total)												3.7E-01
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	9.1E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	2.9E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	1.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.0E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	3.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.7E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	4.3E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	8.5E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	5.5E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.8E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.2E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.2E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	2.0E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.5E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	7.7E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.0E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	1.1E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.5E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	2.0E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.3E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.4E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	3.1E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.2E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	7.0E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	4.4E-04
	(total)												5.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.63a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	3.0E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.7E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	2.7E-08
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	5.4E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-09
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.8E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.9E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	5.6E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	3.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	2.6E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.9E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	5.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	8.5E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	4.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	8.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	5.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	3.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.1E-06**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	2.6E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.4E-07	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	4.0E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.2E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-07
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.5E-07	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.3E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.3E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	9.8E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	4.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	9.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	1.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.6E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.6E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	8.4E-09
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	3.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	8.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	2.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.3E-06**
										Total Risk Across All Exposure Routes/Pathways	**8.3E-06**

TABLE 4.64
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cw	Chemical Concentration in Water	(mg/L)	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Chronic Daily Intake (CDI) (mg/kg-day)=
	IR	Ingestion Rate of Surface Water	(L/hr)	0.01	U.S. EPA Region 4, May 2000	0.01	U.S. EPA Region 4, May 2000	Cw x IR x ET x EF x ED / BW x AT
	EF	Exposure Frequency	(days/year)	52	Professional judgement	26	Professional judgement	
	ED	Exposure Duration	(years)	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	ET	Exposure Time	(hr/day)	4	Professional judgement	2	Professional judgement	
	BW	Body Weight	(kg)	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	(days)	25550	U.S. EPA, December 1989	25550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Noncancer)	(days)	8760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cw	Chemical Concentration in Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4.3 of the text.
	A	Skin Surface Area	cm^2	9,070	USEPA, August 1997	9,070	USEPA, August 1997	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional judgement	1	Professional judgement	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional judgement	26	Professional judgement	
	t_{event}	Duration of Event	hour/event	4	Professional judgement	2	Professional judgement	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	USEPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	USEPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 2.79E-05
Noncancer Ingestion Intake(RME) = 8.14E-05

Cancer Ingestion Intake(CTE) = 2.04E-06
Noncancer Ingestion Intake(CTE) = 2.04E-05

Cancer Dermal Intake(RME) = 6.33E+00
Noncancer Dermal Intake(RME) = 1.85E+01

Cancer Dermal Intake(CTE) = 9.23E-01
Noncancer Dermal Intake(CTE) = 9.23E+00

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
FUTURE ADULT RESIDENTS- REASONABLE MAXIMUM EXPOSURE (RME)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	FA	DAevent
Benzo(a)anthracene	2.20E-04	o	8.53E+00	4.00E+00	2.03E+00	4.74E-01	2.75E+00	1	8.21E-07
Benzo(a)pyrene	2.70E-04	o	1.17E+01	4.00E+00	2.69E+00	7.01E-01	4.27E+00	1	1.72E-06
Benzo(b)fluoranthene	4.00E-04	o	1.20E+01	4.00E+00	2.77E+00	7.02E-01	4.29E+00	1	2.58E-06
Indeno(1,2,3-cd)pyrene	2.10E-04	o	1.68E+01	4.00E+00	3.78E+00	1.04E+00	6.65E+00	0.6	1.41E-06
2,4,6-Trinitrotoluene	1.39E-03	o	4.71E+00	4.00E+00	1.96E+00	9.64E-04	5.59E-03	1	1.04E-08
2-Amino-4,6-Dinitrotoluene	3.09E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	1.32E-08
4-Amino-2,6-Dinitrotoluene	7.60E-03	o	3.21E+00	4.00E+00	1.34E+00	6.41E-04	3.46E-03	1	3.25E-08
HMX	2.63E-01	o	1.15E+01	4.00E+00	4.78E+00	1.21E-04	8.01E-04	1	3.85E-07
RDX	1.94E+00	o	4.42E+00	4.00E+00	1.84E+00	3.39E-04	1.94E-03	1	4.93E-06
Aluminum	3.71E+00	i		4.00E+00		1.00E-03		1	1.49E-05
Arsenic	6.26E-03	i		4.00E+00		1.00E-03		1	2.50E-08
Chromium	1.23E-02	i		4.00E+00		2.00E-03		1	9.87E-08
Iron	3.37E+00	i		4.00E+00		1.00E-03		1	1.35E-05
Lead	6.42E-03	i		4.00E+00		1.00E-03		1	2.57E-08
Manganese	4.18E-01	i		4.00E+00		1.00E-03		1	1.67E-06
Vanadium	9.75E-03	i		4.00E+00		1.00E-03		1	3.90E-08
Nitrite/Nitrate-N	2.24E+01	i		4.00E+00		1.00E-03		1	8.94E-05

TABLE 7.64 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	2.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	3.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	1.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.5E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.3E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.2E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.1E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.1E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.3E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	1.6E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.3E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	3.0E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	3.0E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	5.1E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.7E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.0E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.3E-04
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.7E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	9.1E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	5.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.4E-05	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	1.4E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	7.9E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	7.9E-04
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.8E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.1E-03
	(total)												6.4E-02
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	1.5E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	3.2E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	4.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	2.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	1.9E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.8E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	2.4E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.2E-03
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	6.0E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.0E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	7.1E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.4E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	9.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.0E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	2.7E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.7E-04
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	4.6E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.5E-03
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	1.8E-06	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.4E-02
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	2.5E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	8.3E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	4.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	3.1E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	3.2E-02
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	7.2E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.8E-02
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	1.7E-03	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	1.0E-03
	(total)												1.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.64 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	6.1E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-09
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	7.5E-09	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	5.5E-08
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.1E-08	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	8.2E-09
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	5.9E-09	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	4.3E-09
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	3.9E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	7.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	5.4E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	1.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.7E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	3.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	6.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.3E-06**
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.2E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-06
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-05	mg/kg-day	7.30E+00	$(mg/kg\text{-}day)^{-1}$	7.9E-05
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.6E-05	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-05
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	8.9E-06	mg/kg-day	7.30E-01	$(mg/kg\text{-}day)^{-1}$	6.5E-06
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.6E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.0E-09
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.1E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-06
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.6E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.4E-07
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	6.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	8.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	1.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	5.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-04
										Total Risk Across All Exposure Routes/Pathways	**1.1E-04**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH SURFACE WATER - GULLY
FUTURE ADULT RESIDENTS- CENTRAL TENDENCY EXPOSURE (CTE)

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	SW CONC. (mg/L)		ORGANIC OR INORGANIC?		t* (HR)	tevent	T (HR)		Kp (CM/HR)		B	FA	DAevent
Benzo(a)anthracene	2.20E-04		o		8.53E+00	2.00E+00	2.03E+00		4.74E-01		2.75E+00	1	5.81E-07
Benzo(a)pyrene	2.70E-04		o		1.17E+01	2.00E+00	2.69E+00		7.01E-01		4.27E+00	1	1.21E-06
Benzo(b)fluoranthene	4.00E-04		o		1.20E+01	2.00E+00	2.77E+00		7.02E-01		4.29E+00	1	1.83E-06
Indeno(1,2,3-cd)pyrene	2.10E-04		o		1.68E+01	2.00E+00	3.78E+00		1.04E+00		6.65E+00	0.6	9.97E-07
2,4,6-Trinitrotoluene	1.39E-03		o		4.71E+00	2.00E+00	1.96E+00		9.64E-04		5.59E-03	1	7.32E-09
2-Amino-4,6-Dinitrotoluene	3.09E-03		o		3.21E+00	2.00E+00	1.34E+00		6.41E-04		3.46E-03	1	8.93E-09
4-Amino-2,6-Dinitrotoluene	7.60E-03		o		3.21E+00	2.00E+00	1.34E+00		6.41E-04		3.46E-03	1	2.20E-08
HMX	2.63E-01		o		1.15E+01	2.00E+00	4.78E+00		1.21E-04		8.01E-04	1	2.72E-07
RDX	1.94E+00		o		4.42E+00	2.00E+00	1.84E+00		3.39E-04		1.94E-03	1	3.49E-06
Aluminum	3.71E+00		i			2.00E+00			1.00E-03			1	7.43E-06
Arsenic	6.26E-03		i			2.00E+00			1.00E-03			1	1.25E-08
Chromium	1.23E-02		i			2.00E+00			2.00E-03			1	4.93E-08
Iron	3.37E+00		i			2.00E+00			1.00E-03			1	6.74E-06
Lead	6.42E-03		i			2.00E+00			1.00E-03			1	1.28E-08
Manganese	4.18E-01		i			2.00E+00			1.00E-03			1	8.36E-07
Vanadium	9.75E-03		i			2.00E+00			1.00E-03			1	1.95E-08
Nitrite/Nitrate-N	2.24E+01		i			2.00E+00			1.00E-03			1	4.47E-05

TABLE 7.64a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.3E-09	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.6E-05
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	6.3E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.1E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.5E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.7E-04
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.4E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.1E-04
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.9E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.3E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.6E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.6E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.3E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.2E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.5E-07	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	8.4E-05
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.9E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.3E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.3E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	8.5E-06	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	3.5E-04
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.0E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.0E-04
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.5E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.8E-04
	(total)												1.6E-02
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-05	mg/kg-day		mg/kg-day	NA	NA	
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.7E-05	mg/kg-day		mg/kg-day	NA	NA	
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	9.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.8E-08	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.4E-04
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.2E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.1E-04
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.0E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.0E-03
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.5E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	5.0E-05
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.1E-02
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.9E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	6.9E-05
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	3.8E-04
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.6E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	6.1E-03
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.2E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-04
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.7E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	8.0E-03
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.8E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	6.9E-03
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.1E-04	mg/kg-day	1.60E+00	mg/kg-day	NA	NA	2.6E-04
	(total)												3.4E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.0E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 8.64a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SURFACE WATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Gully
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	4.5E-10	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	3.3E-10
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	5.5E-10	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	4.0E-09
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	8.1E-10	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	5.9E-10
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	4.3E-10	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	3.1E-10
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	2.8E-09	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	8.5E-11
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	6.3E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	1.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	5.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.9E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	4.3E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	7.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.3E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.9E-08
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	2.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.9E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	8.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.5E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										4.6E-07
Dermal	Benzo(a)anthracene	2.20E-04	mg/L	2.20E-04	mg/L	M	5.4E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	3.9E-07
	Benzo(a)pyrene	2.70E-04	mg/L	2.70E-04	mg/L	M	1.1E-06	mg/kg-day	7.30E+00	$(mg/kg-day)^{-1}$	8.2E-06
	Benzo(b)fluoranthene	4.00E-04	mg/L	4.00E-04	mg/L	M	1.7E-06	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	1.2E-06
	Indeno(1,2,3-cd)pyrene	2.10E-04	mg/L	2.10E-04	mg/L	M	9.2E-07	mg/kg-day	7.30E-01	$(mg/kg-day)^{-1}$	6.7E-07
	2,4,6-Trinitrotoluene	1.39E-03	mg/L	1.39E-03	mg/L	M	6.8E-09	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.0E-10
	2-Amino-4,6-Dinitrotoluene	3.09E-03	mg/L	3.09E-03	mg/L	M	8.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	4-Amino-2,6-Dinitrotoluene	7.60E-03	mg/L	7.60E-03	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	2.63E-01	mg/L	2.63E-01	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	1.94E+00	mg/L	1.94E+00	mg/L	M	3.2E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	3.5E-07
	Aluminum	3.71E+00	mg/L	3.71E+00	mg/L	M	6.9E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	6.26E-03	mg/L	6.26E-03	mg/L	M	1.2E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.7E-08
	Chromium	1.23E-02	mg/L	1.23E-02	mg/L	M	4.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	3.37E+00	mg/L	3.37E+00	mg/L	M	6.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	6.42E-03	mg/L	6.42E-03	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	4.18E-01	mg/L	4.18E-01	mg/L	M	7.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	9.75E-03	mg/L	9.75E-03	mg/L	M	1.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	2.24E+01	mg/L	2.24E+01	mg/L	M	4.1E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										1.1E-05
										Total Risk Across All Exposure Routes/Pathways	**1.1E-05**

TABLE 7.65 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	9.6E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	9.6E-04
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7.9E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.6E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.3E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.3E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.5E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	8.3E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.8E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	7.2E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.4E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	5.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	2.2E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.2E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	5.5E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	5.5E-03
	(total)												**4.5E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	6.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.7E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.6E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	8.3E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.3E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.6E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**4.6E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.65 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.6E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	3.4E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	8.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	3.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.6E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	2.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	8.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	2.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-06**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.1E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.2E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.5E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.7E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.65
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF MAINTENANCE WORKERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	24	Professional Judgment	12	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.02	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	24	Professional Judgment	12	Professional Judgment	
	ED	Exposure Duration	years	25	U.S. EPA, December 1989	9	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.35E-08
Noncancer Ingestion Intake - RME = 9.39E-08

Cancer Ingestion Intake - CTE = 3.02E-09
Noncancer Ingestion Intake - CTE = 2.35E-08

Cancer Dermal Intake - RME = 2.21E-07
Noncancer Dermal Intake - RME = 6.20E-07

Cancer Dermal Intake - CTE = 3.99E-09
Noncancer Dermal Intake - CTE = 3.10E-08

TABLE 7.65a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.4E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.4E-04
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.0E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.0E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.7E-05
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.1E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.3E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.1E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.9E-04
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.8E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	6.0E-03
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.4E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	5.6E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.0E-04
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.4E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.4E-03
	(total)												**1.1E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.6E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	3.0E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.4E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	7 9E-05
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.1E-11	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	1.7E-06
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**8.0E-05**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.1E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.65a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF MAINTENANCE WORKERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Maintenance Worker
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.6E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	3.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	7.7E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.3E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	7.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.8E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.3E-07
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	3.8E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	3.0E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.6E-09
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	5.3E-12	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										6.3E-09
										Total Risk Across All Exposure Routes/Pathways	1.3E-07

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.66
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	$\frac{Csed \times IR \times Fi \times EF \times ED \times CF}{BW \times AT}$
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	0.5	Professional Judgement	
	EF	Exposure Frequency	days/year	26	Professional Judgement	13	Professional Judgement	U.S. EPA, December 1989
	ED	Exposure Duration	years	11	6 - 17 years of age	11	6 - 17 years of age	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	$\frac{Csed \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Area	cm^2/day	3,280	U.S. EPA, August 1997	3,100	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	26	Professional Judgment	13	Professional Judgment	
	ED	Exposure Duration	years	11	U.S. EPA, December 1989	11	U.S. EPA, December 1989	
	BW	Body Weight	kg	43	U.S. EPA, August 1997	43	U.S. EPA, August 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	4,015	U.S. EPA, December 1989	4,015	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 2.60E-08
Noncancer Ingestion Intake - RME = 1.66E-07

Cancer Ingestion Intake - CTE = 3.25E-09
Noncancer Ingestion Intake - CTE = 2.07E-08

Cancer Dermal Intake - RME = 1.71E-07
Noncancer Dermal Intake - RME = 1.09E-06

Cancer Dermal Intake - CTE = 1.61E-08
Noncancer Dermal Intake - CTE = 1.03E-07

TABLE 7.66 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	6.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	1.7E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.7E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.4E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	2.8E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	4.0E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	4.4E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	1.5E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	4.9E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.3E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	4.2E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	9.8E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	4.0E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.7E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	9.7E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	9.7E-03
	(total)												**7.9E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	5.5E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	8.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.8E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.5E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	5.8E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**2.8E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**8.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.66 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.4E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.6E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.0E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	6.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-06
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	8.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.3E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.3E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										2.7E-07
										Total Risk Across All Exposure Routes/Pathways	1.3E-06

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.66a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	8.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.1E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.1E-04
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	5.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.8E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	3.5E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.0E-05
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.8E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	5.5E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	6.1E-04
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.6E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	5.3E-03
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.2E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	5.0E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	7.1E-04
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.2E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.2E-03
	(total)												**9.9E-03**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	5.2E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	9.9E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	7.8E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.6E-04
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.4E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	5.5E-06
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**2.7E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.0E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.66a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADOLESCENT TRESPASSERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Trespasser
Receptor Age: Adolescent (age 6 - 17)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.3E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.4E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	3.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	8.3E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.5E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	7.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.3E-07**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	8.2E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.0E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.6E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.8E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.2E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.6E-08**
										Total Risk Across All Exposure Routes/Pathways	**1.6E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.67
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	200	U.S. EPA, May 1993	100	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF / BW x AT
	FI	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	3,300	1/2 total body area (EPA 2004)	3,300	1/2 total body area (EPA 2004)	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 5.37E-07
Noncancer Dermal Intake - RME = 6.27E-06

Cancer Dermal Intake - CTE = 1.79E-08
Noncancer Dermal Intake - CTE = 6.27E-07

TABLE 7.67 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	9.7E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	9.7E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.0E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.3E-03
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.3E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.5E-03
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	8.4E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.8E-02
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	7.3E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.4E-01
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	5.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	2.3E-03	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.2E-02
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	5.5E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	5.5E-02
	(total)												**4.5E-01**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.2E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	6.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.6E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	8.4E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.4E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.6E-02**
										Total Hazard Index Across All Exposure Routes/Pathways			**4.7E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.67 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	6.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	8.3E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	7.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	6.2E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	4.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	1.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	4.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.4E-06**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.1E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	7.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**8.5E-07**
										Total Risk Across All Exposure Routes/Pathways	**4.2E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.67a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.4E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.0E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.0E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.0E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.8E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.4E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.1E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	7.0E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.8E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	6.1E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	5.7E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.1E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.4E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.4E-02
	(total)												**1.1E-01**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	6.0E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.8E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.6E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	8.4E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.4E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.6E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.1E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.67a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.6E-09	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.9E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.0E-10	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	3.7E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	6.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.6E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	9.1E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	6.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	5.2E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	1.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**2.8E-07**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.1E-10	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	6.6E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.7E-10	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.3E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.4E-08	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	2.0E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.4E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**2.8E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.1E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.68
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	U.S. EPA, May 1993	50	U.S. EPA, May 1993	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	0.5	Professional Judgment	0.5	Professional Judgment	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	9,070	U.S. EPA, August 1997	9,070	U.S. EPA, August 1997	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 4.43E-07
Noncancer Dermal Intake - RME = 1.29E-06

Cancer Dermal Intake - CTE = 9.23E-09
Noncancer Dermal Intake - CTE = 9.23E-08

TABLE 7.68 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	4.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	1.0E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.0E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.6E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.7E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.5E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.7E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	9.0E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.0E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	7.8E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.6E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	6.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	2.4E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.5E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	5.9E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	5.9E-03
	(total)												**4.9E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	6.6E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.2E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	9.8E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	3.3E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.7E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	6.9E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**3.3E-03**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.68 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	3.5E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	8.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	3.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.7E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	2.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	8.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	2.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-06**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.6E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	4.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	3.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	5.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.0E-07**
										Total Risk Across All Exposure Routes/Pathways	**2.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.68a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.6E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.6E-04
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.2E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.3E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	6.2E-05
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.8E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.3E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	7.5E-04
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.9E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	6.5E-03
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	6.1E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.7E-04
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.5E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.5E-03
	(total)												**1.2E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	4.7E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	8.9E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	7.0E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.3E-04
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.2E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.9E-06
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**2.4E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.68a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.2E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.5E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	6.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.1E-07
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	4.7E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.4E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	8.9E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-10
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	7.0E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.2E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.5E-08
										Total Risk Across All Exposure Routes/Pathways	1.2E-07

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.69
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	100	Professional Judgment	50	Professional Judgment	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	2,800	U.S. EPA, July 2004	2,800	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.2	U.S. EPA, July 2004	0.04	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	6	U.S. EPA, December 1989	2	U.S. EPA, December 1989	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 8.14E-08
Noncancer Ingestion Intake - RME = 9.50E-07

Cancer Ingestion Intake - CTE = 6.78E-09
Noncancer Ingestion Intake - CTE = 2.37E-07

Cancer Dermal Intake - RME = 4.56E-07
Noncancer Dermal Intake - RME = 5.32E-06

Cancer Dermal Intake - CTE = 1.52E-08
Noncancer Dermal Intake - CTE = 5.32E-07

TABLE 7.69 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	9.7E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	9.7E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.0E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.6E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.3E-03
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.3E-06	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.5E-03
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	8.4E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	2.8E-02
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	7.3E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.4E-01
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	5.6E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	2.3E-03	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.2E-02
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	5.5E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	5.5E-02
	(total)												**4.5E-01**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.7E-07	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.0E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.3E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	7.1E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	2.8E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.4E-02**
										Total Hazard Index Across All Exposure Routes/Pathways			**4.7E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.69 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	3.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	6.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.4E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	8.3E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.1E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	7.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	6.2E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	4.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	1.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	4.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**3.4E-06**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	4.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	3.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	6.1E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**7.2E-07**
										Total Risk Across All Exposure Routes/Pathways	**4.1E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.69a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.3E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.8E-08	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.4E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.0E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.0E-02
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.0E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	5.8E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.2E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.4E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.1E-05	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	7.0E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.8E-02	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	6.1E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.4E-05	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	5.7E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.1E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.4E-05	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.4E-02
	(total)												**1.1E-01**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.7E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.1E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.0E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.3E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	7.1E-10	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	2.8E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.4E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.1E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.69a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.7E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	6.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	9.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	6.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	5.2E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	1.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	4.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.8E-07**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	7.7E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.6E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	2.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**2.4E-08**
										Total Risk Across All Exposure Routes/Pathways	**3.1E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.70
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Ingestion CDI[1] (mg/kg/day) =
	IR	Ingestion Rate of Sediment	mg/day	50	Professional Judgment	25	Professional Judgment	Csed x IR x Fi x EF x ED x CF / BW x AT
	Fi	Fraction Ingested	unitless	1.0	U.S. EPA, May 1993	1.0	U.S. EPA, May 1993	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	U.S. EPA, December 1989
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	U.S. EPA, December 2002	95% UCL or Max	U.S. EPA, December 2002	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA, December 1989	1.0E-06	U.S. EPA, December 1989	Csed x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	5,700	U.S. EPA, July 2004	5,700	U.S. EPA, July 2004	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.07	U.S. EPA, July 2004	0.01	U.S. EPA, July 2004	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	U.S. EPA, July 2004	chemical specific	U.S. EPA, July 2004	
	EF	Exposure Frequency	days/year	52	Professional Judgment	26	Professional Judgment	
	ED	Exposure Duration	years	24	U.S. EPA, December 1989	7	U.S. EPA, December 1989	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Ingestion Intake - RME = 3.49E-08
Noncancer Ingestion Intake - RME = 1.02E-07

Cancer Ingestion Intake - CTE = 2.54E-09
Noncancer Ingestion Intake - CTE = 2.54E-08

Cancer Dermal Intake - RME = 2.78E-07
Noncancer Dermal Intake - RME = 8.12E-07

Cancer Dermal Intake - CTE = 5.80E-09
Noncancer Dermal Intake - CTE = 5.80E-08

TABLE 7.70 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	4.0E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.5E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	1.0E-03	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	1.0E-03
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.6E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	1.7E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	2.5E-04
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	2.7E-04
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	9.0E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	3.0E-03
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	7.8E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	2.6E-02
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	6.0E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	2.4E-04	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	3.5E-03
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	5.9E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	5.9E-03
	(total)												**4.9E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	4.1E-08	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	7.8E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.2E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.1E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	1.1E-09	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	4.3E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**2.1E-03**
										Total Hazard Index Across All Exposure Routes/Pathways			**5.1E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.70 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.9E-08
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.6E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	3.5E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	8.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	5.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	4.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	3.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	2.7E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	2.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	8.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	2.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.4E-06**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	2.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.0E-08
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	2.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.2E-07
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.7E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**4.4E-07**
										Total Risk Across All Exposure Routes/Pathways	**1.9E-06**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 7.70a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.6E-04	mg/kg-day	1.0E+00	mg/kg-day	NA	NA	2.6E-04
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.5E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.2E-03
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.3E-06	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	6.2E-05
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.4E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	6.8E-05
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.3E-06	mg/kg-day	3.0E-03	mg/kg-day	NA	NA	7.5E-04
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.9E-03	mg/kg-day	3.0E-01	mg/kg-day	NA	NA	6.5E-03
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.5E-06	mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	6.1E-05	mg/kg-day	7.0E-02	mg/kg-day	NA	NA	8.7E-04
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.5E-06	mg/kg-day	1.0E-03	mg/kg-day	NA	NA	1.5E-03
	(total)												**1.2E-02**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.9E-09	mg/kg-day		mg/kg-day	NA	NA	
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.6E-10	mg/kg-day		mg/kg-day	NA	NA	
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day	1.0E+00	mg/kg-day	NA	NA	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.4E-08	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.5E-04
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day	4.9E-03	mg/kg-day	NA	NA	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	7.8E-11	mg/kg-day	2.5E-05	mg/kg-day	NA	NA	3.1E-06
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day	2.1E-04	mg/kg-day	NA	NA	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day	3.0E-01	mg/kg-day	NA	NA	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day	2.8E-03	mg/kg-day	NA	NA	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day	2.6E-05	mg/kg-day	NA	NA	
	(total)												**1.5E-04**
										Total Hazard Index Across All Exposure Routes/Pathways			**1.2E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 8.70a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO GULLY SEDIMENT
SWMU 13 (MINE FILL B)
NSWCDL, DAHLGREN, VIRGINIA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Gully Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	9.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.2E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	1.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-09
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M	2.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	6.5E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.7E-08
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M	4.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	3.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M	1.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M	6.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**1.1E-07**
Dermal	Benzo(a)pyrene	3.90E-01	mg/kg	3.90E-01	mg/kg	M	2.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	Dibenzo(a,h)anthracene	7.40E-02	mg/kg	7.40E-02	mg/kg	M	5.6E-11	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-10
	Aluminum	1.02E+04	mg/kg	1.02E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	2.54E+01	mg/kg	2.54E+01	mg/kg	M	4.4E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-09
	Barium	1.70E+02	mg/kg	1.70E+02	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E+00	mg/kg	1.34E+00	mg/kg	M	7.8E-12	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	8.85E+01	mg/kg	8.85E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	7.65E+04	mg/kg	7.65E+04	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	5.90E+01	mg/kg	5.90E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	2.39E+03	mg/kg	2.39E+03	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	5.83E+01	mg/kg	5.83E+01	mg/kg	M		mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**9.2E-09**
										Total Risk Across All Exposure Routes/Pathways	**1.1E-07**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13
Arsenic - 0.03
Cadmium - 0.001
Other Metals - not evaluated for dermal contact with soil.

TABLE 4.71
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
CONSTRUCTION WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for for estimating DAevent and the chemical-specific dermally absorbed dose from water (DAD) are provided in Section 7.3.4. of the text. USEPA, July 2004
	A	Skin Surface Area	cm^2	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	
	ED	Exposure Duration	years	1	Professional Judgement	1	Professional Judgement	
	EF	Exposure Frequency	days/year	150	Professional Judgement	150	Professional Judgement	
	t_{event}	Duration of Event	hour/event	2	Professional Judgement	1.5	Professional Judgement	
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	U.S. EPA, December 1989	365	U.S. EPA, December 1989	

Daily Intake Calculations

Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Dermal Intake(RME) = 2.77E-01
Noncancer Dermal Intake(RME) = 1.94E+01

Cancer Dermal Intake(CTE) = 2.77E-01
Noncancer Dermal Intake(CTE) = 1.94E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- CONSTRUCTION WORKERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.00E+00	9.19E-01	1.75E-03	3.73E-05	1.54E-09	1	1.54E-09
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.00E+00	1.96E+00	9.64E-04	5.59E-03	3.66E-08	1	3.66E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.00E+00	1.12E+00	2.07E-03	1.07E-02	8.46E-09	1	8.46E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	5.82E-09	1	5.82E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.00E+00	6.15E-01	8.91E-03	4.01E-02	3.86E-09	1	3.86E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.00E+00	1.34E+00	6.41E-04	3.46E-03	9.92E-09	1	9.92E-09
HMX	7.86E-02	o	1.15E+01	2.00E+00	4.78E+00	1.21E-04	8.01E-04	8.13E-08	1	8.13E-08
RDX	6.69E-01	o	4.42E+00	2.00E+00	1.84E+00	3.39E-04	1.94E-03	1.20E-06	1	1.20E-06
Aluminum	2.80E+00	i		2.00E+00		1.00E-03		5.59E-06	1	5.59E-06
Antimony	3.71E-05	i		2.00E+00		1.00E-03		7.42E-11	1	7.42E-11
Arsenic	1.25E-03	i		2.00E+00		1.00E-03		2.50E-09	1	2.50E-09
Barium	4.79E-02	i		2.00E+00		1.00E-03		9.57E-08	1	9.57E-08
Beryllium	1.63E-03	i		2.00E+00		1.00E-03		3.26E-09	1	3.26E-09
Cadmium	1.34E-04	i		2.00E+00		1.00E-03		2.68E-10	1	2.68E-10
Chromium	2.18E-03	i		2.00E+00		2.00E-03		8.72E-09	1	8.72E-09
Cobalt	4.94E-02	i		2.00E+00		1.00E-03		9.88E-08	1	9.88E-08
Iron	2.19E+01	i		2.00E+00		1.00E-03		4.38E-05	1	4.38E-05
Lead	4.53E-03	i		2.00E+00		1.00E-03		9.06E-09	1	9.06E-09
Lithium	8.50E-02	i		2.00E+00		1.00E-03		1.70E-07	1	1.70E-07
Manganese	1.79E+00	i		2.00E+00		1.00E-03		3.58E-06	1	3.58E-06
Nickel	1.06E-01	i		2.00E+00		2.00E-04		4.23E-08	1	4.23E-08
Vanadium	1.78E-03	i		2.00E+00		1.00E-03		3.57E-09	1	3.57E-09
Zinc	1.35E-01	i		2.00E+00		6.00E-04		1.62E-07	1	1.62E-07
Nitrite/Nitrate-N	6.73E+00	i		2.00E+00		1.00E-03		1.35E-05	1	1.35E-05

TABLE 7.71 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.0E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	3.0E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	7.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.4E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.6E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.6E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	5.6E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	7.5E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	7.5E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.9E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	9.6E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.6E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	3.1E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.3E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.8E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.1E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.1E-04
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.4E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	2.4E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	4.8E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.6E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.9E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	3.8E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	6.3E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	4.5E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	5.2E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.1E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.7E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.3E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.9E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	9.6E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	8.5E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.8E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.8E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	3.3E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.6E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	6.9E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	7.2E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	8.2E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.0E-03
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	6.9E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.7E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.1E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.0E-05
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.6E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	2.6E-03
	(total)												1.0E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.0E-01

TABLE 8.71 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	4.3E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.0E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	3.0E-10
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.1E-09	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-10
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	3.3E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	2.1E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	6.9E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	9.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	7.4E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	4.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	9.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	9.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	4.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	3.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.8E-08

Total Risk Across All Exposure Routes/Pathways **3.8E-08**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- CONSTRUCTION WORKERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	1.50E+00	9.19E-01	1.75E-03	3.73E-05	1.33E-09	1	1.33E-09
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	1.50E+00	1.96E+00	9.64E-04	5.59E-03	3.17E-08	1	3.17E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	1.50E+00	1.12E+00	2.07E-03	1.07E-02	7.33E-09	1	7.33E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	1.50E+00	1.34E+00	6.41E-04	3.46E-03	5.04E-09	1	5.04E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	1.50E+00	6.15E-01	8.91E-03	4.01E-02	3.28E-09	1	3.28E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	1.50E+00	1.34E+00	6.41E-04	3.46E-03	8.59E-09	1	8.59E-09
HMX	7.86E-02	o	1.15E+01	1.50E+00	4.78E+00	1.21E-04	8.01E-04	7.04E-08	1	7.04E-08
RDX	6.69E-01	o	4.42E+00	1.50E+00	1.84E+00	3.39E-04	1.94E-03	1.04E-06	1	1.04E-06
Aluminum	2.80E+00	i		1.50E+00		1.00E-03		4.20E-06	1	4.20E-06
Antimony	3.71E-05	i		1.50E+00		1.00E-03		5.56E-11	1	5.56E-11
Arsenic	1.25E-03	i		1.50E+00		1.00E-03		1.87E-09	1	1.87E-09
Barium	4.79E-02	i		1.50E+00		1.00E-03		7.18E-08	1	7.18E-08
Beryllium	1.63E-03	i		1.50E+00		1.00E-03		2.45E-09	1	2.45E-09
Cadmium	1.34E-04	i		1.50E+00		1.00E-03		2.01E-10	1	2.01E-10
Chromium	2.18E-03	i		1.50E+00		2.00E-03		6.54E-09	1	6.54E-09
Cobalt	4.94E-02	i		1.50E+00		1.00E-03		7.41E-08	1	7.41E-08
Iron	2.19E+01	i		1.50E+00		1.00E-03		3.29E-05	1	3.29E-05
Lead	4.53E-03	i		1.50E+00		1.00E-03		6.79E-09	1	6.79E-09
Lithium	8.50E-02	i		1.50E+00		1.00E-03		1.28E-07	1	1.28E-07
Manganese	1.79E+00	i		1.50E+00		1.00E-03		2.69E-06	1	2.69E-06
Nickel	1.06E-01	i		1.50E+00		2.00E-04		3.17E-08	1	3.17E-08
Vanadium	1.78E-03	i		1.50E+00		1.00E-03		2.68E-09	1	2.68E-09
Zinc	1.35E-01	i		1.50E+00		6.00E-04		1.21E-07	1	1.21E-07
Nitrite/Nitrate-N	6.73E+00	i		1.50E+00		1.00E-03		1.01E-05	1	1.01E-05

TABLE 7.71a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.6E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.6E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.2E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.4E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.4E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	9.8E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.9E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	6.4E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	6.4E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.7E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	8.3E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.4E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.7E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.0E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.7E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	8.1E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	8.1E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.1E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	1.8E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.6E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.2E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.4E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	2.8E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.7E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	3.4E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.9E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	1.6E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.3E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.7E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	7.2E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.4E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.3E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.5E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.2E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.2E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	5.4E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	6.1E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	7.7E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.2E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.0E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.4E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.8E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.0E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	2.0E-03
	(total)												7.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	7.8E-02

TABLE 8.71a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CONSTRUCTION WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.7E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	8.8E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.6E-10
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.0E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	9.1E-10	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	2.1E-10
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.9E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-08
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.5E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	5.2E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	7 8E-10
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	6.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	5.6E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	9.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	3.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	7.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	8.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	7.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.3E-08
										Total Risk Across All Exposure Routes/Pathways	**3.3E-08**

TABLE 4.72
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Ingestion CDI (mg/kg/day) =
	IRgw	Water Ingestion Rate	L/day	1	Professional Judgement	1	Professional Judgement	$\frac{Cgw \times IRgw \times EF \times ED}{BW \times AT}$
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	CDI = Chronic Daily Intake
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	U.S. EPA, December 1989
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	3,300	U.S. EPA, July 2004	3,300	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	water (DAD) are provided in Section 7.3.4.
	ED	Exposure Duration	years	25	U.S. EPA, May 1993	9	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	250	U.S. EPA, May 1993	219	U.S. EPA, May 1993	
	t_{event}	Duration of Event	hour/event	0.25	U.S. EPA, July 2004	0.167	U.S. EPA, July 2004	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	U.S. EPA, December 1989	3,285	U.S. EPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 3.49E-03
Noncancer Ingestion Intake(RME) = 9.78E-03

Cancer Ingestion Intake(CTE) = 1.10E-03
Noncancer Ingestion Intake(CTE) = 8.57E-03

Cancer Dermal Intake(RME) = 1.15E+01
Noncancer Dermal Intake(RME) = 3.23E+01

Cancer Dermal Intake(CTE) = 3.64E+00
Noncancer Dermal Intake(CTE) = 2.83E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- OCCUPATIONAL WORKERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.50E-01	9.19E-01	1.75E-03	3.73E-05	5.45E-10	1	5.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.50E-01	1.96E+00	9.64E-04	5.59E-03	1.29E-08	1	1.29E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.50E-01	1.12E+00	2.07E-03	1.07E-02	2.99E-09	1	2.99E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	2.06E-09	1	2.06E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.50E-01	6.15E-01	8.91E-03	4.01E-02	1.31E-09	1	1.31E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	3.51E-09	1	3.51E-09
HMX	7.86E-02	o	1.15E+01	2.50E-01	4.78E+00	1.21E-04	8.01E-04	2.87E-08	1	2.87E-08
RDX	6.69E-01	o	4.42E+00	2.50E-01	1.84E+00	3.39E-04	1.94E-03	4.25E-07	1	4.25E-07
Aluminum	2.80E+00	i		2.50E-01		1.00E-03		6.99E-07	1	6.99E-07
Antimony	3.71E-05	i		2.50E-01		1.00E-03		9.27E-12	1	9.27E-12
Arsenic	1.25E-03	i		2.50E-01		1.00E-03		3.12E-10	1	3.12E-10
Barium	4.79E-02	i		2.50E-01		1.00E-03		1.20E-08	1	1.20E-08
Beryllium	1.63E-03	i		2.50E-01		1.00E-03		4.08E-10	1	4.08E-10
Cadmium	1.34E-04	i		2.50E-01		1.00E-03		3.35E-11	1	3.35E-11
Chromium	2.18E-03	i		2.50E-01		2.00E-03		1.09E-09	1	1.09E-09
Cobalt	4.94E-02	i		2.50E-01		1.00E-03		1.23E-08	1	1.23E-08
Iron	2.19E+01	i		2.50E-01		1.00E-03		5.48E-06	1	5.48E-06
Lead	4.53E-03	i		2.50E-01		1.00E-03		1.13E-09	1	1.13E-09
Lithium	8.50E-02	i		2.50E-01		1.00E-03		2.13E-08	1	2.13E-08
Manganese	1.79E+00	i		2.50E-01		1.00E-03		4.48E-07	1	4.48E-07
Nickel	1.06E-01	i		2.50E-01		2.00E-04		5.29E-09	1	5.29E-09
Vanadium	1.78E-03	i		2.50E-01		1.00E-03		4.46E-10	1	4.46E-10
Zinc	1.35E-01	i		2.50E-01		6.00E-04		2.02E-08	1	2.02E-08
Nitrite/Nitrate-N	6.73E+00	i		2.50E-01		1.00E-03		1.68E-06	1	1.68E-06

TABLE 7.72 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.3E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.3E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.8E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.4E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	9.7E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	9.7E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.0E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	9.8E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.3E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	5.7E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.4E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.7E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.7E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.5E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.5E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.2E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.7E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.7E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.6E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	9.1E-04
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.2E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.1E-02
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.7E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	6.7E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.6E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	8.0E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.3E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.6E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.1E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.8E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.4E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.1E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.1E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.4E-05	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.3E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	4.2E-01
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.8E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	7.3E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.0E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.2E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.7E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.7E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.3E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.4E-03
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.6E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	6.6E-01
	(total)												**5.3E+00**

TABLE 7.72 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.8E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.8E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	4.2E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	8.3E-04
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	9.7E-08	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	9.7E-05
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	6.6E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.3E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	4.2E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	4.2E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	5.7E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	9.3E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.9E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.4E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	4.6E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.3E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.3E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.0E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	5.0E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.0E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	3.4E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.9E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	7.9E-05
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.3E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	9.4E-04
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.1E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	4.3E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	3.5E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	4.7E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.0E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.0E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.8E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	5.9E-04
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.7E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	6.9E-07	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	3.4E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.4E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.5E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.7E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	2.1E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.4E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	5.5E-04
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	6.5E-07	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.2E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	5.4E-05	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	5.4E-04
	(total)												**2.6E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.4E+00**

TABLE 8.72 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	8.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	2.4E-05	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	7.3E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	3.5E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	7.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	4.7E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	1.1E-07
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.3E-03	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	2.6E-04
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	9.8E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	4.4E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	6.6E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	5.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	4.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	7.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	7.7E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	3.0E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	6.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	3.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	6.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	4.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.4E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**2.6E-04**

TABLE 8.72 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	6.3E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.5E-07	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	4.5E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	3.5E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.5E-08	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	3.5E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	3.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	4.9E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	5.4E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	8.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.1E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.6E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	5.4E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.7E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.9E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	6.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.1E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										5.5E-07
										Total Risk Across All Exposure Routes/Pathways	**2.6E-04**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- OCCUPATIONAL WORKERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	1.67E-01	9.19E-01	1.75E-03	3.73E-05	4.45E-10	1	4.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	1.67E-01	1.96E+00	9.64E-04	5.59E-03	1.06E-08	1	1.06E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	1.67E-01	1.12E+00	2.07E-03	1.07E-02	2.45E-09	1	2.45E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	1.68E-09	1	1.68E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	1.67E-01	6.15E-01	8.91E-03	4.01E-02	1.07E-09	1	1.07E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	2.87E-09	1	2.87E-09
HMX	7.86E-02	o	1.15E+01	1.67E-01	4.78E+00	1.21E-04	8.01E-04	2.35E-08	1	2.35E-08
RDX	6.69E-01	o	4.42E+00	1.67E-01	1.84E+00	3.39E-04	1.94E-03	3.48E-07	1	3.48E-07
Aluminum	2.80E+00	i		1.67E-01		1.00E-03		4.67E-07	1	4.67E-07
Antimony	3.71E-05	i		1.67E-01		1.00E-03		6.19E-12	1	6.19E-12
Arsenic	1.25E-03	i		1.67E-01		1.00E-03		2.09E-10	1	2.09E-10
Barium	4.79E-02	i		1.67E-01		1.00E-03		7.99E-09	1	7.99E-09
Beryllium	1.63E-03	i		1.67E-01		1.00E-03		2.72E-10	1	2.72E-10
Cadmium	1.34E-04	i		1.67E-01		1.00E-03		2.24E-11	1	2.24E-11
Chromium	2.18E-03	i		1.67E-01		2.00E-03		7.28E-10	1	7.28E-10
Cobalt	4.94E-02	i		1.67E-01		1.00E-03		8.25E-09	1	8.25E-09
Iron	2.19E+01	i		1.67E-01		1.00E-03		3.66E-06	1	3.66E-06
Lead	4.53E-03	i		1.67E-01		1.00E-03		7.56E-10	1	7.56E-10
Lithium	8.50E-02	i		1.67E-01		1.00E-03		1.42E-08	1	1.42E-08
Manganese	1.79E+00	i		1.67E-01		1.00E-03		2.99E-07	1	2.99E-07
Nickel	1.06E-01	i		1.67E-01		2.00E-04		3.53E-09	1	3.53E-09
Vanadium	1.78E-03	i		1.67E-01		1.00E-03		2.98E-10	1	2.98E-10
Zinc	1.35E-01	i		1.67E-01		6.00E-04		1.35E-08	1	1.35E-08
Nitrite/Nitrate-N	6.73E+00	i		1.67E-01		1.00E-03		1.12E-06	1	1.12E-06

TABLE 7.72a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.0E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.0E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	5.9E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.2E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	8.5E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	8.5E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.7E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	8.6E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.2E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	5.0E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.9E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.5E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.7E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.3E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.7E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.9E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.4E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.4E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.2E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	7.9E-04
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.1E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	3.6E-02
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.1E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	5.9E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.4E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	7.0E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.1E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.3E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.9E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.2E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.2E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.1E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.9E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	6.3E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.9E-05	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	7.3E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	3.6E-01
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.5E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	6.4E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	9.1E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	4.5E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.5E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.5E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.2E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.9E-03
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	5.8E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	5.8E-01
	(total)												**4.7E+00**

TABLE 7.72a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.3E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.3E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.0E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.0E-04
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	6.9E-08	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	6.9E-05
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	4.8E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.4E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.0E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	3.0E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	8.1E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.1E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.6E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.3E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	9.8E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.3E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.3E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.3E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.8E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	2.9E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	5.9E-09	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.0E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.3E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	4.6E-05
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	7.7E-09	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	5.5E-04
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	6.3E-10	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.5E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.1E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.7E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.3E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.2E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.0E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.4E-04
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.1E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	4.0E-07	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.0E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	8.5E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	8.8E-03
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.0E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.2E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	8.4E-09	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	3.2E-04
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.8E-07	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.3E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	3.2E-05	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	3.2E-04
	(total)												1.6E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.7E+00

TABLE 8.72a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.6E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	7.6E-06	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.3E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.5E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	3.4E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	8.7E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	7.4E-04	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	8.1E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.1E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	4.1E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.4E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.1E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	5.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	5.4E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.4E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	5.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.0E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.2E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.5E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	7.4E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**8.3E-05**

TABLE 8.72a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.8E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	8.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	6.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.9E-09	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	8.9E-10
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	8.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.3E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	2.3E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	7.6E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	9.9E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	8.1E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	3.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.7E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	5.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	4.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	4.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.4E-07
										Total Risk Across All Exposure Routes/Pathways	**8.4E-05**

TABLE 4.73
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Ingestion CDI (mg/kg/day) =
	IRgw	Water Ingestion Rate	L/day	1	Professional Judgement	1	Professional Judgement	$\frac{Cgw \times IRgw \times EF \times ED}{BW \times AT}$
	EF	Exposure Frequency	days/year	52	Professional Judgement	26	Professional Judgement	
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	CDI = Chronic Daily Intake
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	U.S. EPA, December 1989
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	6,600	U.S. EPA, July 2004	6,600	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	water (DAD) are provided in Section 7.3.4.
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	U.S. EPA, May 1993	26	U.S. EPA, May 1993	
	t_{event}	Duration of Event	hour/event	0.25	U.S. EPA, July 2004	0.167	U.S. EPA, July 2004	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 8.14E-04
Noncancer Ingestion Intake(RME) = 9.50E-03

Cancer Ingestion Intake(CTE) = 1.36E-04
Noncancer Ingestion Intake(CTE) = 4.75E-03

Cancer Dermal Intake(RME) = 5.37E+00
Noncancer Dermal Intake(RME) = 6.27E+01

Cancer Dermal Intake(CTE) = 8.95E-01
Noncancer Dermal Intake(CTE) = 3.13E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- CHILD RECREATIONAL USERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.50E-01	9.19E-01	1.75E-03	3.73E-05	5.45E-10	1	5.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.50E-01	1.96E+00	9.64E-04	5.59E-03	1.29E-08	1	1.29E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.50E-01	1.12E+00	2.07E-03	1.07E-02	2.99E-09	1	2.99E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	2.06E-09	1	2.06E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.50E-01	6.15E-01	8.91E-03	4.01E-02	1.31E-09	1	1.31E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	3.51E-09	1	3.51E-09
HMX	7.86E-02	o	1.15E+01	2.50E-01	4.78E+00	1.21E-04	8.01E-04	2.87E-08	1	2.87E-08
RDX	6.69E-01	o	4.42E+00	2.50E-01	1.84E+00	3.39E-04	1.94E-03	4.25E-07	1	4.25E-07
Aluminum	2.80E+00	i		2.50E-01		1.00E-03		6.99E-07	1	6.99E-07
Antimony	3.71E-05	i		2.50E-01		1.00E-03		9.27E-12	1	9.27E-12
Arsenic	1.25E-03	i		2.50E-01		1.00E-03		3.12E-10	1	3.12E-10
Barium	4.79E-02	i		2.50E-01		1.00E-03		1.20E-08	1	1.20E-08
Beryllium	1.63E-03	i		2.50E-01		1.00E-03		4.08E-10	1	4.08E-10
Cadmium	1.34E-04	i		2.50E-01		1.00E-03		3.35E-11	1	3.35E-11
Chromium	2.18E-03	i		2.50E-01		2.00E-03		1.09E-09	1	1.09E-09
Cobalt	4.94E-02	i		2.50E-01		1.00E-03		1.23E-08	1	1.23E-08
Iron	2.19E+01	i		2.50E-01		1.00E-03		5.48E-06	1	5.48E-06
Lead	4.53E-03	i		2.50E-01		1.00E-03		1.13E-09	1	1.13E-09
Lithium	8.50E-02	i		2.50E-01		1.00E-03		2.13E-08	1	2.13E-08
Manganese	1.79E+00	i		2.50E-01		1.00E-03		4.48E-07	1	4.48E-07
Nickel	1.06E-01	i		2.50E-01		2.00E-04		5.29E-09	1	5.29E-09
Vanadium	1.78E-03	i		2.50E-01		1.00E-03		4.46E-10	1	4.46E-10
Zinc	1.35E-01	i		2.50E-01		6.00E-04		2.02E-08	1	2.02E-08
Nitrite/Nitrate-N	6.73E+00	i		2.50E-01		1.00E-03		1.68E-06	1	1.68E-06

TABLE 7.73 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.2E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.2E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.6E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.3E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	9.4E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	9.4E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.9E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	9.5E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.3E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	5.6E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.3E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.6E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.5E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.5E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.4E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.1E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.7E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.7E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.5E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	8.8E-04
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.2E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.0E-02
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.5E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	6.5E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.5E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	7.7E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.3E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.5E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.9E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.7E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.3E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.1E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	6.9E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.3E-05	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.1E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	4.0E-01
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.7E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	7.1E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.0E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.0E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.7E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.7E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.3E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.3E-03
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.4E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	6.4E-01
	(total)												**5.2E+00**

TABLE 7.73 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.4E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	3.4E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	8.1E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.6E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.9E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.9E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.3E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	6.4E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	8.2E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	8.2E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.2E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.1E-03
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.8E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	3.6E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.7E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	8.9E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	4.4E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	4.4E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	5.8E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	9.7E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	2.0E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	6.5E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	7.5E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.5E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.6E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	1.8E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	2.1E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	8.4E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	6.8E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	9.1E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	7.7E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	3.9E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	3.4E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.1E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	7.1E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.3E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	6.7E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.8E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	2.9E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	3.3E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	4.1E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.8E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.1E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.3E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.2E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.1E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.1E-03
	(total)												**5.0E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.2E+00**

TABLE 8.73 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	5.6E-06	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	1.7E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	8.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.1E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	2.5E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.4E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.4E-04	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	6.0E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.0E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.5E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.8E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	6.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.5E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	8.6E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.5E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.1E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	5.5E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**6.2E-05**

TABLE 8.73 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.9E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.1E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	7.0E-09	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.3E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	2.5E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	5.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.7E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	6.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	5.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	6.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	6.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	2.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	9.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										2.6E-07
										Total Risk Across All Exposure Routes/Pathways	**6.2E-05**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- CHILD RECREATIONAL USERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	1.67E-01	9.19E-01	1.75E-03	3.73E-05	4.45E-10	1	4.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	1.67E-01	1.96E+00	9.64E-04	5.59E-03	1.06E-08	1	1.06E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	1.67E-01	1.12E+00	2.07E-03	1.07E-02	2.45E-09	1	2.45E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	1.68E-09	1	1.68E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	1.67E-01	6.15E-01	8.91E-03	4.01E-02	1.07E-09	1	1.07E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	2.87E-09	1	2.87E-09
HMX	7.86E-02	o	1.15E+01	1.67E-01	4.78E+00	1.21E-04	8.01E-04	2.35E-08	1	2.35E-08
RDX	6.69E-01	o	4.42E+00	1.67E-01	1.84E+00	3.39E-04	1.94E-03	3.48E-07	1	3.48E-07
Aluminum	2.80E+00	i		1.67E-01		1.00E-03		4.67E-07	1	4.67E-07
Antimony	3.71E-05	i		1.67E-01		1.00E-03		6.19E-12	1	6.19E-12
Arsenic	1.25E-03	i		1.67E-01		1.00E-03		2.09E-10	1	2.09E-10
Barium	4.79E-02	i		1.67E-01		1.00E-03		7.99E-09	1	7.99E-09
Beryllium	1.63E-03	i		1.67E-01		1.00E-03		2.72E-10	1	2.72E-10
Cadmium	1.34E-04	i		1.67E-01		1.00E-03		2.24E-11	1	2.24E-11
Chromium	2.18E-03	i		1.67E-01		2.00E-03		7.28E-10	1	7.28E-10
Cobalt	4.94E-02	i		1.67E-01		1.00E-03		8.25E-09	1	8.25E-09
Iron	2.19E+01	i		1.67E-01		1.00E-03		3.66E-06	1	3.66E-06
Lead	4.53E-03	i		1.67E-01		1.00E-03		7.56E-10	1	7.56E-10
Lithium	8.50E-02	i		1.67E-01		1.00E-03		1.42E-08	1	1.42E-08
Manganese	1.79E+00	i		1.67E-01		1.00E-03		2.99E-07	1	2.99E-07
Nickel	1.06E-01	i		1.67E-01		2.00E-04		3.53E-09	1	3.53E-09
Vanadium	1.78E-03	i		1.67E-01		1.00E-03		2.98E-10	1	2.98E-10
Zinc	1.35E-01	i		1.67E-01		6.00E-04		1.35E-08	1	1.35E-08
Nitrite/Nitrate-N	6.73E+00	i		1.67E-01		1.00E-03		1.12E-06	1	1.12E-06

TABLE 7.73a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.1E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.1E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.3E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.6E-02
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	4.7E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.7E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	9.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.8E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	6.4E-07	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	2.8E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.6E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	8.1E-02
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	3.7E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	7.5E-03
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	3.2E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.1E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.3E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.3E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.8E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	4.4E-04
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	5.9E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.0E-02
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.3E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	3.2E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	7.7E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	3.9E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	6.4E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.3E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.0E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.5E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.3E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.2E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.0E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.5E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.2E-05	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	4.0E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.0E-01
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	8.5E-03	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	3.5E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	5.0E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.5E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	8.5E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	8.5E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	6.4E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E-03
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	3.2E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	3.2E-01
	(total)												**2.6E+00**

TABLE 7.73a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.4E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.4E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.3E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.6E-04
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	7.7E-08	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	7.7E-05
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	5.3E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.6E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.3E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	3.3E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	9.0E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.5E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.4E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.5E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.6E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.5E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.5E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.9E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	3.2E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	6.5E-09	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.2E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.5E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	5.1E-05
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	8.5E-09	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	6.1E-04
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	7.0E-10	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.8E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.3E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	3.0E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.6E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.3E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.1E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.8E-04
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.4E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	4.5E-07	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.2E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	9.4E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	9.8E-03
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.1E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.4E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	9.3E-09	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	3.6E-04
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	4.2E-07	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.4E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	3.5E-05	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	3.5E-04
	(total)												**1.8E-02**
												Total Hazard Index Across All Exposure Routes/Pathways	**2.6E+00**

TABLE 8.73a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	9.4E-07	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.8E-08
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.8E-08	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	4.2E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.1E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	9.1E-05	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	1.0E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.8E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	5.0E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.7E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.5E-07
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	6.5E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	6.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	3.0E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	6.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.2E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.4E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.4E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.8E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	9.1E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**1.0E-05**

TABLE 8.73a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	4.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	9.5E-09	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	9.6E-10	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-10
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	3.1E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-08
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	4.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	5.5E-12	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.9E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-10
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	7.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	2.0E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	6.5E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	7.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	3.3E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	6.8E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	3.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.7E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										3.5E-08

Total Risk Across All Exposure Routes/Pathways **1.0E-05**

TABLE 4.74
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Ingestion CDI (mg/kg/day) =
	IRgw	Water Ingestion Rate	L/day	1	Professional Judgement	1	Professional Judgement	$\frac{Cgw \times IRgw \times EF \times ED}{BW \times AT}$
	EF	Exposure Frequency	days/year	52	Professional Judgement	26	Professional Judgement	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	CDI = Chronic Daily Intake
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	U.S. EPA, December 1989
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	18,000	U.S. EPA, July 2004	18,000	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	water (DAD) are provided in Section 7.3.4.
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	52	U.S. EPA, May 1993	26	U.S. EPA, May 1993	
	t_{event}	Duration of Event	hour/event	0.25	U.S. EPA, July 2004	0.167	U.S. EPA, July 2004	USEPA, July 2004
	t^*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 6.98E-04
Noncancer Ingestion Intake(RME) = 2.04E-03

Cancer Ingestion Intake(CTE) = 1.02E-04
Noncancer Ingestion Intake(CTE) = 1.02E-03

Cancer Dermal Intake(RME) = 1.26E+01
Noncancer Dermal Intake(RME) = 3.66E+01

Cancer Dermal Intake(CTE) = 1.83E+00
Noncancer Dermal Intake(CTE) = 1.83E+01

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- ADULT RECREATIONAL USERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.50E-01	9.19E-01	1.75E-03	3.73E-05	5.45E-10	1	5.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.50E-01	1.96E+00	9.64E-04	5.59E-03	1.29E-08	1	1.29E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.50E-01	1.12E+00	2.07E-03	1.07E-02	2.99E-09	1	2.99E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	2.06E-09	1	2.06E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.50E-01	6.15E-01	8.91E-03	4.01E-02	1.31E-09	1	1.31E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	3.51E-09	1	3.51E-09
HMX	7.86E-02	o	1.15E+01	2.50E-01	4.78E+00	1.21E-04	8.01E-04	2.87E-08	1	2.87E-08
RDX	6.69E-01	o	4.42E+00	2.50E-01	1.84E+00	3.39E-04	1.94E-03	4.25E-07	1	4.25E-07
Aluminum	2.80E+00	i		2.50E-01		1.00E-03		6.99E-07	1	6.99E-07
Antimony	3.71E-05	i		2.50E-01		1.00E-03		9.27E-12	1	9.27E-12
Arsenic	1.25E-03	i		2.50E-01		1.00E-03		3.12E-10	1	3.12E-10
Barium	4.79E-02	i		2.50E-01		1.00E-03		1.20E-08	1	1.20E-08
Beryllium	1.63E-03	i		2.50E-01		1.00E-03		4.08E-10	1	4.08E-10
Cadmium	1.34E-04	i		2.50E-01		1.00E-03		3.35E-11	1	3.35E-11
Chromium	2.18E-03	i		2.50E-01		2.00E-03		1.09E-09	1	1.09E-09
Cobalt	4.94E-02	i		2.50E-01		1.00E-03		1.23E-08	1	1.23E-08
Iron	2.19E+01	i		2.50E-01		1.00E-03		5.48E-06	1	5.48E-06
Lead	4.53E-03	i		2.50E-01		1.00E-03		1.13E-09	1	1.13E-09
Lithium	8.50E-02	i		2.50E-01		1.00E-03		2.13E-08	1	2.13E-08
Manganese	1.79E+00	i		2.50E-01		1.00E-03		4.48E-07	1	4.48E-07
Nickel	1.06E-01	i		2.50E-01		2.00E-04		5.29E-09	1	5.29E-09
Vanadium	1.78E-03	i		2.50E-01		1.00E-03		4.46E-10	1	4.46E-10
Zinc	1.35E-01	i		2.50E-01		6.00E-04		2.02E-08	1	2.02E-08
Nitrite/Nitrate-N	6.73E+00	i		2.50E-01		1.00E-03		1.68E-06	1	1.68E-06

TABLE 7.74 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	4.8E-07	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	4.8E-03
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.4E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.8E-02
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.0E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.0E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	4.1E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.0E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	2.8E-07	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	1.2E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	7.0E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.5E-02
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.6E-04	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	3.2E-03
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.4E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	4.5E-01
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	5.7E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	5.7E-03
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	7.5E-08	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	1.9E-04
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	2.5E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	8.5E-03
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	9.7E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.4E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	3.3E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.7E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	2.7E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	5.5E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	4.4E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.5E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.0E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.0E-03
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	4.5E-02	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.5E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	9.2E-06	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.7E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	8.7E-02
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	3.6E-03	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	1.5E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	2.2E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.1E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	3.6E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	3.6E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.7E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	9.2E-04
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.4E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.4E-01
	(total)												**1.1E+00**

TABLE 7.74 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.0E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.0E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	4.7E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	9.5E-04
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.1E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.1E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	7.5E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	3.8E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	4.8E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	4.8E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.3E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	6.4E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.1E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.1E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.6E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	5.2E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.6E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.6E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.4E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	5.7E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.1E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	3.8E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.4E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	8.9E-05
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.5E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	1.1E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.2E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	4.9E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	4.0E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	5.3E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.5E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.3E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.0E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	6.7E-04
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.1E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	7.8E-07	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	3.9E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.6E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.7E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.9E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	2.4E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.6E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	6.3E-04
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	7.4E-07	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.5E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.2E-05	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	6.2E-04
	(total)												2.9E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+00

TABLE 8.74 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	4.8E-06	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	6.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	9.4E-08	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	2.2E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	5.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	4.7E-04	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	5.1E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.0E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	2.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	8.7E-07	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.3E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	9.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.5E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	3.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.5E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	5.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.3E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	7.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.2E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	9.4E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	4.7E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**5.3E-05**

TABLE 8.74 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	6.8E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.6E-07	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	4.9E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	3.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.6E-08	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	3.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.3E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	5.9E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	8.8E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.9E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.9E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	5.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	4.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.6E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	6.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.6E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										6.0E-07
										Total Risk Across All Exposure Routes/Pathways	**5.3E-05**

TABLE 3-2

ANALYTICAL DETECTION LIMITS - ORGANICS
SWMU 6 – INERT LANDFILL SEEPAGE TRENCHES AND
SWMU 14 – INERT LANDFILL
MCAS BEAUFORT, SOUTH CAROLINA

Parameter	Reporting Limit[1]	
	Aqueous Samples (µg/L)[2]	Solid Samples (µg/kg)[3]
Volatile Organic Compounds (TCL and Appendix IX)		
1,1,1,2-Tetrachloroethane[4]	10	NA
1,1,1-trichloroethane	10	10
1,1,2-trichloro-1,2,2-trifluorethane[5]	10	10
1,1,2,2-tetrachloroethane	10	10
1,1,2-trichloroethane	10	10
1,1-dichloroethane	10	10
1,1-dichloroethene	10	10
1,2,3-Trichlorobenzene[5]	10	10
1,2,3-Trichloropropane[4]	10	NA
1,2,4-trichlorobenzene	10	10
1,2-Dibromo-3-Chloropropane	10	10
1,2-Dibromoethane	10	10
1,2-dichlorobenzene	10	10
1,2-dichloroethane	10	10
1,2-dichloropropane	10	10
1,3-dichlorobenzene	10	10
1,4-dichlorobenzene	10	10
1,4-Dioxane[4]	10	NA
2-butanone (methyl ethyl ketone)	10	10
Chloroprene[4]	10	NA
2-hexanone	10	10
4-methyl-2-pentanone	10	10
Acetone	10	10
Acetonitrile[4]	10	NA
Acrolein[4]	10	NA
Acrylonitrile[4]	10	NA
Allyl Chloride[4]	10	NA
Benzene	10	10
Bromochloromethane[5]	10	10
Bromodichloromethane	10	10
Bromoform	10	10
Bromomethane	10	10

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- ADULT RECREATIONAL USERS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$
IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	1.67E-01	9.19E-01	1.75E-03	3.73E-05	4.45E-10	1	4.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	1.67E-01	1.96E+00	9.64E-04	5.59E-03	1.06E-08	1	1.06E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	1.67E-01	1.12E+00	2.07E-03	1.07E-02	2.45E-09	1	2.45E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	1.68E-09	1	1.68E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	1.67E-01	6.15E-01	8.91E-03	4.01E-02	1.07E-09	1	1.07E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	2.87E-09	1	2.87E-09
HMX	7.86E-02	o	1.15E+01	1.67E-01	4.78E+00	1.21E-04	8.01E-04	2.35E-08	1	2.35E-08
RDX	6.69E-01	o	4.42E+00	1.67E-01	1.84E+00	3.39E-04	1.94E-03	3.48E-07	1	3.48E-07
Aluminum	2.80E+00	i		1.67E-01		1.00E-03		4.67E-07	1	4.67E-07
Antimony	3.71E-05	i		1.67E-01		1.00E-03		6.19E-12	1	6.19E-12
Arsenic	1.25E-03	i		1.67E-01		1.00E-03		2.09E-10	1	2.09E-10
Barium	4.79E-02	i		1.67E-01		1.00E-03		7.99E-09	1	7.99E-09
Beryllium	1.63E-03	i		1.67E-01		1.00E-03		2.72E-10	1	2.72E-10
Cadmium	1.34E-04	i		1.67E-01		1.00E-03		2.24E-11	1	2.24E-11
Chromium	2.18E-03	i		1.67E-01		2.00E-03		7.28E-10	1	7.28E-10
Cobalt	4.94E-02	i		1.67E-01		1.00E-03		8.25E-09	1	8.25E-09
Iron	2.19E+01	i		1.67E-01		1.00E-03		3.66E-06	1	3.66E-06
Lead	4.53E-03	i		1.67E-01		1.00E-03		7.56E-10	1	7.56E-10
Lithium	8.50E-02	i		1.67E-01		1.00E-03		1.42E-08	1	1.42E-08
Manganese	1.79E+00	i		1.67E-01		1.00E-03		2.99E-07	1	2.99E-07
Nickel	1.06E-01	i		1.67E-01		2.00E-04		3.53E-09	1	3.53E-09
Vanadium	1.78E-03	i		1.67E-01		1.00E-03		2.98E-10	1	2.98E-10
Zinc	1.35E-01	i		1.67E-01		6.00E-04		1.35E-08	1	1.35E-08
Nitrite/Nitrate-N	6.73E+00	i		1.67E-01		1.00E-03		1.12E-06	1	1.12E-06

TABLE 7.74a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.4E-07	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.4E-03
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	7.0E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.4E-02
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.0E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.0E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.0E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.0E-02
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.4E-07	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	6.0E-07
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.7E-02
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	8.0E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.6E-03
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.8E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.3E-01
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.8E-03	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.8E-03
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.8E-08	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	9.4E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.3E-06	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.2E-03
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.9E-05	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	7.0E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.7E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	8.3E-04
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.4E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.7E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.2E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.4E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	5.0E-05	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.5E-03
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.2E-02	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.4E-02
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.6E-06	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.7E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	4.3E-02
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.8E-03	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	7.6E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.1E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.4E-03
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.8E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.8E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.4E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.6E-04
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.9E-03	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	6.9E-02
	(total)												**5.6E-01**

TABLE 7.74a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	8.2E-09	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	8.2E-05
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.9E-07	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.9E-04
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	4.5E-08	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.5E-05
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	3.1E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.5E-04
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	2.0E-08	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	2.0E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	5.3E-08	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.6E-04
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	4.3E-07	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	8.6E-06
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.4E-06	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.1E-03
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	8.6E-06	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	8.6E-06
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.1E-10	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	1.9E-06
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.8E-09	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.3E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.5E-07	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	3.0E-05
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	5.0E-09	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	3.6E-04
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	4.1E-10	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	1.6E-05
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.3E-08	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.8E-04
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.5E-07	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	7.6E-06
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.7E-05	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.2E-04
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.4E-08	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.6E-07	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.3E-04
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.5E-06	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	5.7E-03
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	6.5E-08	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	8.1E-05
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.5E-09	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	2.1E-04
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.5E-07	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	8.3E-07
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.1E-05	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	2.1E-04
	(total)												**1.0E-02**

Total Hazard Index Across All Exposure Routes/Pathways **5.7E-01**

TABLE 8.74a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	7.0E-07	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.1E-08
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.4E-08	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	3.2E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	8.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.8E-05	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	7.5E-06
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.8E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.3E-07	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.9E-07
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.9E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.2E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	5.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.2E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.6E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.8E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.1E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.8E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.4E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.9E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**7.7E-06**

TABLE 8.74a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RECREATIONAL USERS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	8.2E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.9E-08	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	5.8E-10
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	4.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	3.1E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	2.0E-09	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	4.5E-10
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	5.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	4.3E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.4E-07	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	7.0E-08
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	8.6E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.1E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.8E-10	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.7E-10
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	5.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	4.1E-11	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.4E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	6.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.5E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	2.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										7.2E-08

Total Risk Across All Exposure Routes/Pathways **7.8E-06**

TABLE 4.75
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Ingestion CDI (mg/kg/day) =
	IRgw	Water Ingestion Rate	L/day	1.5	U.S. EPA, August 1997	0.66	U.S. EPA, August 1997	Cgw x IRgw x EF x ED / BW x AT
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	CDI = Chronic Daily Intake
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	U.S. EPA, December 1989
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	6,600	U.S. EPA, July 2004	6,600	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	water (DAD) are provided in Section 7.3.4.
	ED	Exposure Duration	years	6	U.S. EPA, May 1993	2	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	t_{event}	Duration of Event	hour/event	0.25	U.S. EPA, July 2004	0.167	U.S. EPA, July 2004	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	15	U.S. EPA, May 1993	15	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	U.S. EPA, December 1989	730	U.S. EPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 8.22E-03
Noncancer Ingestion Intake(RME) = 9.59E-02

Cancer Ingestion Intake(CTE) = 8.06E-04
Noncancer Ingestion Intake(CTE) = 2.82E-02

Cancer Dermal Intake(RME) = 3.62E+01
Noncancer Dermal Intake(RME) = 4.22E+02

Cancer Dermal Intake(CTE) = 8.06E+00
Noncancer Dermal Intake(CTE) = 2.82E+02

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- FUTURE CHILD RESIDENTS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.50E-01	9.19E-01	1.75E-03	3.73E-05	5.45E-10	1	5.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.50E-01	1.96E+00	9.64E-04	5.59E-03	1.29E-08	1	1.29E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.50E-01	1.12E+00	2.07E-03	1.07E-02	2.99E-09	1	2.99E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	2.06E-09	1	2.06E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.50E-01	6.15E-01	8.91E-03	4.01E-02	1.31E-09	1	1.31E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	3.51E-09	1	3.51E-09
HMX	7.86E-02	o	1.15E+01	2.50E-01	4.78E+00	1.21E-04	8.01E-04	2.87E-08	1	2.87E-08
RDX	6.69E-01	o	4.42E+00	2.50E-01	1.84E+00	3.39E-04	1.94E-03	4.25E-07	1	4.25E-07
Aluminum	2.80E+00	i		2.50E-01		1.00E-03		6.99E-07	1	6.99E-07
Antimony	3.71E-05	i		2.50E-01		1.00E-03		9.27E-12	1	9.27E-12
Arsenic	1.25E-03	i		2.50E-01		1.00E-03		3.12E-10	1	3.12E-10
Barium	4.79E-02	i		2.50E-01		1.00E-03		1.20E-08	1	1.20E-08
Beryllium	1.63E-03	i		2.50E-01		1.00E-03		4.08E-10	1	4.08E-10
Cadmium	1.34E-04	i		2.50E-01		1.00E-03		3.35E-11	1	3.35E-11
Chromium	2.18E-03	i		2.50E-01		2.00E-03		1.09E-09	1	1.09E-09
Cobalt	4.94E-02	i		2.50E-01		1.00E-03		1.23E-08	1	1.23E-08
Iron	2.19E+01	i		2.50E-01		1.00E-03		5.48E-06	1	5.48E-06
Lead	4.53E-03	i		2.50E-01		1.00E-03		1.13E-09	1	1.13E-09
Lithium	8.50E-02	i		2.50E-01		1.00E-03		2.13E-08	1	2.13E-08
Manganese	1.79E+00	i		2.50E-01		1.00E-03		4.48E-07	1	4.48E-07
Nickel	1.06E-01	i		2.50E-01		2.00E-04		5.29E-09	1	5.29E-09
Vanadium	1.78E-03	i		2.50E-01		1.00E-03		4.46E-10	1	4.46E-10
Zinc	1.35E-01	i		2.50E-01		6.00E-04		2.02E-08	1	2.02E-08
Nitrite/Nitrate-N	6.73E+00	i		2.50E-01		1.00E-03		1.68E-06	1	1.68E-06

TABLE 7.75 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.3E-05	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.3E-01
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.6E-04	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.3E+00
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	9.5E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	9.5E-02
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.9E-04	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	9.6E-01
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.3E-05	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	5.6E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.3E-04	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.6E+00
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.5E-03	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.5E-01
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.4E-02	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.1E+01
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.7E-01	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	2.7E-01
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.6E-06	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	8.9E-03
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.2E-04	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.0E-01
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.6E-03	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	6.6E-02
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.6E-04	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	7.8E-02
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.3E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	2.6E-02
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.1E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	7.0E-02
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.7E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.4E-01
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.1E+00	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.0E+00
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.3E-04	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.2E-03	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	4.1E+00
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.7E-01	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	7.2E+00
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.0E-02	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	5.1E-01
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.7E-04	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.7E-01
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.3E-02	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.3E-02
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.5E-01	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	6.5E+00
	(total)												**5.2E+01**

TABLE 7.75 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.3E-07	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	2.3E-03
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	5.5E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.1E-02
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.3E-06	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.3E-03
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	8.7E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.3E-03
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	5.5E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	5.5E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.5E-06	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	7.4E-03
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.2E-05	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.4E-04
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.8E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.0E-02
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.0E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	3.0E-04
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.9E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	6.5E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.3E-07	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	4.4E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	5.0E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	1.0E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.7E-07	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	1.2E-02
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.4E-08	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	5.7E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	4.6E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	6.1E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	5.2E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	2.6E-04
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.3E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.7E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.8E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	9.0E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	4.5E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.9E-04	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	2.0E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	2.2E-06	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	2.8E-03
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.9E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	7.2E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	8.5E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.8E-05
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	7.1E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	7.1E-03
	(total)												**3.3E-01**
												Total Hazard Index Across All Exposure Routes/Pathways	**5.3E+01**

TABLE 8.75 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	5.7E-05	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.7E-06
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	8.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.7E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.1E-06	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-07
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.8E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.5E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.5E-03	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	6.0E-04
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.3E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.0E-05	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.5E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.9E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.3E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.1E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.8E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.1E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.8E-01	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.7E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	7.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.5E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	8.7E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.1E-03	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	5.5E-02	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										**6.2E-04**

TABLE 8.75 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	4.7E-07	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	7.4E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	4.7E-08	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	1.1E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.5E-05	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	1.7E-06
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.5E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.4E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.1E-08	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1.7E-08
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.5E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.2E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	3.9E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.5E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.0E-04	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.1E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	7.7E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.6E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.6E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	7.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.1E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										1.7E-06
										Total Risk Across All Exposure Routes/Pathways	**6.2E-04**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- FUTURE CHILD RESIDENTS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)		ORGANIC OR INORGANIC?		t* (HR)	tevent	T (HR)		Kp (CM/HR)		B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04		o		2.21E+00	1.67E-01	9.19E-01		1.75E-03		3.73E-05	4.45E-10	1	4.45E-10
2,4,6-Trinitrotoluene	6.92E-03		o		4.71E+00	1.67E-01	1.96E+00		9.64E-04		5.59E-03	1.06E-08	1	1.06E-08
2,6-Dinitrotoluene	9.88E-04		o		2.69E+00	1.67E-01	1.12E+00		2.07E-03		1.07E-02	2.45E-09	1	2.45E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03		o		3.21E+00	1.67E-01	1.34E+00		6.41E-04		3.46E-03	1.68E-09	1	1.68E-09
2-Nitrotoluene	1.35E-04		o		1.48E+00	1.67E-01	6.15E-01		8.91E-03		4.01E-02	1.07E-09	1	1.07E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03		o		3.21E+00	1.67E-01	1.34E+00		6.41E-04		3.46E-03	2.87E-09	1	2.87E-09
HMX	7.86E-02		o		1.15E+01	1.67E-01	4.78E+00		1.21E-04		8.01E-04	2.35E-08	1	2.35E-08
RDX	6.69E-01		o		4.42E+00	1.67E-01	1.84E+00		3.39E-04		1.94E-03	3.48E-07	1	3.48E-07
Aluminum	2.80E+00		i			1.67E-01			1.00E-03			4.67E-07	1	4.67E-07
Antimony	3.71E-05		i			1.67E-01			1.00E-03			6.19E-12	1	6.19E-12
Arsenic	1.25E-03		i			1.67E-01			1.00E-03			2.09E-10	1	2.09E-10
Barium	4.79E-02		i			1.67E-01			1.00E-03			7.99E-09	1	7.99E-09
Beryllium	1.63E-03		i			1.67E-01			1.00E-03			2.72E-10	1	2.72E-10
Cadmium	1.34E-04		i			1.67E-01			1.00E-03			2.24E-11	1	2.24E-11
Chromium	2.18E-03		i			1.67E-01			2.00E-03			7.28E-10	1	7.28E-10
Cobalt	4.94E-02		i			1.67E-01			1.00E-03			8.25E-09	1	8.25E-09
Iron	2.19E+01		i			1.67E-01			1.00E-03			3.66E-06	1	3.66E-06
Lead	4.53E-03		i			1.67E-01			1.00E-03			7.56E-10	1	7.56E-10
Lithium	8.50E-02		i			1.67E-01			1.00E-03			1.42E-08	1	1.42E-08
Manganese	1.79E+00		i			1.67E-01			1.00E-03			2.99E-07	1	2.99E-07
Nickel	1.06E-01		i			1.67E-01			2.00E-04			3.53E-09	1	3.53E-09
Vanadium	1.78E-03		i			1.67E-01			1.00E-03			2.98E-10	1	2.98E-10
Zinc	1.35E-01		i			1.67E-01			6.00E-04			1.35E-08	1	1.35E-08
Nitrite/Nitrate-N	6.73E+00		i			1.67E-01			1.00E-03			1.12E-06	1	1.12E-06

TABLE 7.75a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	6.6E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	6.6E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	2.0E-04	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.9E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.8E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.8E-02
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	5.7E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.8E-01
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.8E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	1.7E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	9.7E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.8E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.2E-03	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.4E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.9E-02	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.3E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	7.9E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.9E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.0E-06	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	2.6E-03
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.5E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.2E-01
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.4E-03	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.9E-02
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.6E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.3E-02
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.8E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	7.6E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	6.1E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.0E-02
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	7.0E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.2E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.1E+00
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.3E-04	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.4E-03	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.2E+00
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	5.1E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	2.1E+00
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	3.0E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.5E-01
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	5.0E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	5.0E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.8E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.3E-02
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.9E-01	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.9E+00
	(total)												**1.5E+01**

TABLE 7.75a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.3E-07	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.3E-03
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.0E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.0E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	6.9E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	6.9E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	4.7E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.4E-03
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.0E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	3.0E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	8.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.0E-03
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.6E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.3E-04
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	9.8E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.3E-02
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.3E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.3E-04
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.7E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	2.9E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	5.9E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.0E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	2.3E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	4.6E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	7.7E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	5.5E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	6.3E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	2.5E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.1E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	2.7E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	2.3E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.2E-04
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.0E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	3.4E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.1E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	4.0E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.0E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	8.4E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	8.8E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.0E-06	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.2E-03
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	8.4E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	3.2E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.8E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.3E-05
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	3.2E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	3.2E-03
	(total)												1.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.6E+01

TABLE 8.75a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	5.6E-06	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	1.7E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	8.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.1E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	2.5E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	6.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.4E-04	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	5.9E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.0E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.5E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.8E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	3.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	6.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.4E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	8.5E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.1E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	5.4E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**6.1E-05**

TABLE 8.75a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF CHILD RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.6E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	8.5E-08	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.6E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.0E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	8.6E-09	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	2.0E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	2.3E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.9E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	2.8E-06	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	3.1E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	5.0E-11	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.7E-09	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.5E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	6.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.2E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.8E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	5.9E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	6.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	6.1E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	2.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.4E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.1E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	9.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										3.2E-07
										Total Risk Across All Exposure Routes/Pathways	**6.1E-05**

TABLE 4.76
VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF
FUTURE ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	Ingestion CDI (mg/kg/day) =
	IRgw	Water Ingestion Rate	L/day	2	U.S. EPA, May 1993	1.4	U.S. EPA, May 1993	$\frac{Cgw \times IRgw \times EF \times ED}{BW \times AT}$
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	CDI = Chronic Daily Intake
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	U.S. EPA, December 1989
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	
Dermal	Cgw	Chemical Concentration in Ground Water	mg/L	Max or 95% UCL	U.S. EPA, December 2002	Maximum	U.S. EPA, December 2002	The equations and parameters for
	A	Skin Surface Area	cm^2	18,000	U.S. EPA, July 2004	18,000	U.S. EPA, July 2004	for estimating DAevent and the chemical-
	DAevent	Absorbed Dose per Event	mg/cm^2-event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	specific dermally absorbed dose from
	EV	Event Frequency	event/day	1	Professional Judgement	1	Professional Judgement	water (DAD) are provided in Section 7.3.4.
	ED	Exposure Duration	years	24	U.S. EPA, May 1993	7	U.S. EPA, May 1993	of the text.
	EF	Exposure Frequency	days/year	350	U.S. EPA, May 1993	234	U.S. EPA, May 1993	
	t_{event}	Duration of Event	hour/event	0.25	U.S. EPA, July 2004	0.167	U.S. EPA, July 2004	USEPA, July 2004
	t*	Time to reach steady state	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	T	Lag Time	hour/event	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	B	Bunge Model Constant	dimensionless	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	Kp	Permeability Coefficient from Water	cm/hour	chemical-specific	U.S. EPA, July 2004	chemical-specific	U.S. EPA, July 2004	
	BW	Body Weight	kg	70	U.S. EPA, May 1993	70	U.S. EPA, May 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	U.S. EPA, December 1989	25,550	U.S. EPA, December 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	U.S. EPA, December 1989	2,555	U.S. EPA, December 1989	

Daily Intake Calculations
Ingestion Intake = (IRgw x EF x ED) / (BW x AT)
Dermal Intake = (A x EV x ED x EF) / (BW x AT)

Cancer Ingestion Intake(RME) = 9.39E-03
Noncancer Ingestion Intake(RME) = 2.74E-02

Cancer Ingestion Intake(CTE) = 1.28E-03
Noncancer Ingestion Intake(CTE) = 1.28E-02

Cancer Dermal Intake(RME) = 8.45E+01
Noncancer Dermal Intake(RME) = 2.47E+02

Cancer Dermal Intake(CTE) = 1.65E+01
Noncancer Dermal Intake(CTE) = 1.65E+02

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RM --- FUTURE ADULT RESIDENTS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: **U.S. EPA, July 2004**

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = 2FA x Kp x C x CF x (6T x tevent/3.1416)$^{0.5}$

IF tevent > t*, DAevent = FA x Kp x C x CF x ((tevent/(1 + B)) + (2T x ((1+3B+3B^2)/(1 + B)^2)))

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	2.50E-01	9.19E-01	1.75E-03	3.73E-05	5.45E-10	1	5.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	2.50E-01	1.96E+00	9.64E-04	5.59E-03	1.29E-08	1	1.29E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	2.50E-01	1.12E+00	2.07E-03	1.07E-02	2.99E-09	1	2.99E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	2.06E-09	1	2.06E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	2.50E-01	6.15E-01	8.91E-03	4.01E-02	1.31E-09	1	1.31E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	2.50E-01	1.34E+00	6.41E-04	3.46E-03	3.51E-09	1	3.51E-09
HMX	7.86E-02	o	1.15E+01	2.50E-01	4.78E+00	1.21E-04	8.01E-04	2.87E-08	1	2.87E-08
RDX	6.69E-01	o	4.42E+00	2.50E-01	1.84E+00	3.39E-04	1.94E-03	4.25E-07	1	4.25E-07
Aluminum	2.80E+00	i		2.50E-01		1.00E-03		6.99E-07	1	6.99E-07
Antimony	3.71E-05	i		2.50E-01		1.00E-03		9.27E-12	1	9.27E-12
Arsenic	1.25E-03	i		2.50E-01		1.00E-03		3.12E-10	1	3.12E-10
Barium	4.79E-02	i		2.50E-01		1.00E-03		1.20E-08	1	1.20E-08
Beryllium	1.63E-03	i		2.50E-01		1.00E-03		4.08E-10	1	4.08E-10
Cadmium	1.34E-04	i		2.50E-01		1.00E-03		3.35E-11	1	3.35E-11
Chromium	2.18E-03	i		2.50E-01		2.00E-03		1.09E-09	1	1.09E-09
Cobalt	4.94E-02	i		2.50E-01		1.00E-03		1.23E-08	1	1.23E-08
Iron	2.19E+01	i		2.50E-01		1.00E-03		5.48E-06	1	5.48E-06
Lead	4.53E-03	i		2.50E-01		1.00E-03		1.13E-09	1	1.13E-09
Lithium	8.50E-02	i		2.50E-01		1.00E-03		2.13E-08	1	2.13E-08
Manganese	1.79E+00	i		2.50E-01		1.00E-03		4.48E-07	1	4.48E-07
Nickel	1.06E-01	i		2.50E-01		2.00E-04		5.29E-09	1	5.29E-09
Vanadium	1.78E-03	i		2.50E-01		1.00E-03		4.46E-10	1	4.46E-10
Zinc	1.35E-01	i		2.50E-01		6.00E-04		2.02E-08	1	2.02E-08
Nitrite/Nitrate-N	6.73E+00	i		2.50E-01		1.00E-03		1.68E-06	1	1.68E-06

TABLE 7.76 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	6.5E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	6.5E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.9E-04	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.8E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.7E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.7E-02
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	5.5E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.8E-01
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.7E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	1.6E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	9.4E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.7E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.2E-03	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	4.3E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.8E-02	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	6.1E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	7.7E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.7E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.0E-06	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	2.5E-03
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.4E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.1E-01
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.3E-03	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	1.9E-02
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.5E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.2E-02
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.7E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	7.3E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	6.0E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.0E-02
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	6.8E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.0E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.0E+00
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.2E-04	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.3E-03	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.2E+00
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	4.9E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	2.0E+00
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	2.9E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.4E-01
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	4.9E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.9E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	3.7E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.2E-02
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.8E-01	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.8E+00
	(total)												1.5E+01

TABLE 7.76 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	1.3E-07	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	1.3E-03
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	3.2E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	6.4E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	7.4E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	7.4E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	5.1E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.5E-03
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	3.2E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	3.2E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	8.7E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	4.3E-03
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.1E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	1.4E-04
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	1.0E-04	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	3.5E-02
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	1.7E-04	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	1.7E-04
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	2.3E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	3.8E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	7.7E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	2.6E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	3.0E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	6.0E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.0E-07	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	7.2E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	8.3E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	3.3E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.7E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	3.6E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	3.0E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	1.5E-04
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	1.4E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	4.5E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	2.8E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	5.2E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	2.6E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.1E-04	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	1.2E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.3E-06	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	1.6E-03
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.1E-07	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	4.2E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	5.0E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	1.7E-05
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	4.1E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	4.1E-03
	(total)												1.9E-01

Total Hazard Index Across All Exposure Routes/Pathways **1.5E+01**

TABLE 8.76 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	2.2E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	6.5E-05	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.0E-06
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	9.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.3E-06	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	2.9E-07
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.2E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	7.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	6.3E-03	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	6.9E-04
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	2.6E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	3.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.2E-05	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	1.8E-05
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	4.5E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	1.5E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.0E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	4.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.1E-01	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	4.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	8.0E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	1.7E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	9.9E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	1.7E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	6.3E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**7.1E-04**

TABLE 8.76 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	4.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.1E-06	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	3.3E-08
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	2.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	1.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.1E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	2.5E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	2.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	3.6E-05	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	4.0E-06
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	5.9E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	7.8E-10	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	2.6E-08	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	4.0E-08
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	3.4E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	2.8E-09	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	9.2E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.0E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	4.6E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	9.6E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	3.8E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	4.5E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	3.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.7E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										4.1E-06

Total Risk Across All Exposure Routes/Pathways **7.1E-04**

CALCULATION OF DAevent - EXPOSURES THROUGH DERMAL CONTACT WITH GROUNDWATER
CENTRAL TENDENCY EXPOSURE (CTE) --- FUTURE ADULT RESIDENTS TO GROUNDWATER

SITE NAME: SWMU 13 (MINE FILL B)
LOCATION: NSWC CRANE, CRANE, INDIANA
DATE: 04/13/05

REFERENCES: U.S. EPA, July 2004

DERMAL CONTACT: DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

WHERE: DAD = DERMALLY ABSORBED DOSE (MG/KG/DAY)
DAevent = ABSORBED DOSE PER EVENT (MG/CM^2/EVENT)
A = SKIN SURFACE AREA AVAILABLE FOR CONTACT(CM^2)
EV = EVENT FREQUENCY (EVENTS/DAY)
ED = EXPOSURE DURATION (YEARS)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
BW = BODY WEIGHT(KG)
AT = AVERAGING TIME (DAYS)

FOR INORGANICS: DAevent = Kp x C x tevent x CF

FOR ORGANICS: IF tevent < t*, DAevent = $2FA \times Kp \times C \times CF \times (6T \times tevent/3.1416)^{0.5}$

IF tevent > t*, DAevent = $FA \times Kp \times C \times CF \times ((tevent/(1 + B)) + (2T \times ((1+3B+3B^2)/(1 + B)^2)))$

WHERE: FA = FRACTION ABSORBED (DIMENSIONLESS)
Kp = PERMEABILITY COEFFICIENT FROM WATER (CM/HR)
C = CONCENTRATION OF CHEMICAL IN WATER (MG/L)
tevent = DURATION OF EVENT (HR/EVENT)
CF = CONVERSION FACTOR (1L/1000 CM^3)
t* = TIME IT TAKES TO REACH STEADY-STATE (HOUR/EVENT)
T = LAG TIME (HOUR/EVENT)
B = BUNGE MODEL CONSTANT (DIMENSIONLESS)

CHEMICAL	GW CONC. (mg/L)	ORGANIC OR INORGANIC?	t* (HR)	tevent	T (HR)	Kp (CM/HR)	B	DAevent	FA	DAevent
1,3-Dinitrobenzene	2.36E-04	o	2.21E+00	1.67E-01	9.19E-01	1.75E-03	3.73E-05	4.45E-10	1	4.45E-10
2,4,6-Trinitrotoluene	6.92E-03	o	4.71E+00	1.67E-01	1.96E+00	9.64E-04	5.59E-03	1.06E-08	1	1.06E-08
2,6-Dinitrotoluene	9.88E-04	o	2.69E+00	1.67E-01	1.12E+00	2.07E-03	1.07E-02	2.45E-09	1	2.45E-09
2-Amino-4,6-Dinitrotoluene	2.01E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	1.68E-09	1	1.68E-09
2-Nitrotoluene	1.35E-04	o	1.48E+00	1.67E-01	6.15E-01	8.91E-03	4.01E-02	1.07E-09	1	1.07E-09
4-Amino-2,6-Dinitrotoluene	3.43E-03	o	3.21E+00	1.67E-01	1.34E+00	6.41E-04	3.46E-03	2.87E-09	1	2.87E-09
HMX	7.86E-02	o	1.15E+01	1.67E-01	4.78E+00	1.21E-04	8.01E-04	2.35E-08	1	2.35E-08
RDX	6.69E-01	o	4.42E+00	1.67E-01	1.84E+00	3.39E-04	1.94E-03	3.48E-07	1	3.48E-07
Aluminum	2.80E+00	i		1.67E-01		1.00E-03		4.67E-07	1	4.67E-07
Antimony	3.71E-05	i		1.67E-01		1.00E-03		6.19E-12	1	6.19E-12
Arsenic	1.25E-03	i		1.67E-01		1.00E-03		2.09E-10	1	2.09E-10
Barium	4.79E-02	i		1.67E-01		1.00E-03		7.99E-09	1	7.99E-09
Beryllium	1.63E-03	i		1.67E-01		1.00E-03		2.72E-10	1	2.72E-10
Cadmium	1.34E-04	i		1.67E-01		1.00E-03		2.24E-11	1	2.24E-11
Chromium	2.18E-03	i		1.67E-01		2.00E-03		7.28E-10	1	7.28E-10
Cobalt	4.94E-02	i		1.67E-01		1.00E-03		8.25E-09	1	8.25E-09
Iron	2.19E+01	i		1.67E-01		1.00E-03		3.66E-06	1	3.66E-06
Lead	4.53E-03	i		1.67E-01		1.00E-03		7.56E-10	1	7.56E-10
Lithium	8.50E-02	i		1.67E-01		1.00E-03		1.42E-08	1	1.42E-08
Manganese	1.79E+00	i		1.67E-01		1.00E-03		2.99E-07	1	2.99E-07
Nickel	1.06E-01	i		1.67E-01		2.00E-04		3.53E-09	1	3.53E-09
Vanadium	1.78E-03	i		1.67E-01		1.00E-03		2.98E-10	1	2.98E-10
Zinc	1.35E-01	i		1.67E-01		6.00E-04		1.35E-08	1	1.35E-08
Nitrite/Nitrate-N	6.73E+00	i		1.67E-01		1.00E-03		1.12E-06	1	1.12E-06

TABLE 7.76a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.0E-06	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	3.0E-02
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	8.9E-05	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	1.8E-01
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.3E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	1.3E-02
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.6E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.3E-01
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.7E-06	mg/kg-day	2.30E-01	mg/kg-day	NA	NA	7.5E-06
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.4E-05	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.2E-01
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.0E-03	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	2.0E-02
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	8.6E-03	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	2.9E+00
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.6E-02	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	3.6E-02
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	4.8E-07	mg/kg-day	4.00E-04	mg/kg-day	NA	NA	1.2E-03
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.6E-05	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	5.3E-02
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	6.1E-04	mg/kg-day	7.00E-02	mg/kg-day	NA	NA	8.8E-03
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.1E-05	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.0E-02
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.7E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.4E-03
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.8E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	9.3E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	6.3E-04	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	3.2E-02
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.8E-01	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	9.4E-01
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	5.8E-05	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.1E-03	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	5.5E-01
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.3E-02	mg/kg-day	2.40E-02	mg/kg-day	NA	NA	9.6E-01
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.4E-03	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	6.8E-02
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.3E-05	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	2.3E-02
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.7E-03	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	5.8E-03
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	8.6E-02	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	8.6E-01
	(total)												**7.0E+00**

TABLE 7.76a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	7.3E-08	mg/kg-day	1.00E-04	mg/kg-day	NA	NA	7.3E-04
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.7E-06	mg/kg-day	5.00E-04	mg/kg-day	NA	NA	3.5E-03
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	4.0E-07	mg/kg-day	1.00E-03	mg/kg-day	NA	NA	4.0E-04
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.8E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	1.4E-03
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.8E-07	mg/kg-day	1.00E-02	mg/kg-day	NA	NA	1.8E-05
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.7E-07	mg/kg-day	2.00E-04	mg/kg-day	NA	NA	2.4E-03
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	3.9E-06	mg/kg-day	5.00E-02	mg/kg-day	NA	NA	7.7E-05
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.7E-05	mg/kg-day	3.00E-03	mg/kg-day	NA	NA	1.9E-02
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	7.7E-05	mg/kg-day	1.00E+00	mg/kg-day	NA	NA	7.7E-05
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.0E-09	mg/kg-day	6.00E-05	mg/kg-day	NA	NA	1.7E-05
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.4E-08	mg/kg-day	3.00E-04	mg/kg-day	NA	NA	1.1E-04
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.3E-06	mg/kg-day	4.90E-03	mg/kg-day	NA	NA	2.7E-04
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.5E-08	mg/kg-day	1.40E-05	mg/kg-day	NA	NA	3.2E-03
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.7E-09	mg/kg-day	2.50E-05	mg/kg-day	NA	NA	1.5E-04
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.2E-07	mg/kg-day	7.50E-05	mg/kg-day	NA	NA	1.6E-03
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-06	mg/kg-day	2.00E-02	mg/kg-day	NA	NA	6.8E-05
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.0E-04	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	2.0E-03
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.2E-07	mg/kg-day	NA	mg/kg-day	NA	NA	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.3E-06	mg/kg-day	2.00E-03	mg/kg-day	NA	NA	1.2E-03
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	4.9E-05	mg/kg-day	9.60E-04	mg/kg-day	NA	NA	5.1E-02
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	5.8E-07	mg/kg-day	8.00E-04	mg/kg-day	NA	NA	7.3E-04
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	4.9E-08	mg/kg-day	2.60E-05	mg/kg-day	NA	NA	1.9E-03
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.2E-06	mg/kg-day	3.00E-01	mg/kg-day	NA	NA	7.4E-06
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.9E-04	mg/kg-day	1.00E-01	mg/kg-day	NA	NA	1.9E-03
	(total)												9.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	7.1E+00

TABLE 8.76a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	3.0E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	8.9E-06	mg/kg-day	3.00E-02	$(mg/kg-day)^{-1}$	2.7E-07
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	1.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.6E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.7E-07	mg/kg-day	2.30E-01	$(mg/kg-day)^{-1}$	4.0E-08
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.4E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	1.0E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	8.6E-04	mg/kg-day	1.10E-01	$(mg/kg-day)^{-1}$	9.4E-05
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	3.6E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	4.8E-08	mg/kg-day		$(mg/kg-day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	1.6E-06	mg/kg-day	1.50E+00	$(mg/kg-day)^{-1}$	2.4E-06
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	6.1E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	2.1E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	1.7E-07	mg/kg-day		$(mg/kg-day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	2.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	6.3E-05	mg/kg-day		$(mg/kg-day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	2.8E-02	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	5.8E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	1.1E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	2.3E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	1.4E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	2.3E-06	mg/kg-day		$(mg/kg-day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	1.7E-04	mg/kg-day		$(mg/kg-day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	8.6E-03	mg/kg-day		$(mg/kg-day)^{-1}$	
	(total)										**9.7E-05**

TABLE 8.76a - CENTRAL TENDENCY EXPOSURE (CTE)
CALCULATION OF CANCER RISKS FROM EXPOSURE OF ADULT RESIDENTS TO GROUNDWATER
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Entire Site
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	1,3-Dinitrobenzene	2.36E-04	mg/L	2.36E-04	mg/L	M	7.3E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2,4,6-Trinitrotoluene	6.92E-03	mg/L	6.92E-03	mg/L	M	1.7E-07	mg/kg-day	3.00E-02	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	2,6-Dinitrotoluene	9.88E-04	mg/L	9.88E-04	mg/L	M	4.0E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Amino-4,6-Dinitrotoluene	2.01E-03	mg/L	2.01E-03	mg/L	M	2.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	2-Nitrotoluene	1.35E-04	mg/L	1.35E-04	mg/L	M	1.8E-08	mg/kg-day	2.30E-01	$(mg/kg\text{-}day)^{-1}$	4.0E-09
	4-Amino-2,6-Dinitrotoluene	3.43E-03	mg/L	3.43E-03	mg/L	M	4.7E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	HMX	7.86E-02	mg/L	7.86E-02	mg/L	M	3.9E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	RDX	6.69E-01	mg/L	6.69E-01	mg/L	M	5.7E-06	mg/kg-day	1.10E-01	$(mg/kg\text{-}day)^{-1}$	6.3E-07
	Aluminum	2.80E+00	mg/L	2.80E+00	mg/L	M	7.7E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Antimony	3.71E-05	mg/L	3.71E-05	mg/L	M	1.0E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Arsenic	1.25E-03	mg/L	1.25E-03	mg/L	M	3.4E-09	mg/kg-day	1.50E+00	$(mg/kg\text{-}day)^{-1}$	5.2E-09
	Barium	4.79E-02	mg/L	4.79E-02	mg/L	M	1.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Beryllium	1.63E-03	mg/L	1.63E-03	mg/L	M	4.5E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cadmium	1.34E-04	mg/L	1.34E-04	mg/L	M	3.7E-10	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Chromium	2.18E-03	mg/L	2.18E-03	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Cobalt	4.94E-02	mg/L	4.94E-02	mg/L	M	1.4E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Iron	2.19E+01	mg/L	2.19E+01	mg/L	M	6.0E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lead	4.53E-03	mg/L	4.53E-03	mg/L	M	1.2E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Lithium	8.50E-02	mg/L	8.50E-02	mg/L	M	2.3E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Manganese	1.79E+00	mg/L	1.79E+00	mg/L	M	4.9E-06	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nickel	1.06E-01	mg/L	1.06E-01	mg/L	M	5.8E-08	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Vanadium	1.78E-03	mg/L	1.78E-03	mg/L	M	4.9E-09	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Zinc	1.35E-01	mg/L	1.35E-01	mg/L	M	2.2E-07	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	Nitrite/Nitrate-N	6.73E+00	mg/L	6.73E+00	mg/L	M	1.9E-05	mg/kg-day		$(mg/kg\text{-}day)^{-1}$	
	(total)										6.4E-07
										Total Risk Across All Exposure Routes/Pathways	**9.8E-05**

TABLE 9.1. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	2.5E-08		2.3E-09	2.7E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	3.7E-10		1.4E-10	5.1E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.5E-09		3.3E-09	1.2E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.2E-09		4.6E-10	1.6E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.0E-10		1.2E-10	4.2E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.3E-06		5.4E-07	1.8E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	1.6E-09		1.5E-10	1.7E-09	2,4,6-Trinitrotoluene	Liver	7.3E-03		7.0E-04	8.0E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	3.9E-03		7.0E-05	3.9E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	4.3E-03		1.2E-04	4.5E-03
			HMX					HMX	Liver, Blood	5.6E-05		1.0E-06	5.7E-05
			RDX	6.0E-09		2.7E-10	6.2E-09	RDX	Prostate	1.3E-03		5.7E-05	1.3E-03
			Aluminum					Aluminum	CNS	2.8E-02			2.8E-02
			Arsenic	3.1E-07		2.8E-08	3.4E-07	Arsenic	Skin, CVS	4.8E-02		4.3E-03	5.2E-02
			Barium					Barium	Kidney	2.1E-03			2.1E-03
			Mercury					Mercury	CNS	1.4E-03			1.4E-03
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				1.9E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				3.4E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					1.0E-01

Target Organ Analysis - Building 166

Total Liver HI =	1.6E-02	Total CNS HI =	2.9E-02
Total Kidney HI =	2.1E-03	Total Blood HI =	5.7E-05
Total CVS HI =	5.2E-02	Total Prostate HI =	1.3E-03
Total Skin HI =	5.2E-02		

TABLE 9.1. REASONABLE MAXIMUM EXPOSURE (RME)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.2E-08		2.0E-09	2.4E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.2E-08		8.6E-09	3.1E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.0E-07		7.8E-08	2.8E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.2E-08		8.6E-09	3.1E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	4.0E-08		1.6E-08	5.6E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.3E-08		5.1E-09	1.8E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.3E-06		1.8E-06	6.1E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	4.4E-10		4.2E-11	4.8E-10	2,4,6-Trinitrotoluene	Liver	2.1E-03		2.0E-04	2.3E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	3.6E-03		6.4E-05	3.6E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	5.3E-02		1.4E-03	5.5E-02
			HMX					HMX	Liver, Blood	7.4E-03		1.3E-04	7.5E-03
			RDX	1.2E-08		5.3E-10	1.2E-08	RDX	Prostate	2.5E-03		1.1E-04	2.6E-03
			Aluminum					Aluminum	CNS	3.1E-02			3.1E-02
			Arsenic	3.4E-07		3.0E-08	3.7E-07	Arsenic	Skin, CVS	5.2E-02		4.7E-03	5.7E-02
			Barium					Barium	Kidney	1.8E-03			1.8E-03
			Mercury					Mercury	CNS	2.1E-03			2.1E-03
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				6.5E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				3.8E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					1.6E-01

Target Organ Analysis - Building 171

Total Liver HI =	6.8E-02	Total CNS HI =	3.3E-02
Total Kidney HI =	1.8E-03	Total Blood HI =	7.5E-03
Total CVS HI =	5.7E-02	Total Prostate HI =	2.6E-03
Total Skin HI =	5.7E-02		

TABLE 9.1. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen			3.0E-04	3.0E-04
			2,4,6-Trinitrotoluene			3.0E-10	3.0E-10	2,4,6-Trinitrotoluene	Liver			1.4E-03	1.4E-03
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney			1.6E-04	1.6E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver			5.6E-04	5.6E-04
			2-Nitrotoluene			2.5E-10	2.5E-10	2-Nitrotoluene	Spleen			7.5E-06	7.5E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver			9.6E-04	9.6E-04
			HMX					HMX	Liver, Blood			3.1E-05	3.1E-05
			RDX			3.7E-08	3.7E-08	RDX	Prostate			7.8E-03	7.8E-03
			Aluminum					Aluminum	CNS			1.1E-04	1.1E-04
			Antimony					Antimony	Blood			2.4E-05	2.4E-05
			Arsenic			1.0E-09	1.0E-09	Arsenic	Skin, CVS			1.6E-04	1.6E-04
			Barium					Barium	Kidney			3.8E-04	3.8E-04
			Beryllium					Beryllium	GS			4.5E-03	4.5E-03
			Cadmium					Cadmium	Kidney			2.1E-04	2.1E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone			2.3E-03	2.3E-03
			Cobalt					Cobalt	NA			9.6E-05	9.6E-05
			Iron					Iron	NA			2.8E-03	2.8E-03
			Lead					Lead	NA				
			Lithium					Lithium	NA			1.6E-03	1.6E-03
			Manganese					Manganese	CNS			7.2E-02	7.2E-02
			Nickel					Nickel	Body Weight			1.0E-03	1.0E-03
			Vanadium					Vanadium	Kidney			2.7E-03	2.7E-03
			Zinc					Zinc	Blood			1.0E-05	1.0E-05
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood			2.6E-03	2.6E-03
							Total Risk Across Groundwater	3.8E-08				Total Hazard Index Across Groundwater	1.02E-01

Total Liver HI =	3.0E-03	Total CNS HI =	7.3E-02
Total Kidney HI =	3.4E-03	Total Fetotoxicity HI =	2.3E-03
Total CVS HI =	1.6E-04	Total Body Weight HI =	1.0E-03
Total GI Tract HI =	6.8E-03	Total Prostate HI =	7.8E-03
Total Skin HI =	1.6E-04	Total Bone HI =	2.3E-03
Total Blood HI =	2.8E-03	Total Spleen HI =	3.1E-04

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	3.5E-08		6.9E-09	4.2E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	7.8E-10		6.7E-10	1.5E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.0E-08		8.8E-09	1.9E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.4E-09		1.2E-09	2.6E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	6.4E-10		5.5E-10	1.2E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.1E-06		2.9E-06	5.9E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	3.0E-08		6.0E-09	3.6E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	4.5E-10		3.8E-10	8.3E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.0E-08		8.8E-09	1.9E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.4E-09		1.2E-09	2.6E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.6E-10		3.1E-10	6.8E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.6E-06		1.4E-06	3.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	1.9E-09		4.0E-10	2.3E-09	2,4,6-Trinitrotoluene	Liver	3.5E-04		7.5E-05	4.3E-04
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.9E-04		7.4E-06	2.0E-04
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.1E-04		1.3E-05	2.2E-04
			HMX					HMX	Liver, Blood	2.7E-06		1.1E-07	2.8E-06
			RDX	7.2E-09		7.2E-10	8.0E-09	RDX	Prostate	6.1E-05		6.1E-06	6.8E-05
			Aluminum					Aluminum	CNS	1.3E-03		0.0E+00	1.3E-03
			Arsenic	3.7E-07		7.4E-08	4.5E-07	Arsenic	Skin, CVS	2.3E-03		4.6E-04	2.8E-03
			Barium					Barium	Kidney	1.0E-04		0.0E+00	1.0E-04
			Mercury					Mercury	CNS	6.6E-05		0.0E+00	6.6E-05
			Total Risk Across Surface Soil - Area Bldg 166				6.0E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				3.0E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				4.6E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					5.2E-03

Target Organ Analysis - Building 166

Total Liver HI =	8.5E-04	Total CNS HI =	1.4E-03
Total Kidney HI =	1.0E-04	Total Blood HI =	2.8E-06
Total CVS HI =	2.8E-03	Total Prostate HI =	6.8E-05
Total Skin HI =	2.8E-03		

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	7.6E-08		1.5E-08	9.1E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.7E-08		2.3E-08	5.0E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.4E-07		2.1E-07	4.6E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.7E-08		2.3E-08	5.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	4.9E-08		4.2E-08	9.1E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.6E-08		1.4E-08	3.0E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.1E-05		9.9E-06	2.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.7E-08		5.3E-09	3.2E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.7E-08		2.3E-08	5.0E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.4E-07		2.1E-07	4.5E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.7E-08		2.3E-08	5.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	4.9E-08		4.2E-08	9.1E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.6E-08		1.4E-08	2.9E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.2E-06		4.8E-06	9.9E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	5.4E-10		1.1E-10	6.5E-10	2,4,6-Trinitrotoluene	Liver	1.0E-04		2.1E-05	1.2E-04
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.7E-04		6.8E-06	1.8E-04
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.6E-03		1.5E-04	2.7E-03
			HMX					HMX	Liver, Blood	3.6E-04		1.4E-05	3.7E-04
			RDX	1.4E-08		1.4E-09	1.6E-08	RDX	Prostate	1.2E-04		1.2E-05	1.3E-04
			Aluminum					Aluminum	CNS	1.5E-03		0.0E+00	1.5E-03
			Arsenic	4.1E-07		8.1E-08	4.9E-07	Arsenic	Skin, CVS	2.5E-03		5.0E-04	3.0E-03
			Barium					Barium	Kidney	8.8E-05		0.0E+00	8.8E-05
			Mercury					Mercury	CNS	1.0E-04		0.0E+00	1.0E-04
			Total Risk Across Surface Soil - Area Bldg 171				2.1E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.1E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				5.0E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					8.3E-03

Target Organ Analysis - Building 171

Total Liver HI =	3.4E-03	Total CNS HI =	1.6E-03
Total Kidney HI =	8.8E-05	Total Blood HI =	3.7E-04
Total CVS HI =	3.0E-03	Total Prostate HI =	1.3E-04
Total Skin HI =	3.0E-03		

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	9.6E-08		8.2E-08	1.8E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.8E-08		1.6E-08	3.4E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	9.6E-04			9.6E-04
			Arsenic	1.3E-06		2.5E-07	1.5E-06	Arsenic	Skin, CVS	7.9E-03		1.6E-03	9.5E-03
			Barium					Barium	Kidney	2.3E-04			2.3E-04
			Cadmium					Cadmium	Kidney	2.5E-04		3.3E-05	2.8E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.8E-03			2.8E-03
			Iron					Iron	NA	2.4E-02			2.4E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.2E-03			3.2E-03
			Vanadium					Vanadium	Kidney	5.5E-03			5.5E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene			4.7E-07	4.7E-07	Benzo(a)anthracene					
			Benzo(a)pyrene			9.8E-06	9.8E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene			1.5E-06	1.5E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene			8.1E-07	8.1E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene			2.4E-10	2.4E-10	2,4,6-Trinitrotoluene	Liver			4.5E-05	4.5E-05
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver			1.4E-04	1.4E-04
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver			3.4E-04	3.4E-04
			HMX					HMX	Liver, Blood			1.7E-05	1.7E-05
			RDX			4.2E-07	4.2E-07	RDX	Prostate			3.6E-03	3.6E-03
			Aluminum					Aluminum	CNS			2.3E-05	2.3E-05
			Arsenic			2.1E-08	2.1E-08	Arsenic	Skin, CVS			1.3E-04	1.3E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone			2.0E-03	2.0E-03
			Iron					Iron	NA			7.0E-05	7.0E-05
			Lead					Lead	NA				
			Manganese					Manganese	CNS			2.7E-03	2.7E-03
			Vanadium					Vanadium	Kidney			2.3E-03	2.3E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood			8.7E-05	8.7E-05
							Total Risk Across Gully Sediment	1.7E-06				Total Hazard Index Across Gully Sediment	4.6E-02
							Total Risk Across Gully Surface Water	1.3E-05				Total Hazard Index Across Gully Surface water	1.15E-02

TABLE 9.2. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	1.3E-03			1.3E-03
			Antimony					Antimony	Blood	1.1E-03			1.1E-03
			Arsenic	2.9E-06		5.7E-07	3.4E-06	Arsenic	Skin, CVS	1.8E-02		3.5E-03	2.1E-02
			Cadmium					Cadmium	Kidney	3.2E-03		4.2E-04	3.6E-03
			Iron					Iron	NA	9.4E-02			9.4E-02
			Manganese					Manganese	CNS	5.3E-03			5.3E-03
			Vanadium					Vanadium	Kidney	9.5E-03			9.5E-03
Surface Water	Surface Water	Mainstream Surface Water	RDX			2.2E-09	2.2E-09	RDX	Prostate			1.8E-05	1.8E-05
			Barium					Barium	Kidney			3.5E-04	3.5E-04
						Total Risk Across Mainstream Sediment	3.4E-06					Total Hazard Index Across Mainstream Sediment	1.4E-01
						Total Risk Across Mainstream Surface Water	2.2E-09					Total Hazard Index Across Mainstream Surface water	3.73E-04

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	5.4E-04	Total CNS HI =	6.9E-03
Total Kidney HI =	8.3E-03	Total Fetotoxicity HI =	4.8E-03
Total CVS HI =	9.6E-03	Total Prostate HI =	3.6E-03
Total GI Tract HI =	4.8E-03	Total Bone HI =	4.8E-03
Total Skin HI =	9.6E-03	Total Blood HI =	1.0E-04

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	1.3E-02	Total CNS HI =	6.6E-03
Total CVS HI =	2.1E-02	Total Prostate HI =	1.8E-05
Total Skin HI =	2.1E-02	Total Blood HI =	1.1E-03

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	3.6E-07		7.2E-08	4.4E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	8.2E-09		7.0E-09	1.5E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.1E-07		9.2E-08	2.0E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.5E-08		1.3E-08	2.7E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	6.6E-09		5.7E-09	1.2E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.2E-05		3.0E-05	6.2E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	3.2E-07		6.3E-08	3.8E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	4.6E-09		4.0E-09	8.6E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.1E-07		9.2E-08	2.0E-07	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	1.5E-08		1.3E-08	2.7E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.8E-09		3.3E-09	7.0E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.6E-05		1.5E-05	3.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.0E-08		4.2E-09	2.4E-08	2,4,6-Trinitrotoluene	Liver	3.7E-03		7.8E-04	4.5E-03
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.0E-03		7.8E-05	2.0E-03
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.2E-03		1.3E-04	2.3E-03
		Building 166	HMX					HMX	Liver, Blood	2.8E-05		1.1E-06	2.9E-05
		Historical Data	RDX	7.5E-08		7.5E-09	8.3E-08	RDX	Prostate	6.4E-04		6.3E-05	7.0E-04
			Aluminum					Aluminum	CNS	1.4E-02			1.4E-02
			Arsenic	3.9E-06		7.7E-07	4.7E-06	Arsenic	Skin, CVS	2.4E-02		4.8E-03	2.9E-02
			Barium					Barium	Kidney	1.0E-03			1.0E-03
			Mercury					Mercury	CNS	6.9E-04			6.9E-04
			Total Risk Across Surface Soil - Area Bldg 166				6.3E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				3.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				4.8E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					5.4E-02

Target Organ Analysis - Building 166

Total Liver HI =	8.9E-03	Total CNS HI =	1.5E-02
Total Kidney HI =	1.0E-03	Total Blood HI =	2.9E-05
Total CVS HI =	2.9E-02	Total Prostate HI =	7.0E-04
Total Skin HI =	2.9E-02		

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	7.9E-07		1.6E-07	9.5E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.8E-07		2.4E-07	5.2E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.6E-06		2.2E-06	4.7E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-07		2.4E-07	5.2E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	5.1E-07		4.4E-07	9.5E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.7E-07		1.4E-07	3.1E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.1E-04		1.0E-04	2.2E-04	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.8E-07		5.6E-08	3.4E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.8E-07		2.4E-07	5.2E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.5E-06		2.2E-06	4.7E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-07		2.4E-07	5.2E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	5.1E-07		4.4E-07	9.4E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.7E-07		1.4E-07	3.1E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.4E-05		5.0E-05	1.0E-04	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	5.6E-09		1.2E-09	6.8E-09	2,4,6-Trinitrotoluene	Liver	1.0E-03		2.2E-04	1.3E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.8E-03		7.1E-05	1.9E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.7E-02		1.6E-03	2.9E-02
			HMX					HMX	Liver, Blood	3.7E-03		1.5E-04	3.9E-03
			RDX	1.5E-07		1.5E-08	1.6E-07	RDX	Prostate	1.3E-03		1.3E-04	1.4E-03
			Aluminum					Aluminum	CNS	1.5E-02			1.5E-02
			Arsenic	4.2E-06		8.4E-07	5.1E-06	Arsenic	Skin, CVS	2.6E-02		5.2E-03	3.2E-02
			Barium					Barium	Kidney	9.2E-04			9.2E-04
			Mercury					Mercury	CNS	1.1E-03			1.1E-03
			Total Risk Across Surface Soil - Area Bldg 171				2.2E-04	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.1E-04	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				5.3E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					8.6E-02

Target Organ Analysis - Building 171

Total Liver HI =	3.6E-02	Total CNS HI =	1.7E-02
Total Kidney HI =	9.2E-04	Total Blood HI =	3.9E-03
Total CVS HI =	3.2E-02	Total Prostate HI =	1.4E-03
Total Skin HI =	3.2E-02		

TABLE 9.3. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	2.3E-02		1.8E-04	2.3E-02
			2,4,6-Trinitrotoluene	7.3E-07		4.5E-09	7.3E-07	2,4,6-Trinitrotoluene	Liver	1.4E-01		8.3E-04	1.4E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	9.7E-03		9.7E-05	9.8E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	9.8E-02		3.3E-04	9.9E-02
			2-Nitrotoluene	1.1E-07		3.5E-09	1.1E-07	2-Nitrotoluene	Spleen	5.7E-06		4.2E-06	1.0E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.7E-01		5.7E-04	1.7E-01
			HMX					HMX	Liver, Blood	1.5E-02		1.9E-05	1.5E-02
			RDX	2.6E-04		5.4E-07	2.6E-04	RDX	Prostate	2.2E+00		4.6E-03	2.2E+00
			Aluminum					Aluminum	CNS	2.7E-02		2.3E-05	2.7E-02
			Antimony					Antimony	Blood	9.1E-04		5.0E-06	9.1E-04
			Arsenic	6.6E-06		5.4E-09	6.6E-06	Arsenic	Skin, CVS	4.1E-02		3.4E-05	4.1E-02
			Barium					Barium	Kidney	6.7E-03		7.9E-05	6.8E-03
			Beryllium					Beryllium	GS	8.0E-03		9.4E-04	8.9E-03
			Cadmium					Cadmium	Kidney	2.6E-03		4.3E-05	2.7E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.1E-03		4.7E-04	7.6E-03
			Cobalt					Cobalt	NA	2.4E-02		2.0E-05	2.4E-02
			Iron					Iron	NA	7.1E-01		5.9E-04	7.2E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	4.2E-01		3.4E-04	4.2E-01
			Manganese					Manganese	CNS	7.3E-01		1.5E-02	7.5E-01
			Nickel					Nickel	Body Weight	5.2E-02		2.1E-04	5.2E-02
			Vanadium					Vanadium	Kidney	1.7E-02		5.5E-04	1.8E-02
			Zinc					Zinc	Blood	4.4E-03		2.2E-06	4.4E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.6E-01		5.4E-04	6.6E-01
							Total Risk Across Groundwater	2.6E-04					Total Hazard Index Across Groundwater 5.3E+00

Total Liver HI =	4.2E-01	Total CNS HI =	7.8E-01
Total Kidney HI =	3.7E-02	Total Fetotoxicity HI =	7.6E-03
Total CVS HI =	4.1E-02	Total Body Weight HI =	5.2E-02
Total GI Tract HI =	1.6E-02	Total Prostate HI =	2.2E+00
Total Skin HI =	4.1E-02	Total Bone HI =	7.6E-03
Total Blood HI =	6.9E-01	Total Spleen HI =	2.3E-02

TABLE 9.4. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ASOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	2.7E-08		5.3E-09	3.2E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	6.1E-10		5.2E-10	1.1E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.0E-09		6.8E-09	1.5E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.1E-09		9.4E-10	2.0E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	4.9E-10		4.2E-10	9.2E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.4E-06		2.2E-06	4.6E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	2.4E-08		4.6E-09	2.8E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	3.5E-10		2.9E-10	6.4E-10	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	8.0E-09		6.8E-09	1.5E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	1.1E-09		9.4E-10	2.0E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.8E-10		2.4E-10	5.2E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.2E-06		1.1E-06	2.3E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.5E-09		3.1E-10	1.8E-09	2,4,6-Trinitrotoluene	Liver	6.3E-04		1.3E-04	7.6E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	3.3E-04		1.3E-05	3.4E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	3.7E-04		2.2E-05	3.9E-04
		Building 166	HMX					HMX	Liver, Blood	4.8E-06		1.9E-07	4.9E-06
		Historical Data	RDX	5.6E-09		5.5E-10	6.2E-09	RDX	Prostate	1.1E-04		1.1E-05	1.2E-04
			Aluminum					Aluminum	CNS	2.4E-03			2.4E-03
			Arsenic	2.9E-07		5.7E-08	3.5E-07	Arsenic	Skin, CVS	4.1E-03		8.1E-04	4.9E-03
			Barium					Barium	Kidney	1.8E-04			1.8E-04
			Mercury					Mercury	CNS	1.2E-04			1.2E-04
			Total Risk Across Surface Soil - Area Bldg 166				4.6E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				2.4E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				3.6E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					9.2E-03

Target Organ Analysis - Building 166

Total Liver HI =	1.5E-03	Total CNS HI =	2.5E-03
Total Kidney HI =	1.8E-04	Total Blood HI =	4.9E-06
Total CVS HI =	4.9E-03	Total Prostate HI =	1.2E-04
Total Skin HI =	4.9E-03		

TABLE 9.4. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ASOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	5.9E-08		1.2E-08	7.1E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	2.1E-08		1.8E-08	3.9E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.9E-07		1.6E-07	3.5E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.1E-08		1.8E-08	3.9E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	3.8E-08		3.2E-08	7.0E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-08		1.1E-08	2.3E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	8.3E-06		7.7E-06	1.6E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	2.1E-08		4.1E-09	2.5E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	2.1E-08		1.8E-08	3.9E-08	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.9E-07		1.6E-07	3.5E-07	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	2.1E-08		1.8E-08	3.9E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	3.8E-08		3.2E-08	7.0E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-08		1.0E-08	2.3E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.0E-06		3.7E-06	7.7E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	4.2E-10		8.7E-11	5.0E-10	2,4,6-Trinitrotoluene	Liver	1.8E-04		3.7E-05	2.1E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	3.0E-04		1.2E-05	3.2E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	4.6E-03		2.7E-04	4.8E-03
		Building 171	HMX					HMX	Liver, Blood	6.3E-04		2.5E-05	6.6E-04
		Historical Data	RDX	1.1E-08		1.1E-09	1.2E-08	RDX	Prostate	2.1E-04		2.1E-05	2.4E-04
			Aluminum					Aluminum	CNS	2.6E-03			2.6E-03
			Arsenic	3.2E-07		6.2E-08	3.8E-07	Arsenic	Skin, CVS	4.5E-03		8.8E-04	5.4E-03
			Barium					Barium	Kidney	1.6E-04			1.6E-04
			Mercury					Mercury	CNS	1.8E-04			1.8E-04
			Total Risk Across Surface Soil - Area Bldg 171				1.7E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				8.2E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				3.9E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					1.5E-02

Target Organ Analysis - Building 171

Total Liver HI =	6.0E-03	Total CNS HI =	2.8E-03
Total Kidney HI =	1.6E-04	Total Blood HI =	6.6E-04
Total CVS HI =	5.4E-03	Total Prostate HI =	2.4E-04
Total Skin HI =	5.4E-03		

TABLE 9.4. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	7.4E-08		6.3E-08	1.4E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.4E-08		1.2E-08	2.6E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	1.7E-03			1.7E-03
			Arsenic	9.9E-07		2.0E-07	1.2E-06	Arsenic	Skin, CVS	1.4E-02		2.8E-03	1.7E-02
			Barium					Barium	Kidney	4.0E-04			4.0E-04
			Cadmium					Cadmium	Kidney	4.4E-04		5.8E-05	5.0E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	4.9E-03			4.9E-03
			Iron					Iron	NA	4.2E-02			4.2E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	5.7E-03			5.7E-03
			Vanadium					Vanadium	Kidney	9.7E-03			9.7E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	8.4E-09		5.1E-07	5.2E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	1.0E-07		1.1E-05	1.1E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	1.5E-08		1.6E-06	1.6E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	8.0E-09		8.8E-07	8.9E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	2.2E-09		2.7E-10	2.4E-09	2,4,6-Trinitrotoluene	Liver	9.2E-04		1.1E-04	1.0E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	5.1E-03		3.6E-04	5.5E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.3E-02		8.8E-04	1.3E-02
			HMX					HMX	Liver, Blood	1.7E-03		4.2E-05	1.8E-03
			RDX	1.1E-05		4.6E-07	1.2E-05	RDX	Prostate	2.1E-01		8.9E-03	2.2E-01
			Aluminum					Aluminum	CNS	1.2E-03		8.1E-05	1.3E-03
			Arsenic	4.9E-07		3.2E-08	5.2E-07	Arsenic	Skin, CVS	6.9E-03		4.5E-04	7.4E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	1.4E-03		7.2E-03	8.5E-03
			Iron					Iron	NA	3.7E-03		2.4E-04	4.0E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	5.8E-03		9.5E-03	1.5E-02
			Vanadium					Vanadium	Kidney	3.2E-03		8.2E-03	1.1E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	4.6E-03		3.0E-04	4.9E-03
						Total Risk Across Gully Sediment	1.3E-06					Total Hazard Index Across Gully Sediment	8.2E-02
						Total Risk Across Gully Surface Water	2.6E-05					Total Hazard Index Across Gully Surface water	2.98E-01

TABLE 9.4. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	2.3E-03			2.3E-03
			Antimony					Antimony	Blood	1.9E-03			1.9E-03
			Arsenic	2.2E-06		4.4E-07	2.7E-06	Arsenic	Skin, CVS	3.1E-02		6.2E-03	3.8E-02
			Cadmium					Cadmium	Kidney	5.7E-03		7.4E-04	6.4E-03
			Iron					Iron	NA	1.7E-01			1.7E-01
			Manganese					Manganese	CNS	9.4E-03			9.4E-03
			Vanadium					Vanadium	Kidney	1.7E-02			1.7E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	5.7E-08		2.4E-09	5.9E-08	RDX	Prostate	1.1E-03		4.6E-05	1.1E-03
			Barium					Barium	Kidney	1.3E-03		1.2E-03	2.6E-03
							Total Risk Across Mainstream Sediment						2.7E-06
							Total Risk Across Mainstream Surface Water						5.9E-08
													Total Hazard Index Across Mainstream Sediment 2.4E-01
													Total Hazard Index Across Mainstream Surface water 3.71E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	2.2E-02	Total CNS HI =	2.4E-02
Total Kidney HI =	2.3E-02	Total Fetotoxicity HI =	1.3E-02
Total CVS HI =	2.4E-02	Total Prostate HI =	2.2E-01
Total GI Tract HI =	1.3E-02	Total Bone HI =	1.3E-02
Total Skin HI =	2.4E-02	Total Blood HI =	6.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	2.6E-02	Total CNS HI =	1.2E-02
Total CVS HI =	3.8E-02	Total Prostate HI =	1.1E-03
Total Skin HI =	3.8E-02	Total Blood HI =	1.9E-03

TABLE 9.5. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	8.5E-08		1.7E-08	1.0E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	1.9E-09		1.6E-09	3.5E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.5E-08		2.1E-08	4.6E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.4E-09		3.0E-09	6.4E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.5E-09		1.3E-09	2.9E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	7.5E-06		6.9E-06	1.4E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	7.4E-08		1.5E-08	8.8E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	1.1E-09		9.3E-10	2.0E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	2.5E-08		2.1E-08	4.6E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	3.4E-09		3.0E-09	6.4E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	8.8E-10		7.6E-10	1.6E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.8E-06		3.5E-06	7.2E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	4.6E-09		9.7E-10	5.6E-09	2,4,6-Trinitrotoluene	Liver	3.6E-03		7.6E-04	4.3E-03
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.9E-03		7.5E-05	2.0E-03
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.1E-03		1.3E-04	2.3E-03
		Building 166	HMX					HMX	Liver, Blood	2.7E-05		1.1E-06	2.8E-05
		Historical Data	RDX	1.8E-08		1.7E-09	1.9E-08	RDX	Prostate	6.2E-04		6.2E-05	6.8E-04
			Aluminum					Aluminum	CNS	1.4E-02			1.4E-02
			Arsenic	9.1E-07		1.8E-07	1.1E-06	Arsenic	Skin, CVS	2.4E-02		4.7E-03	2.8E-02
			Barium					Barium	Kidney	1.0E-03			1.0E-03
			Mercury					Mercury	CNS	6.7E-04			6.7E-04
			Total Risk Across Surface Soil - Area Bldg 166				1.5E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				7.4E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.1E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					5.3E-02

Target Organ Analysis - Building 166

Total Liver HI =	8.6E-03	Total CNS HI =	1.4E-02
Total Kidney HI =	1.0E-03	Total Blood HI =	2.8E-05
Total CVS HI =	2.8E-02	Total Prostate HI =	6.8E-04
Total Skin HI =	2.8E-02		

TABLE 9.5. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg. 171	2,3,7,8-TCDD TEQ	1.8E-07		3.7E-08	2.2E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	6.5E-08		5.6E-08	1.2E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	5.9E-07		5.1E-07	1.1E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	6.5E-08		5.6E-08	1.2E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.2E-07		1.0E-07	2.2E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.9E-08		3.3E-08	7.2E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.6E-05		2.4E-05	5.0E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	6.5E-08		1.3E-08	7.8E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	6.5E-08		5.6E-08	1.2E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	5.9E-07		5.1E-07	1.1E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	6.5E-08		5.6E-08	1.2E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.2E-07		1.0E-07	2.2E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.8E-08		3.3E-08	7.1E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.3E-05		1.2E-05	2.4E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	1.3E-09		2.7E-10	1.6E-09	2,4,6-Trinitrotoluene	Liver	1.0E-03		2.1E-04	1.2E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.7E-03		6.9E-05	1.8E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.6E-02		1.6E-03	2.8E-02
			HMX					HMX	Liver, Blood	3.6E-03		1.4E-04	3.8E-03
			RDX	3.5E-08		3.5E-09	3.8E-08	RDX	Prostate	1.2E-03		1.2E-04	1.4E-03
			Aluminum					Aluminum	CNS	1.5E-02			1.5E-02
			Arsenic	9.9E-07		2.0E-07	1.2E-06	Arsenic	Skin, CVS	2.6E-02		5.1E-03	3.1E-02
			Barium					Barium	Kidney	8.9E-04			8.9E-04
			Mercury					Mercury	CNS	1.0E-03			1.0E-03
			Total Risk Across Surface Soil - Area Bldg 171				5.2E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				2.6E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.2E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					8.4E-02

Target Organ Analysis - Building 171

Total Liver HI =	3.5E-02	Total CNS HI =	1.6E-02
Total Kidney HI =	8.9E-04	Total Blood HI =	3.8E-03
Total CVS HI =	3.1E-02	Total Prostate HI =	1.4E-03
Total Skin HI =	3.1E-02		

TABLE 9.5. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	2.2E-02		3.4E-04	2.3E-02
			2,4,6-Trinitrotoluene	1.7E-07		2.1E-09	1.7E-07	2,4,6-Trinitrotoluene	Liver	1.3E-01		1.6E-03	1.3E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	9.4E-03		1.9E-04	9.6E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	9.5E-02		6.4E-04	9.6E-02
			2-Nitrotoluene	2.5E-08		1.6E-09	2.7E-08	2-Nitrotoluene	Spleen	5.6E-06		8.2E-06	1.4E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.6E-01		1.1E-03	1.6E-01
			HMX					HMX	Liver, Blood	1.5E-02		3.6E-05	1.5E-02
			RDX	6.0E-05		2.5E-07	6.0E-05	RDX	Prostate	2.1E+00		8.9E-03	2.1E+00
			Aluminum					Aluminum	CNS	2.7E-02		4.4E-05	2.7E-02
			Antimony					Antimony	Blood	8.8E-04		9.7E-06	8.9E-04
			Arsenic	1.5E-06		2.5E-09	1.5E-06	Arsenic	Skin, CVS	4.0E-02		6.5E-05	4.0E-02
			Barium					Barium	Kidney	6.5E-03		1.5E-04	6.6E-03
			Beryllium					Beryllium	GS	7.7E-03		1.8E-03	9.6E-03
			Cadmium					Cadmium	Kidney	2.5E-03		8.4E-05	2.6E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	6.9E-03		9.1E-04	7.8E-03
			Cobalt					Cobalt	NA	2.3E-02		3.9E-05	2.3E-02
			Iron					Iron	NA	6.9E-01		1.1E-03	6.9E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	4.0E-01		6.7E-04	4.0E-01
			Manganese					Manganese	CNS	7.1E-01		2.9E-02	7.4E-01
			Nickel					Nickel	Body Weight	5.0E-02		4.1E-04	5.1E-02
			Vanadium					Vanadium	Kidney	1.7E-02		1.1E-03	1.8E-02
			Zinc					Zinc	Blood	4.3E-03		4.2E-06	4.3E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.4E-01		1.1E-03	6.4E-01
							Total Risk Across Groundwater	6.2E-05					Total Hazard Index Across Groundwater 5.23E+00

Total Liver HI =	4.1E-01	Total CNS HI =	7.7E-01
Total Kidney HI =	3.7E-02	Total Fetotoxicity HI =	7.8E-03
Total CVS HI =	4.0E-02	Total Body Weight HI =	5.1E-02
Total GI Tract HI =	1.7E-02	Total Prostate HI =	2.1E+00
Total Skin HI =	4.0E-02	Total Bone HI =	7.8E-03
Total Blood HI =	6.7E-01	Total Spleen HI =	2.3E-02

TABLE 9.5. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	2.3E-07		2.0E-07	4.3E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	4.4E-08		3.8E-08	8.2E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	9.7E-03			9.7E-03
			Arsenic	3.1E-06		6.1E-07	3.7E-06	Arsenic	Skin, CVS	8.0E-02		1.6E-02	9.6E-02
			Barium					Barium	Kidney	2.3E-03			2.3E-03
			Cadmium					Cadmium	Kidney	2.5E-03		3.4E-04	2.9E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.8E-02			2.8E-02
			Iron					Iron	NA	2.4E-01			2.4E-01
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.2E-02			3.2E-02
			Vanadium					Vanadium	Kidney	5.5E-02			5.5E-02
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.6E-08		1.6E-06	1.6E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	3.2E-07		3.4E-05	3.4E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.8E-08		5.1E-06	5.1E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.5E-08		2.8E-06	2.8E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	6.8E-09		8.3E-10	7.6E-09	2,4,6-Trinitrotoluene	Liver	5.3E-03		6.5E-04	5.9E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	2.9E-02		2.1E-03	3.1E-02
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	7.2E-02		5.1E-03	7.7E-02
			HMX					HMX	Liver, Blood	1.0E-02		2.4E-04	1.0E-02
			RDX	3.5E-05		1.5E-06	3.6E-05	RDX	Prostate	1.2E+00		5.2E-02	1.3E+00
			Aluminum					Aluminum	CNS	7.1E-03		4.7E-04	7.5E-03
			Arsenic	1.5E-06		1.0E-07	1.6E-06	Arsenic	Skin, CVS	4.0E-02		2.6E-03	4.2E-02
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.8E-03		4.1E-02	4.9E-02
			Iron					Iron	NA	2.1E-02		1.4E-03	2.3E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.3E-02		5.5E-02	8.8E-02
			Vanadium					Vanadium	Kidney	1.9E-02		4.7E-02	6.6E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	2.7E-02		1.8E-03	2.8E-02
							Total Risk Across Gully Sediment	4.2E-06					Total Hazard Index Across Gully Sediment	4.7E-01
							Total Risk Across Gully Surface Water	8.1E-05					Total Hazard Index Across Gully Surface water	1.71E+00

TABLE 9.5. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	1.3E-02			1.3E-02
			Antimony					Antimony	Blood	1.1E-02			1.1E-02
			Arsenic	6.9E-06		1.4E-06	8.3E-06	Arsenic	Skin, CVS	1.8E-01		3.6E-02	2.2E-01
			Cadmium					Cadmium	Kidney	3.2E-02		4.3E-03	3.7E-02
			Iron					Iron	NA	9.5E-01			9.5E-01
			Manganese					Manganese	CNS	5.4E-02			5.4E-02
			Vanadium					Vanadium	Kidney	9.6E-02			9.6E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.8E-07		7.4E-09	1.8E-07	RDX	Prostate	6.3E-03		2.6E-04	6.5E-03
			Barium					Barium	Kidney	7.6E-03		7.2E-03	1.5E-02
							Total Risk Across Mainstream Sediment						Total Hazard Index Across Mainstream Sediment
							8.3E-06						1.4E+00
							Total Risk Across Mainstream Surface Water						Total Hazard Index Across Mainstream Surface water
							1.8E-07						2.13E-02

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	1.2E-01	Total CNS HI =	1.4E-01
Total Kidney HI =	1.3E-01	Total Fetotoxicity HI =	7.7E-02
Total CVS HI =	1.4E-01	Total Prostate HI =	1.3E+00
Total GI Tract HI =	7.7E-02	Total Bone HI =	7.7E-02
Total Skin HI =	1.4E-01	Total Blood HI =	3.9E-02

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	1.5E-01	Total CNS HI =	6.7E-02
Total CVS HI =	2.2E-01	Total Prostate HI =	6.5E-03
Total Skin HI =	2.2E-01	Total Blood HI =	1.1E-02

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	3.6E-08		1.4E-08	5.0E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	8.2E-10		1.3E-09	2.2E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.1E-08		1.8E-08	2.8E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.5E-09		2.4E-09	3.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	6.6E-10		1.1E-09	1.8E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.2E-06		5.7E-06	8.9E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	3.2E-08		1.2E-08	4.4E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	4.6E-10		7.7E-10	1.2E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.1E-08		1.8E-08	2.8E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	1.5E-09		2.4E-09	3.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.8E-10		6.2E-10	1.0E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.6E-06		2.9E-06	4.5E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.0E-09		8.0E-10	2.8E-09	2,4,6-Trinitrotoluene	Liver	3.8E-04		1.6E-04	5.4E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.0E-04		1.6E-05	2.2E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.3E-04		2.6E-05	2.5E-04
		Building 166	HMX					HMX	Liver, Blood	2.9E-06		2.2E-07	3.1E-06
		Historical Data	RDX	7.5E-09		1.4E-09	9.0E-09	RDX	Prostate	6.7E-05		1.3E-05	7.9E-05
			Aluminum					Aluminum	CNS	1.5E-03			1.5E-03
			Arsenic	3.9E-07		1.5E-07	5.4E-07	Arsenic	Skin, CVS	2.5E-03		9.6E-04	3.5E-03
			Barium					Barium	Kidney	1.1E-04			1.1E-04
			Mercury					Mercury	CNS	7.1E-05			7.1E-05
			Total Risk Across Surface Soil - Area Bldg 166				9.0E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				4.6E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				5.5E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					6.2E-03

Target Organ Analysis - Building 166

Total Liver HI =	1.0E-03	Total CNS HI =	1.5E-03
Total Kidney HI =	1.1E-04	Total Blood HI =	3.1E-06
Total CVS HI =	3.5E-03	Total Prostate HI =	7.9E-05
Total Skin HI =	3.5E-03		

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	7.9E-08		3.0E-08	1.1E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.8E-08		4.6E-08	7.4E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.5E-07		4.2E-07	6.8E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-08		4.6E-08	7.4E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	5.1E-08		8.4E-08	1.4E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.7E-08		2.7E-08	4.4E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.1E-05		2.0E-05	3.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.8E-08		1.1E-08	3.9E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.8E-08		4.6E-08	7.4E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.5E-07		4.2E-07	6.7E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-08		4.6E-08	7.4E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	5.1E-08		8.4E-08	1.3E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.6E-08		2.7E-08	4.4E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.4E-06		9.6E-06	1.5E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	5.6E-10		2.3E-10	7.8E-10	2,4,6-Trinitrotoluene	Liver	1.1E-04		4.4E-05	1.5E-04
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.9E-04		1.4E-05	2.0E-04
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.8E-03		3.2E-04	3.1E-03
			HMX					HMX	Liver, Blood	3.9E-04		3.0E-05	4.2E-04
			RDX	1.5E-08		2.8E-09	1.8E-08	RDX	Prostate	1.3E-04		2.5E-05	1.6E-04
			Aluminum					Aluminum	CNS	1.6E-03			1.6E-03
			Arsenic	4.2E-07		1.6E-07	5.9E-07	Arsenic	Skin, CVS	2.7E-03		1.0E-03	3.8E-03
			Barium					Barium	Kidney	9.5E-05			9.5E-05
			Mercury					Mercury	CNS	1.1E-04			1.1E-04
			Total Risk Across Surface Soil - Area Bldg 171				3.2E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.6E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				6.0E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					9.7E-03

Target Organ Analysis - Building 171

Total Liver HI =	3.9E-03	Total CNS HI =	1.7E-03
Total Kidney HI =	9.5E-05	Total Blood HI =	4.2E-04
Total CVS HI =	3.8E-03	Total Prostate HI =	1.6E-04
Total Skin HI =	3.8E-03		

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	4.8E-03		2.0E-04	5.0E-03
			2,4,6-Trinitrotoluene	1.4E-07		4.9E-09	1.5E-07	2,4,6-Trinitrotoluene	Liver	2.8E-02		9.5E-04	2.9E-02
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	2.0E-03		1.1E-04	2.1E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	2.0E-02		3.8E-04	2.1E-02
			2-Nitrotoluene	2.2E-08		3.8E-09	2.5E-08	2-Nitrotoluene	Spleen	1.2E-06		4.8E-06	6.0E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	3.5E-02		6.4E-04	3.6E-02
			HMX					HMX	Liver, Blood	3.2E-03		2.1E-05	3.2E-03
			RDX	5.1E-05		5.9E-07	5.2E-05	RDX	Prostate	4.5E-01		5.2E-03	4.6E-01
			Aluminum					Aluminum	CNS	5.7E-03		2.6E-05	5.7E-03
			Antimony					Antimony	Blood	1.9E-04		5.7E-06	1.9E-04
			Arsenic	1.3E-06		5.9E-09	1.3E-06	Arsenic	Skin, CVS	8.5E-03		3.8E-05	8.5E-03
			Barium					Barium	Kidney	1.4E-03		8.9E-05	1.5E-03
			Beryllium					Beryllium	GS	1.7E-03		1.1E-03	2.7E-03
			Cadmium					Cadmium	Kidney	5.5E-04		4.9E-05	5.9E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	1.5E-03		5.3E-04	2.0E-03
			Cobalt					Cobalt	NA	5.0E-03		2.3E-05	5.0E-03
			Iron					Iron	NA	1.5E-01		6.7E-04	1.5E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	8.7E-02		3.9E-04	8.7E-02
			Manganese					Manganese	CNS	1.5E-01		1.7E-02	1.7E-01
			Nickel					Nickel	Body Weight	1.1E-02		2.4E-04	1.1E-02
			Vanadium					Vanadium	Kidney	3.6E-03		6.3E-04	4.3E-03
			Zinc					Zinc	Blood	9.2E-04		2.5E-06	9.2E-04
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.4E-01		6.2E-04	1.4E-01
							Total Risk Across Groundwater	5.3E-05					Total Hazard Index Across Groundwater	1.14E+00

Total Liver HI =	8.9E-02	Total CNS HI =	1.8E-01
Total Kidney HI =	8.5E-03	Total Fetotoxicity HI =	2.0E-03
Total CVS HI =	8.5E-03	Total Body Weight HI =	1.1E-02
Total GI Tract HI =	4.7E-03	Total Prostate HI =	4.6E-01
Total Skin HI =	8.5E-03	Total Bone HI =	2.0E-03
Total Blood HI =	1.4E-01	Total Spleen HI =	5.0E-03

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	9.9E-08		1.6E-07	2.6E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.9E-08		3.1E-08	5.0E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	1.0E-03			1.0E-03
			Arsenic	1.3E-06		5.1E-07	1.8E-06	Arsenic	Skin, CVS	8.6E-03		3.3E-03	1.2E-02
			Barium					Barium	Kidney	2.5E-04			2.5E-04
			Cadmium					Cadmium	Kidney	2.7E-04		6.9E-05	3.4E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.0E-03			3.0E-03
			Iron					Iron	NA	2.6E-02			2.6E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.5E-03			3.5E-03
			Vanadium					Vanadium	Kidney	5.9E-03			5.9E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	4.5E-09		3.8E-06	3.8E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	5.5E-08		7.9E-05	7.9E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	8.2E-09		1.2E-05	1.2E-05	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	4.3E-09		6.5E-06	6.5E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	1.2E-09		2.0E-09	3.1E-09	2,4,6-Trinitrotoluene	Liver	2.3E-04		3.8E-04	6.1E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	1.3E-03		1.2E-03	2.5E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	3.1E-03		3.0E-03	6.1E-03
			HMX					HMX	Liver, Blood	4.3E-04		1.4E-04	5.7E-04
			RDX	6.0E-06		3.4E-06	9.4E-06	RDX	Prostate	5.3E-02		3.0E-02	8.3E-02
			Aluminum					Aluminum	CNS	3.0E-04		2.7E-04	5.8E-04
			Arsenic	2.6E-07		2.4E-07	5.0E-07	Arsenic	Skin, CVS	1.7E-03		1.5E-03	3.2E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.3E-04		2.4E-02	2.5E-02
			Iron					Iron	NA	9.1E-04		8.3E-04	1.7E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	1.4E-03		3.2E-02	3.4E-02
			Vanadium					Vanadium	Kidney	7.9E-04		2.8E-02	2.8E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.1E-03		1.0E-03	2.2E-03
							Total Risk Across Gully Sediment	2.1E-06					Total Hazard Index Across Gully Sediment	5.2E-02
							Total Risk Across Gully Surface Water	1.1E-04					Total Hazard Index Across Gully Surface water	1.87E-01

TABLE 9.6. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	1.4E-03			1.4E-03
			Antimony					Antimony	Blood	1.2E-03			1.2E-03
			Arsenic	3.0E-06		1.1E-06	4.1E-06	Arsenic	Skin, CVS	1.9E-02		7.4E-03	2.7E-02
			Cadmium					Cadmium	Kidney	3.5E-03		8.8E-04	4.4E-03
			Iron					Iron	NA	1.0E-01			1.0E-01
			Manganese					Manganese	CNS	5.8E-03			5.8E-03
			Vanadium					Vanadium	Kidney	1.0E-02			1.0E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	3.0E-08		1.8E-08	4.8E-08	RDX	Prostate	2.7E-04		1.5E-04	4.2E-04
			Barium					Barium	Kidney	3.3E-04		4.2E-03	4.5E-03
							Total Risk Across Mainstream Sediment	4.1E-06					Total Hazard Index Across Mainstream Sediment 1.5E-01
							Total Risk Across Mainstream Surface Water	4.8E-08					Total Hazard Index Across Mainstream Surface water 4.97E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	9.7E-03	Total CNS HI =	3.9E-02
Total Kidney HI =	3.5E-02	Total Fetotoxicity HI =	2.8E-02
Total CVS HI =	1.5E-02	Total Prostate HI =	8.3E-02
Total GI Tract HI =	2.8E-02	Total Bone HI =	2.8E-02
Total Skin HI =	1.5E-02	Total Blood HI =	2.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	1.9E-02	Total CNS HI =	7.2E-03
Total CVS HI =	2.7E-02	Total Prostate HI =	4.2E-04
Total Skin HI =	2.7E-02	Total Blood HI =	1.2E-03

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.2E-07		3.1E-08	1.5E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	2.7E-09		3.0E-09	5.7E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.6E-08		3.9E-08	7.5E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	4.9E-09		5.4E-09	1.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.2E-09		2.4E-09	4.6E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.1E-05		1.3E-05	2.3E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	1.1E-07		2.7E-08	1.3E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	1.5E-09		1.7E-09	3.2E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	3.6E-08		3.9E-08	7.5E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	4.9E-09		5.4E-09	1.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.3E-09		1.4E-09	2.6E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.4E-06		6.4E-06	1.2E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	6.6E-09		1.8E-09	8.4E-09	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 166	HMX					HMX	Liver, Blood				
		Historical Data	RDX	2.5E-08		3.2E-09	2.8E-08	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.3E-06		3.3E-07	1.6E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 166				2.4E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				1.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.7E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					

Target Organ Analysis - Building 166

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	2.6E-07		6.7E-08	3.3E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	9.3E-08		1.0E-07	2.0E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.5E-07		9.3E-07	1.8E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	9.3E-08		1.0E-07	2.0E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.7E-07		1.9E-07	3.6E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.5E-08		6.0E-08	1.2E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.7E-05		4.4E-05	8.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	9.3E-08		2.4E-08	1.2E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	9.3E-08		1.0E-07	1.9E-07	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	8.5E-07		9.3E-07	1.8E-06	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	9.3E-08		1.0E-07	1.9E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.7E-07		1.9E-07	3.5E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.5E-08		6.0E-08	1.2E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.8E-05		2.1E-05	3.9E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.9E-09		5.0E-10	2.4E-09	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 171	HMX					HMX	Liver, Blood				
		Historical Data	RDX	5.0E-08		6.3E-09	5.6E-08	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.4E-06		3.6E-07	1.8E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 171				8.4E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				4.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.8E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					

Target Organ Analysis - Building 171

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen				
			2,4,6-Trinitrotoluene	3.1E-07		7.0E-09	3.2E-07	2,4,6-Trinitrotoluene	Liver				
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			2-Nitrotoluene	4.7E-08		5.4E-09	5.2E-08	2-Nitrotoluene	Spleen				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	1.1E-04		8.4E-07	1.1E-04	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	2.8E-06		8.4E-09	2.8E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Beryllium					Beryllium	GS				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Cobalt					Cobalt	NA				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Lithium					Lithium	NA				
			Manganese					Manganese	CNS				
			Nickel					Nickel	Body Weight				
			Vanadium					Vanadium	Kidney				
			Zinc					Zinc	Blood				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Groundwater	1.2E-04					Total Hazard Index Across Groundwater	

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Body Weight HI =	
Total GI Tract HI =		Total Prostate HI =	
Total Skin HI =		Total Bone HI =	
Total Blood HI =		Total Spleen HI =	

TABLE 9.7. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	3.3E-07		3.6E-07	6.9E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	6.3E-08		6.9E-08	1.3E-07	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS				
			Arsenic	4.4E-06		1.1E-06	5.5E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	3.1E-08		5.4E-06	5.4E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	3.8E-07		1.1E-04	1.1E-04	Benzo(a)pyrene					
			Benzo(b)fluoranthene	5.6E-08		1.7E-05	1.7E-05	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.9E-08		9.3E-06	9.3E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	7.9E-09		2.8E-09	1.1E-08	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	4.1E-05		4.9E-06	4.6E-05	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.8E-06		3.4E-07	2.1E-06	Arsenic	Skin, CVS				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Gully Sediment	6.4E-06					Total Hazard Index Across Gully Sediment	
						Total Risk Across Gully Surface Water	1.9E-04					Total Hazard Index Across Gully Surface water	

TABLE 9.7, REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	9.9E-06		2.5E-06	1.2E-05	Arsenic	Skin, CVS				
			Cadmium					Cadmium	Kidney				
			Iron					Iron	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Mainstream Surface Water	RDX	2.1E-07		2.5E-08	2.3E-07	RDX	Prostate				
			Barium					Barium	Kidney				
							Total Risk Across Mainstream Sediment	1.2E-05					Total Hazard Index Across Mainstream Sediment
							Total Risk Across Mainstream Surface Water	2.3E-07					Total Hazard Index Across Mainstream Surface water

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Prostate HI =	
Total GI Tract HI =		Total Bone HI =	
Total Skin HI =		Total Blood HI =	

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =		Total CNS HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =		Total Blood HI =	

TABLE 9.8, REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	1.1E-06		9.6E-08	1.2E-06	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.6E-08		9.3E-09	3.5E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.4E-07		1.2E-07	4.6E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	4.6E-08		1.7E-08	6.3E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.1E-08		7.6E-09	2.8E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.0E-04		4.0E-05	1.4E-04	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	9.9E-07		8.3E-08	1.1E-06	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.5E-08		5.3E-09	2.0E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.4E-07		1.2E-07	4.6E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	4.6E-08		1.7E-08	6.3E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-08		4.3E-09	1.6E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.1E-05		2.0E-05	7.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	6.2E-08		5.6E-09	6.8E-08	2,4,6-Trinitrotoluene	Liver	4.8E-02		4.3E-03	5.3E-02
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.6E-02		4.3E-04	2.6E-02
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.9E-02		7.2E-04	2.9E-02
			HMX					HMX	Liver, Blood	3.7E-04		6.2E-06	3.7E-04
			RDX	2.4E-07		9.9E-09	2.5E-07	RDX	Prostate	8.4E-03		3.5E-04	8.7E-03
			Aluminum					Aluminum	CNS	1.8E-01			1.8E-01
			Arsenic	1.2E-05		1.0E-06	1.3E-05	Arsenic	Skin, CVS	3.2E-01		2.7E-02	3.4E-01
			Barium					Barium	Kidney	1.4E-02			1.4E-02
			Mercury					Mercury	CNS	9.0E-03			9.0E-03
			Total Risk Across Surface Soil - Area Bldg 166				1.4E-04	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				7.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.4E-05	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					6.7E-01

Target Organ Analysis - Building 166

Total Liver HI =	1.1E-01	Total CNS HI =	1.9E-01
Total Kidney HI =	1.4E-02	Total Blood HI =	3.7E-04
Total CVS HI =	3.4E-01	Total Prostate HI =	8.7E-03
Total Skin HI =	3.4E-01		

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	2.5E-06		2.1E-07	2.7E-06	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	8.8E-07		3.2E-07	1.2E-06	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.0E-06		2.9E-06	1.1E-05	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	8.8E-07		3.2E-07	1.2E-06	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.6E-06		5.8E-07	2.2E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.2E-07		1.9E-07	7.1E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.5E-04		1.4E-04	4.9E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	8.8E-07		7.4E-08	9.5E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	8.8E-07		3.2E-07	1.2E-06	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	8.0E-06		2.9E-06	1.1E-05	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	8.8E-07		3.2E-07	1.2E-06	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.6E-06		5.8E-07	2.2E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.2E-07		1.9E-07	7.1E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.7E-04		6.6E-05	2.4E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.7E-08		1.6E-09	1.9E-08	2,4,6-Trinitrotoluene	Liver	1.4E-02		1.2E-03	1.5E-02
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.4E-02		4.0E-04	2.4E-02
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	3.5E-01		8.9E-03	3.6E-01
		Building 171	HMX					HMX	Liver, Blood	4.9E-02		8.2E-04	5.0E-02
		Historical Data	RDX	4.7E-07		2.0E-08	4.9E-07	RDX	Prostate	1.7E-02		7.0E-04	1.7E-02
			Aluminum					Aluminum	CNS	2.0E-01			2.0E-01
			Arsenic	1.3E-05		1.1E-06	1.4E-05	Arsenic	Skin, CVS	3.5E-01		2.9E-02	3.7E-01
			Barium					Barium	Kidney	1.2E-02			1.2E-02
			Mercury					Mercury	CNS	1.4E-02			1.4E-02
			Total Risk Across Surface Soil - Area Bldg 171				5.1E-04	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				2.5E-04	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.5E-05	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					1.1E+00

Target Organ Analysis - Building 171

Total Liver HI =	4.5E-01	Total CNS HI =	2.2E-01
Total Kidney HI =	1.2E-02	Total Blood HI =	5.0E-02
Total CVS HI =	3.7E-01	Total Prostate HI =	1.7E-02
Total Skin HI =	3.7E-01		

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	2.3E-01		2.3E-03	2.3E-01
			2,4,6-Trinitrotoluene	1.7E-06		1.4E-08	1.7E-06	2,4,6-Trinitrotoluene	Liver	1.3E+00		1.1E-02	1.3E+00
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	9.5E-02		1.3E-03	9.6E-02
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	9.6E-01		4.3E-03	9.7E-01
			2-Nitrotoluene	2.6E-07		1.1E-08	2.7E-07	2-Nitrotoluene	Spleen	5.6E-05		5.5E-05	1.1E-04
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.6E+00		7.4E-03	1.7E+00
			HMX					HMX	Liver, Blood	1.5E-01		2.4E-04	1.5E-01
			RDX	6.0E-04		1.7E-06	6.1E-04	RDX	Prostate	2.1E+01		6.0E-02	2.1E+01
			Aluminum					Aluminum	CNS	2.7E-01		3.0E-04	2.7E-01
			Antimony					Antimony	Blood	8.9E-03		6.5E-05	9.0E-03
			Arsenic	1.5E-05		1.7E-08	1.5E-05	Arsenic	Skin, CVS	4.0E-01		4.4E-04	4.0E-01
			Barium					Barium	Kidney	6.6E-02		1.0E-03	6.7E-02
			Beryllium					Beryllium	GS	7.8E-02		1.2E-02	9.0E-02
			Cadmium					Cadmium	Kidney	2.6E-02		5.7E-04	2.6E-02
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.0E-02		6.1E-03	7.6E-02
			Cobalt					Cobalt	NA	2.4E-01		2.6E-04	2.4E-01
			Iron					Iron	NA	7.0E+00		7.7E-03	7.0E+00
			Lead					Lead	NA				
			Lithium					Lithium	NA	4.1E+00		4.5E-03	4.1E+00
			Manganese					Manganese	CNS	7.2E+00		2.0E-01	7.4E+00
			Nickel					Nickel	Body Weight	5.1E-01		2.8E-03	5.1E-01
			Vanadium					Vanadium	Kidney	1.7E-01		7.2E-03	1.8E-01
			Zinc					Zinc	Blood	4.3E-02		2.8E-05	4.3E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.5E+00		7.1E-03	6.5E+00
							Total Risk Across Groundwater	6.2E-04					Total Hazard Index Across Groundwater	5.27E+01

Total Liver HI =	4.1E+00	Total CNS HI =	7.7E+00
Total Kidney HI =	3.7E-01	Total Fetotoxicity HI =	7.6E-02
Total CVS HI =	4.0E-01	Total Body Weight HI =	5.1E-01
Total GI Tract HI =	1.7E-01	Total Prostate HI =	2.1E+01
Total Skin HI =	4.0E-01	Total Bone HI =	7.6E-02
Total Blood HI =	6.8E+00	Total Spleen HI =	2.3E-01

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	2.3E-07		1.7E-07	4.0E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	4.4E-08		3.2E-08	7.6E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	9.7E-03			9.7E-03
			Arsenic	3.1E-06		5.2E-07	3.6E-06	Arsenic	Skin, CVS	8.0E-02		1.3E-02	9.4E-02
			Barium					Barium	Kidney	2.3E-03			2.3E-03
			Cadmium					Cadmium	Kidney	2.5E-03		2.8E-04	2.8E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.8E-02			2.8E-02
			Iron					Iron	NA	2.4E-01			2.4E-01
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.2E-02			3.2E-02
			Vanadium					Vanadium	Kidney	5.5E-02			5.5E-02
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.6E-08		1.6E-06	1.6E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	3.2E-07		3.4E-05	3.4E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.8E-08		5.1E-06	5.1E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.5E-08		2.8E-06	2.8E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	6.8E-09		8.3E-10	7.6E-09	2,4,6-Trinitrotoluene	Liver	5.3E-03		6.5E-04	5.9E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	2.9E-02		2.1E-03	3.1E-02
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	7.2E-02		5.1E-03	7.7E-02
			HMX					HMX	Liver, Blood	1.0E-02		2.4E-04	1.0E-02
			RDX	3.5E-05		1.5E-06	3.6E-05	RDX	Prostate	1.2E+00		5.2E-02	1.3E+00
			Aluminum					Aluminum	CNS	7.1E-03		4.7E-04	7.5E-03
			Arsenic	1.5E-06		1.0E-07	1.6E-06	Arsenic	Skin, CVS	4.0E-02		2.6E-03	4.2E-02
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.8E-03		4.1E-02	4.9E-02
			Iron					Iron	NA	2.1E-02		1.4E-03	2.3E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.3E-02		5.5E-02	8.8E-02
			Vanadium					Vanadium	Kidney	1.9E-02		4.7E-02	6.6E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	2.7E-02		1.8E-03	2.8E-02
							Total Risk Across Gully Sediment	4.1E-06					Total Hazard Index Across Gully Sediment 4.7E-01
							Total Risk Across Gully Surface Water	8.1E-05					Total Hazard Index Across Gully Surface water 1.71E+00

TABLE 9.8. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	1.3E-02			1.3E-02
			Antimony					Antimony	Blood	1.1E-02			1.1E-02
			Arsenic	6.9E-06		1.2E-06	8.1E-06	Arsenic	Skin, CVS	1.8E-01		3.0E-02	2.1E-01
			Cadmium					Cadmium	Kidney	3.2E-02		3.6E-03	3.6E-02
			Iron					Iron	NA	9.5E-01			9.5E-01
			Manganese					Manganese	CNS	5.4E-02			5.4E-02
			Vanadium					Vanadium	Kidney	9.6E-02			9.6E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.8E-07		7.4E-09	1.8E-07	RDX	Prostate	6.3E-03		2.6E-04	6.5E-03
			Barium					Barium	Kidney	7.6E-03		7.2E-03	1.5E-02
							Total Risk Across Mainstream Sediment	8.1E-06					Total Hazard Index Across Mainstream Sediment	1.4E+00
							Total Risk Across Mainstream Surface Water	1.8E-07					Total Hazard Index Across Mainstream Surface water	2.1E-02

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	1.2E-01	Total CNS HI =	1.4E-01
Total Kidney HI =	1.3E-01	Total Fetotoxicity HI =	7.7E-02
Total CVS HI =	1.4E-01	Total Prostate HI =	1.3E+00
Total GI Tract HI =	7.7E-02	Total Bone HI =	7.7E-02
Total Skin HI =	1.4E-01	Total Blood HI =	3.9E-02

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	1.5E-01	Total CNS HI =	6.7E-02
Total CVS HI =	2.1E-01	Total Prostate HI =	6.5E-03
Total Skin HI =	2.1E-01	Total Blood HI =	1.1E-02

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	4.9E-07		5.8E-08	5.5E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	1.1E-08		5.7E-09	1.7E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.4E-07		7.5E-08	2.2E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.0E-08		1.0E-08	3.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	8.9E-09		4.6E-09	1.4E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.3E-05		2.4E-05	6.7E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	4.2E-07		5.1E-08	4.8E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	6.2E-09		3.2E-09	9.5E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.4E-07		7.5E-08	2.2E-07	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	2.0E-08		1.0E-08	3.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.1E-09		2.6E-09	7.7E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.2E-05		1.2E-05	3.4E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.7E-08		3.4E-09	3.0E-08	2,4,6-Trinitrotoluene	Liver	5.2E-03		6.6E-04	5.8E-03
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.7E-03		6.6E-05	2.8E-03
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	3.1E-03		1.1E-04	3.2E-03
		Building 166	HMX					HMX	Liver, Blood	3.9E-05		9.4E-07	4.0E-05
		Historical Data	RDX	1.0E-07		6.1E-09	1.1E-07	RDX	Prostate	9.0E-04		5.4E-05	9.5E-04
			Aluminum					Aluminum	CNS	2.0E-02			2.0E-02
			Arsenic	5.2E-06		6.3E-07	5.9E-06	Arsenic	Skin, CVS	3.4E-02		4.1E-03	3.8E-02
			Barium					Barium	Kidney	1.5E-03			1.5E-03
			Mercury					Mercury	CNS	9.6E-04			9.6E-04
			Total Risk Across Surface Soil - Area Bldg 166				6.8E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				3.5E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				6.0E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					7.3E-02

Target Organ Analysis - Building 166

Total Liver HI =	1.2E-02	Total CNS HI =	2.1E-02
Total Kidney HI =	1.5E-03	Total Blood HI =	4.0E-05
Total CVS HI =	3.8E-02	Total Prostate HI =	9.5E-04
Total Skin HI =	3.8E-02		

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	1.1E-06		1.3E-07	1.2E-06	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	3.8E-07		2.0E-07	5.7E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.4E-06		1.8E-06	5.2E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.8E-07		2.0E-07	5.7E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	6.9E-07		3.6E-07	1.0E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.2E-07		1.2E-07	3.4E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.5E-04		8.4E-05	2.3E-04	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	3.8E-07		4.5E-08	4.2E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	3.8E-07		1.9E-07	5.7E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.4E-06		1.8E-06	5.2E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.8E-07		1.9E-07	5.7E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	6.8E-07		3.5E-07	1.0E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.2E-07		1.2E-07	3.4E-07	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	7.2E-05		4.0E-05	1.1E-04	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	7.5E-09		9.6E-10	8.5E-09	2,4,6-Trinitrotoluene	Liver	1.5E-03		1.9E-04	1.6E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	2.5E-03		6.0E-05	2.6E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	3.8E-02		1.4E-03	3.9E-02
			HMX					HMX	Liver, Blood	5.2E-03		1.3E-04	5.4E-03
			RDX	2.0E-07		1.2E-08	2.1E-07	RDX	Prostate	1.8E-03		1.1E-04	1.9E-03
			Aluminum					Aluminum	CNS	2.2E-02			2.2E-02
			Arsenic	5.7E-06		6.8E-07	6.4E-06	Arsenic	Skin, CVS	3.7E-02		4.4E-03	4.1E-02
			Barium					Barium	Kidney	1.3E-03			1.3E-03
			Mercury					Mercury	CNS	1.5E-03			1.5E-03
			Total Risk Across Surface Soil - Area Bldg 171				2.4E-04	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.2E-04	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				6.6E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					1.2E-01

Target Organ Analysis - Building 171

Total Liver HI =	4.9E-02	Total CNS HI =	2.3E-02
Total Kidney HI =	1.3E-03	Total Blood HI =	5.4E-03
Total CVS HI =	4.1E-02	Total Prostate HI =	1.9E-03
Total Skin HI =	4.1E-02		

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	6.5E-02		1.3E-03	6.6E-02
			2,4,6-Trinitrotoluene	2.0E-06		3.3E-08	2.0E-06	2,4,6-Trinitrotoluene	Liver	3.8E-01		6.4E-03	3.9E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	2.7E-02		7.4E-04	2.8E-02
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	2.8E-01		2.5E-03	2.8E-01
			2-Nitrotoluene	2.9E-07		2.5E-08	3.2E-07	2-Nitrotoluene	Spleen	1.6E-05		3.2E-05	4.8E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	4.7E-01		4.3E-03	4.7E-01
			HMX					HMX	Liver, Blood	4.3E-02		1.4E-04	4.3E-02
			RDX	6.9E-04		4.0E-06	6.9E-04	RDX	Prostate	6.1E+00		3.5E-02	6.1E+00
			Aluminum					Aluminum	CNS	7.7E-02		1.7E-04	7.7E-02
			Antimony					Antimony	Blood	2.5E-03		3.8E-05	2.6E-03
			Arsenic	1.8E-05		4.0E-08	1.8E-05	Arsenic	Skin, CVS	1.1E-01		2.6E-04	1.1E-01
			Barium					Barium	Kidney	1.9E-02		6.0E-04	1.9E-02
			Beryllium					Beryllium	GS	2.2E-02		7.2E-03	3.0E-02
			Cadmium					Cadmium	Kidney	7.3E-03		3.3E-04	7.7E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.0E-02		3.6E-03	2.3E-02
			Cobalt					Cobalt	NA	6.8E-02		1.5E-04	6.8E-02
			Iron					Iron	NA	2.0E+00		4.5E-03	2.0E+00
			Lead					Lead	NA				
			Lithium					Lithium	NA	1.2E+00		2.6E-03	1.2E+00
			Manganese					Manganese	CNS	2.0E+00		1.2E-01	2.2E+00
			Nickel					Nickel	Body Weight	1.4E-01		1.6E-03	1.5E-01
			Vanadium					Vanadium	Kidney	4.9E-02		4.2E-03	5.3E-02
			Zinc					Zinc	Blood	1.2E-02		1.7E-05	1.2E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.8E+00		4.1E-03	1.8E+00
						Total Risk Across Groundwater	7.1E-04					Total Hazard Index Across Groundwater	1.52E+01

Total Liver HI =	1.2E+00	Total CNS HI =	2.3E+00
Total Kidney HI =	1.1E-01	Total Fetotoxicity HI =	2.3E-02
Total CVS HI =	1.1E-01	Total Body Weight HI =	1.5E-01
Total GI Tract HI =	5.3E-02	Total Prostate HI =	6.1E+00
Total Skin HI =	1.1E-01	Total Bone HI =	2.3E-02
Total Blood HI =	1.9E+00	Total Spleen HI =	6.6E-02

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	9.9E-08		1.0E-07	2.0E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.9E-08		2.0E-08	3.8E-08	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	1.0E-03			1.0E-03
			Arsenic	1.3E-06		3.2E-07	1.6E-06	Arsenic	Skin, CVS	8.6E-03		2.1E-03	1.1E-02
			Barium					Barium	Kidney	2.5E-04			2.5E-04
			Cadmium					Cadmium	Kidney	2.7E-04		4.3E-05	3.2E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.0E-03			3.0E-03
			Iron					Iron	NA	2.6E-02			2.6E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.5E-03			3.5E-03
			Vanadium					Vanadium	Kidney	5.9E-03			5.9E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	4.5E-09		3.8E-06	3.8E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	5.5E-08		7.9E-05	7.9E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	8.2E-09		1.2E-05	1.2E-05	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	4.3E-09		6.5E-06	6.5E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	1.2E-09		2.0E-09	3.1E-09	2,4,6-Trinitrotoluene	Liver	2.3E-04		3.8E-04	6.1E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	1.3E-03		1.2E-03	2.5E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	3.1E-03		3.0E-03	6.1E-03
			HMX					HMX	Liver, Blood	4.3E-04		1.4E-04	5.7E-04
			RDX	6.0E-06		3.4E-06	9.4E-06	RDX	Prostate	5.3E-02		3.0E-02	8.3E-02
			Aluminum					Aluminum	CNS	3.0E-04		2.7E-04	5.8E-04
			Arsenic	2.6E-07		2.4E-07	5.0E-07	Arsenic	Skin, CVS	1.7E-03		1.5E-03	3.2E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.3E-04		2.4E-02	2.5E-02
			Iron					Iron	NA	9.1E-04		8.3E-04	1.7E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	1.4E-03		3.2E-02	3.4E-02
			Vanadium					Vanadium	Kidney	7.9E-04		2.8E-02	2.8E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.1E-03		1.0E-03	2.2E-03
						Total Risk Across Gully Sediment	1.9E-06					Total Hazard Index Across Gully Sediment	5.1E-02
						Total Risk Across Gully Surface Water	1.1E-04					Total Hazard Index Across Gully Surface water	1.87E-01

TABLE 9.9. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	1.4E-03			1.4E-03
			Antimony					Antimony	Blood	1.2E-03			1.2E-03
			Arsenic	3.0E-06		7.1E-07	3.7E-06	Arsenic	Skin, CVS	1.9E-02		4.6E-03	2.4E-02
			Cadmium					Cadmium	Kidney	3.5E-03		5.6E-04	4.0E-03
			Iron					Iron	NA	1.0E-01			1.0E-01
			Manganese					Manganese	CNS	5.8E-03			5.8E-03
			Vanadium					Vanadium	Kidney	1.0E-02			1.0E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	3.0E-08		1.8E-08	4.8E-08	RDX	Prostate	2.7E-04		1.5E-04	4.2E-04
			Barium					Barium	Kidney	3.3E-04		4.2E-03	4.5E-03
							Total Risk Across Mainstream Sediment	3.7E-06					Total Hazard Index Across Mainstream Sediment 1.5E-01
							Total Risk Across Mainstream Surface Water	4.8E-08					Total Hazard Index Across Mainstream Surface water 4.97E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	9.7E-03	Total CNS HI =	3.9E-02
Total Kidney HI =	3.5E-02	Total Fetotoxicity HI =	2.8E-02
Total CVS HI =	1.4E-02	Total Prostate HI =	8.3E-02
Total GI Tract HI =	2.8E-02	Total Bone HI =	2.8E-02
Total Skin HI =	1.4E-02	Total Blood HI =	2.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	1.9E-02	Total CNS HI =	7.2E-03
Total CVS HI =	2.4E-02	Total Prostate HI =	4.2E-04
Total Skin HI =	2.4E-02	Total Blood HI =	1.2E-03

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.6E-06		1.5E-07	1.8E-06	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	3.7E-08		1.5E-08	5.2E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	4.8E-07		2.0E-07	6.8E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	6.6E-08		2.7E-08	9.3E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.0E-08		1.2E-08	4.2E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.4E-04		6.4E-05	2.1E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	1.4E-06		1.3E-07	1.5E-06	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	2.1E-08		8.5E-09	2.9E-08	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	4.8E-07		2.0E-07	6.8E-07	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	6.6E-08		2.7E-08	9.3E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.7E-08		7.0E-09	2.4E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	7.2E-05		3.2E-05	1.0E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	8.9E-08		9.0E-09	9.8E-08	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 166	HMX					HMX	Liver, Blood				
		Historical Data	RDX	3.4E-07		1.6E-08	3.5E-07	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.7E-05		1.7E-06	1.9E-05	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 166				2.1E-04	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				1.1E-04	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				2.0E-05	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					

Target Organ Analysis - Building 166

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	3.5E-06		3.4E-07	3.9E-06	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	1.3E-06		5.2E-07	1.8E-06	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.1E-05		4.7E-06	1.6E-05	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.3E-06		5.2E-07	1.8E-06	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	2.3E-06		9.4E-07	3.2E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	7.4E-07		3.0E-07	1.0E-06	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.0E-04		2.2E-04	7.2E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	1.3E-06		1.2E-07	1.4E-06	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	1.3E-06		5.1E-07	1.8E-06	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.1E-05		4.7E-06	1.6E-05	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	1.3E-06		5.1E-07	1.8E-06	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	2.3E-06		9.3E-07	3.2E-06	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	7.4E-07		3.0E-07	1.0E-06	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.4E-04		1.1E-04	3.5E-04	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.5E-08		2.5E-09	2.8E-08	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 171	HMX					HMX	Liver, Blood				
		Historical Data	RDX	6.7E-07		3.2E-08	7.0E-07	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.9E-05		1.8E-06	2.1E-05	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 171				7.5E-04	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				3.7E-04	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				2.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					

Target Organ Analysis - Building 171

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen				
			2,4,6-Trinitrotoluene	3.7E-06		4.7E-08	3.7E-06	2,4,6-Trinitrotoluene	Liver				
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			2-Nitrotoluene	5.5E-07		3.6E-08	5.8E-07	2-Nitrotoluene	Spleen				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	1.3E-03		5.6E-06	1.3E-03	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	3.3E-05		5.7E-08	3.3E-05	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Beryllium					Beryllium	GS				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Cobalt					Cobalt	NA				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Lithium					Lithium	NA				
			Manganese					Manganese	CNS				
			Nickel					Nickel	Body Weight				
			Vanadium					Vanadium	Kidney				
			Zinc					Zinc	Blood				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
							Total Risk Across Groundwater	1.3E-03					Total Hazard Index Across Groundwater

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Body Weight HI =	
Total GI Tract HI =		Total Prostate HI =	
Total Skin HI =		Total Bone HI =	
Total Blood HI =		Total Spleen HI =	

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	3.3E-07		2.7E-07	6.0E-07	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	6.3E-08		5.2E-08	1.1E-07	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS				
			Arsenic	4.4E-06		8.4E-07	5.3E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	3.1E-08		5.4E-06	5.4E-06	Benzo(a)anthracene					
			Benzo(a)pyrene	3.8E-07		1.1E-04	1.1E-04	Benzo(a)pyrene					
			Benzo(b)fluoranthene	5.6E-08		1.7E-05	1.7E-05	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.9E-08		9.3E-06	9.3E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	7.9E-09		2.8E-09	1.1E-08	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	4.1E-05		4.9E-06	4.6E-05	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.8E-06		3.4E-07	2.1E-06	Arsenic	Skin, CVS				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Gully Sediment	6.0E-06					Total Hazard Index Across Gully Sediment	
						Total Risk Across Gully Surface Water	1.9E-04					Total Hazard Index Across Gully Surface water	

TABLE 9.10. REASONABLE MAXIMUM EXPOSURE (RME)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	9.9E-06		1.9E-06	1.2E-05	Arsenic	Skin, CVS				
			Cadmium					Cadmium	Kidney				
			Iron					Iron	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Mainstream Surface Water	RDX	2.1E-07		2.5E-08	2.3E-07	RDX	Prostate				
			Barium					Barium	Kidney				
							Total Risk Across Mainstream Sediment	1.2E-05					Total Hazard Index Across Mainstream Sediment
							Total Risk Across Mainstream Surface Water	2.3E-07					Total Hazard Index Across Mainstream Surface water

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Prostate HI =	
Total GI Tract HI =		Total Bone HI =	
Total Skin HI =		Total Blood HI =	

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =		Total CNS HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =		Total Blood HI =	

TABLE 9.1a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	1.3E-08		7.5E-10	1.3E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.8E-10		4.8E-11	2.3E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	4.2E-09		1.1E-09	5.3E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	5.9E-10		1.5E-10	7.4E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.5E-10		3.9E-11	1.9E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	6.4E-07		1.8E-07	8.2E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	7.8E-10		5.0E-11	8.3E-10	2,4,6-Trinitrotoluene	Liver	3.7E-03		2.3E-04	3.9E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.9E-03		2.3E-05	2.0E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.2E-03		3.9E-05	2.2E-03
			HMX					HMX	Liver, Blood	2.8E-05		3.3E-07	2.8E-05
			RDX	3.0E-09		9.0E-11	3.1E-09	RDX	Prostate	6.3E-04		1.9E-05	6.5E-04
			Aluminum					Aluminum	CNS	1.4E-02			1.4E-02
			Arsenic	1.5E-07		9.3E-09	1.6E-07	Arsenic	Skin, CVS	2.4E-02		1.4E-03	2.5E-02
			Barium					Barium	Kidney	1.0E-03			1.0E-03
			Mercury					Mercury	CNS	6.8E-04			6.8E-04
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				8.4E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.7E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					5.0E-02

Target Organ Analysis - Building 166

Total Liver HI =	8.1E-03	Total CNS HI =	1.5E-02
Total Kidney HI =	1.0E-03	Total Blood HI =	2.8E-05
Total CVS HI =	2.5E-02	Total Prostate HI =	6.5E-04
Total Skin HI =	2.5E-02		

TABLE 9.1a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	1.1E-08		6.7E-10	1.2E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.1E-08		2.9E-09	1.4E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.0E-07		2.6E-08	1.3E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.1E-08		2.9E-09	1.4E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	2.0E-08		5.2E-09	2.5E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	6.5E-09		1.7E-09	8.2E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.1E-06		6.0E-07	2.7E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	2.2E-10		1.4E-11	2.4E-10	2,4,6-Trinitrotoluene	Liver	1.0E-03		6.6E-05	1.1E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	1.8E-03		2.1E-05	1.8E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	2.7E-02		4.8E-04	2.7E-02
			HMX					HMX	Liver, Blood	3.7E-03		4.4E-05	3.7E-03
			RDX	5.9E-09		1.8E-10	6.1E-09	RDX	Prostate	1.3E-03		3.8E-05	1.3E-03
			Aluminum					Aluminum	CNS	1.5E-02			1.5E-02
			Arsenic	1.7E-07		1.0E-08	1.8E-07	Arsenic	Skin, CVS	2.6E-02		1.6E-03	2.8E-02
			Barium					Barium	Kidney	9.1E-04			9.1E-04
			Mercury					Mercury	CNS	1.1E-03			1.1E-03
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				2.9E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.8E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					8.0E-02

Target Organ Analysis - Building 171

Total Liver HI =	3.4E-02	Total CNS HI =	1.6E-02
Total Kidney HI =	9.1E-04	Total Blood HI =	3.7E-03
Total CVS HI =	2.8E-02	Total Prostate HI =	1.3E-03
Total Skin HI =	2.8E-02		

TABLE 9.1a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CONSTRUCTION/EXCAVATION WORKERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen			2.6E-04	2.6E-04
			2,4,6-Trinitrotoluene			2.6E-10	2.6E-10	2,4,6-Trinitrotoluene	Liver			1.2E-03	1.2E-03
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney			1.4E-04	1.4E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver			4.9E-04	4.9E-04
			2-Nitrotoluene			2.1E-10	2.1E-10	2-Nitrotoluene	Spleen			6.4E-06	6.4E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver			8.3E-04	8.3E-04
			HMX					HMX	Liver, Blood			2.7E-05	2.7E-05
			RDX			3.2E-08	3.2E-08	RDX	Prostate			6.7E-03	6.7E-03
			Aluminum					Aluminum	CNS			8.1E-05	8.1E-05
			Antimony					Antimony	Blood			1.8E-05	1.8E-05
			Arsenic			7.8E-10	7.8E-10	Arsenic	Skin, CVS			1.2E-04	1.2E-04
			Barium					Barium	Kidney			2.8E-04	2.8E-04
			Beryllium					Beryllium	GS			3.4E-03	3.4E-03
			Cadmium					Cadmium	Kidney			1.6E-04	1.6E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone			1.7E-03	1.7E-03
			Cobalt					Cobalt	NA			7.2E-05	7.2E-05
			Iron					Iron	NA			2.1E-03	2.1E-03
			Lead					Lead	NA				
			Lithium					Lithium	NA			1.2E-03	1.2E-03
			Manganese					Manganese	CNS			5.4E-02	5.4E-02
			Nickel					Nickel	Body Weight			7.7E-04	7.7E-04
			Vanadium					Vanadium	Kidney			2.0E-03	2.0E-03
			Zinc					Zinc	Blood			7.8E-06	7.8E-06
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood			2.0E-03	2.0E-03
						Total Risk Across Groundwater	3.3E-08					Total Hazard Index Across Groundwater	7.79E-02

Total Liver HI =	2.6E-03	Total CNS HI =	5.4E-02
Total Kidney HI =	2.6E-03	Total Fetotoxicity HI =	1.7E-03
Total CVS HI =	1.2E-04	Total Body Weight HI =	7.7E-04
Total GI Tract HI =	5.1E-03	Total Prostate HI =	6.7E-03
Total Skin HI =	1.2E-04	Total Bone HI =	1.7E-03
Total Blood HI =	2.2E-03	Total Spleen HI =	2.6E-04

TABLE 9.2a, CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	3.1E-09		1.2E-10	3.3E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	7.1E-11		1.2E-11	8.3E-11	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	9.3E-10		1.6E-10	1.1E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.3E-10		2.2E-11	1.5E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.7E-11		9.8E-12	6.7E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.8E-07		5.1E-08	3.3E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	2.7E-09		1.1E-10	2.8E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	4.0E-11		6.9E-12	4.7E-11	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	9.3E-10		1.6E-10	1.1E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.3E-10		2.2E-11	1.5E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.3E-11		5.6E-12	3.8E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.4E-07		2.6E-08	1.7E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	1.7E-10		7.2E-12	1.8E-10	2,4,6-Trinitrotoluene	Liver	8.9E-05		3.7E-06	9.2E-05
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	4.7E-05		3.7E-07	4.7E-05
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	5.3E-05		6.3E-07	5.3E-05
			HMX					HMX	Liver, Blood	6.8E-07		5.3E-09	6.8E-07
			RDX	6.5E-10		1.3E-11	6.7E-10	RDX	Prostate	1.5E-05		3.0E-07	1.6E-05
			Aluminum					Aluminum	CNS	3.4E-04		0.0E+00	3.4E-04
			Arsenic	3.4E-08		1.3E-09	3.5E-08	Arsenic	Skin, CVS	5.8E-04		2.3E-05	6.1E-04
			Barium					Barium	Kidney	2.5E-05		0.0E+00	2.5E-05
			Mercury					Mercury	CNS	1.6E-05		0.0E+00	1.6E-05
			Total Risk Across Surface Soil - Area Bldg 166				3.3E-07	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				1.7E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				3.6E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					1.2E-03

Target Organ Analysis - Building 166

Total Liver HI =	1.9E-04	Total CNS HI =	3.5E-04
Total Kidney HI =	2.5E-05	Total Blood HI =	6.8E-07
Total CVS HI =	6.1E-04	Total Prostate HI =	1.6E-05
Total Skin HI =	6.1E-04		

TABLE 9.2a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	6.8E-09		2.7E-10	7.1E-09	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	2.4E-09		4.2E-10	2.8E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.2E-08		3.8E-09	2.6E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.4E-09		4.2E-10	2.8E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	4.4E-09		7.6E-10	5.2E-09	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.4E-09		2.5E-10	1.7E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	9.7E-07		1.8E-07	1.1E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	2.4E-09		9.6E-11	2.5E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	2.4E-09		4.1E-10	2.8E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	2.2E-08		3.8E-09	2.6E-08	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	2.4E-09		4.1E-10	2.8E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	4.4E-09		7.5E-10	5.1E-09	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.4E-09		2.4E-10	1.7E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.7E-07		8.6E-08	5.5E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	4.8E-11		2.0E-12	5.0E-11	2,4,6-Trinitrotoluene	Liver	2.5E-05		1.1E-06	2.6E-05
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	4.3E-05		3.4E-07	4.4E-05
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	6.5E-04		7.7E-06	6.6E-04
		Building 171	HMX					HMX	Liver, Blood	9.0E-05		7.1E-07	9.1E-05
		Historical Data	RDX	1.3E-09		2.6E-11	1.3E-09	RDX	Prostate	3.0E-05		6.0E-07	3.1E-05
			Aluminum					Aluminum	CNS	3.7E-04		0.0E+00	3.7E-04
			Arsenic	3.7E-08		1.5E-09	3.8E-08	Arsenic	Skin, CVS	6.3E-04		2.5E-05	6.6E-04
			Barium					Barium	Kidney	2.2E-05		0.0E+00	2.2E-05
			Mercury					Mercury	CNS	2.6E-05		0.0E+00	2.6E-05
			Total Risk Across Surface Soil - Area Bldg 171				1.2E-06	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				5.9E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				3.9E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					1.9E-03

Target Organ Analysis - Building 171

Total Liver HI =	8.2E-04	Total CNS HI =	4.0E-04
Total Kidney HI =	2.2E-05	Total Blood HI =	9.1E-05
Total CVS HI =	6.6E-04	Total Prostate HI =	3.1E-05
Total Skin HI =	6.6E-04		

TABLE 9.2a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	8.6E-09		1.5E-09	1.0E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.6E-09		2.8E-10	1.9E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.4E-04			2.4E-04
			Arsenic	1.1E-07		4.6E-09	1.2E-07	Arsenic	Skin, CVS	2.0E-03		7.9E-05	2.1E-03
			Barium					Barium	Kidney	5.7E-05			5.7E-05
			Cadmium					Cadmium	Kidney	6.3E-05		1.7E-06	6.4E-05
			Chromium					Chromium	Fetotoxicity/GS/Bone	6.9E-04			6.9E-04
			Iron					Iron	NA	6.0E-03			6.0E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.0E-04			8.0E-04
			Vanadium					Vanadium	Kidney	1.4E-03			1.4E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene			6.0E-08	6.0E-08	Benzo(a)anthracene					
			Benzo(a)pyrene			1.2E-06	1.2E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene			1.9E-07	1.9E-07	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene			1.0E-07	1.0E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene			3.1E-11	3.1E-11	2,4,6-Trinitrotoluene	Liver			3.2E-05	3.2E-05
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver			9.8E-05	9.8E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver			2.4E-04	2.4E-04
			HMX					HMX	Liver, Blood			1.2E-05	1.2E-05
			RDX			5.4E-08	5.4E-08	RDX	Prostate			2.5E-03	2.5E-03
			Aluminum					Aluminum	CNS			1.2E-05	1.2E-05
			Arsenic			1.9E-09	1.9E-09	Arsenic	Skin, CVS			6.5E-05	6.5E-05
			Chromium					Chromium	Fetotoxicity/GS/Bone			1.0E-03	1.0E-03
			Iron					Iron	NA			3.5E-05	3.5E-05
			Lead					Lead	NA				
			Manganese					Manganese	CNS			1.4E-03	1.4E-03
			Vanadium					Vanadium	Kidney			1.2E-03	1.2E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood			4.3E-05	4.3E-05
							Total Risk Across Gully Sediment	1.3E-07				Total Hazard Index Across Gully Sediment	1.1E-02
							Total Risk Across Gully Surface Water	1.7E-06				Total Hazard Index Across Gully Surface water	6.62E-03

TABLE 9.2a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - MAINTENANCE WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.2E-04			3.2E-04
			Antimony					Antimony	Blood	2.8E-04			2.8E-04
			Arsenic	2.6E-07		1.0E-08	2.7E-07	Arsenic	Skin, CVS	4.5E-03		1.8E-04	4.6E-03
			Cadmium					Cadmium	Kidney	8.0E-04		2.1E-05	8.2E-04
			Iron					Iron	NA	2.3E-02			2.3E-02
			Manganese					Manganese	CNS	1.3E-03			1.3E-03
			Vanadium					Vanadium	Kidney	2.4E-03			2.4E-03
Surface Water	Surface Water	Mainstream Surface Water	RDX			2.8E-10	2.8E-10	RDX	Prostate			6.5E-06	6.5E-06
			Barium					Barium	Kidney			8.9E-05	8.9E-05
						Total Risk Across Mainstream Sediment	2.7E-07				Total Hazard Index Across Mainstream Sediment		3.3E-02
						Total Risk Across Mainstream Surface Water	2.8E-10				Total Hazard Index Across Mainstream Surface water		9.51E-05

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	3.8E-04	Total CNS HI =	2.4E-03
Total Kidney HI =	2.7E-03	Total Fetotoxicity HI =	1.7E-03
Total CVS HI =	2.1E-03	Total Prostate HI =	2.5E-03
Total GI Tract HI =	1.7E-03	Total Bone HI =	1.7E-03
Total Skin HI =	2.1E-03	Total Blood HI =	5.5E-05

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	3.3E-03	Total CNS HI =	1.7E-03
Total CVS HI =	4.6E-03	Total Prostate HI =	6.5E-06
Total Skin HI =	4.6E-03	Total Blood HI =	2.8E-04

TABLE 9.3a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	5.7E-08		2.3E-09	6.0E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	1.3E-09		2.2E-10	1.5E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.7E-08		2.9E-09	2.0E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.3E-09		4.0E-10	2.7E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.0E-09		1.8E-10	1.2E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.1E-06		9.4E-07	6.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	5.0E-08		2.0E-09	5.2E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	7.3E-10		1.3E-10	8.6E-10	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.7E-08		2.9E-09	2.0E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	2.3E-09		4.0E-10	2.7E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	6.0E-10		1.0E-10	7.0E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.6E-06		4.7E-07	3.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	3.1E-09		1.3E-10	3.3E-09	2,4,6-Trinitrotoluene	Liver	1.6E-03		6.8E-05	1.7E-03
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	8.6E-04		6.8E-06	8.6E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	9.6E-04		1.1E-05	9.7E-04
		Building 166	HMX					HMX	Liver, Blood	1.2E-05		9.8E-08	1.2E-05
		Historical Data	RDX	1.2E-08		2.4E-10	1.2E-08	RDX	Prostate	2.8E-04		5.6E-06	2.9E-04
			Aluminum					Aluminum	CNS	6.1E-03			6.1E-03
			Arsenic	6.1E-07		2.4E-08	6.4E-07	Arsenic	Skin, CVS	1.1E-02		4.2E-04	1.1E-02
			Barium					Barium	Kidney	4.6E-04			4.6E-04
			Mercury					Mercury	CNS	3.0E-04			3.0E-04
			Total Risk Across Surface Soil - Area Bldg 166				6.1E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				3.1E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				6.5E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					2.2E-02

Target Organ Analysis - Building 166

Total Liver HI =	3.5E-03	Total CNS HI =	6.4E-03
Total Kidney HI =	4.6E-04	Total Blood HI =	1.2E-05
Total CVS HI =	1.1E-02	Total Prostate HI =	2.9E-04
Total Skin HI =	1.1E-02		

TABLE 9.3a, CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.2E-07		4.9E-09	1.3E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	4.4E-08		7.6E-09	5.2E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	4.0E-07		6.9E-08	4.7E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	4.4E-08		7.6E-09	5.2E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	8.0E-08		1.4E-08	9.4E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.6E-08		4.5E-09	3.1E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.8E-05		3.3E-06	2.1E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	4.4E-08		1.8E-09	4.6E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	4.4E-08		7.6E-09	5.2E-08	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	4.0E-07		6.9E-08	4.7E-07	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	4.4E-08		7.6E-09	5.2E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	8.0E-08		1.4E-08	9.4E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.6E-08		4.5E-09	3.0E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	8.5E-06		1.6E-06	1.0E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	8.8E-10		3.7E-11	9.2E-10	2,4,6-Trinitrotoluene	Liver	4.6E-04		1.9E-05	4.8E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	7.9E-04		6.2E-06	8.0E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	1.2E-02		1.4E-04	1.2E-02
		Building 171	HMX					HMX	Liver, Blood	1.6E-03		1.3E-05	1.7E-03
		Historical Data	RDX	2.4E-08		4.7E-10	2.4E-08	RDX	Prostate	5.6E-04		1.1E-05	5.7E-04
			Aluminum					Aluminum	CNS	6.8E-03			6.8E-03
			Arsenic	6.7E-07		2.7E-08	7.0E-07	Arsenic	Skin, CVS	1.2E-02		4.6E-04	1.2E-02
			Barium					Barium	Kidney	4.0E-04			4.0E-04
			Mercury					Mercury	CNS	4.7E-04			4.7E-04
			Total Risk Across Surface Soil - Area Bldg 171				2.2E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.1E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				7.2E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					3.5E-02

Target Organ Analysis - Building 171

Total Liver HI =	1.5E-02	Total CNS HI =	7.3E-03
Total Kidney HI =	4.0E-04	Total Blood HI =	1.7E-03
Total CVS HI =	1.2E-02	Total Prostate HI =	5.7E-04
Total Skin HI =	1.2E-02		

TABLE 9.3a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - OCCUPATIONAL WORKERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	2.0E-02		1.3E-04	2.0E-02
			2,4,6-Trinitrotoluene	2.3E-07		1.2E-09	2.3E-07	2,4,6-Trinitrotoluene	Liver	1.2E-01		6.0E-04	1.2E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	8.5E-03		6.9E-05	8.5E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	8.6E-02		2.4E-04	8.6E-02
			2-Nitrotoluene	3.4E-08		8.9E-10	3.5E-08	2-Nitrotoluene	Spleen	5.0E-06		3.0E-06	8.1E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.5E-01		4.1E-04	1.5E-01
			HMX					HMX	Liver, Blood	1.3E-02		1.3E-05	1.3E-02
			RDX	8.1E-05		1.4E-07	8.1E-05	RDX	Prostate	1.9E+00		3.3E-03	1.9E+00
			Aluminum					Aluminum	CNS	2.4E-02		1.3E-05	2.4E-02
			Antimony					Antimony	Blood	7.9E-04		2.9E-06	8.0E-04
			Arsenic	2.1E-06		1.1E-09	2.1E-06	Arsenic	Skin, CVS	3.6E-02		2.0E-05	3.6E-02
			Barium					Barium	Kidney	5.9E-03		4.6E-05	5.9E-03
			Beryllium					Beryllium	GS	7.0E-03		5.5E-04	7.5E-03
			Cadmium					Cadmium	Kidney	2.3E-03		2.5E-05	2.3E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	6.2E-03		2.7E-04	6.5E-03
			Cobalt					Cobalt	NA	2.1E-02		1.2E-05	2.1E-02
			Iron					Iron	NA	6.3E-01		3.4E-04	6.3E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	3.6E-01		2.0E-04	3.6E-01
			Manganese					Manganese	CNS	6.4E-01		8.8E-03	6.5E-01
			Nickel					Nickel	Body Weight	4.5E-02		1.2E-04	4.5E-02
			Vanadium					Vanadium	Kidney	1.5E-02		3.2E-04	1.6E-02
			Zinc					Zinc	Blood	3.9E-03		1.3E-06	3.9E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	5.8E-01		3.2E-04	5.8E-01
							Total Risk Across Groundwater	8.4E-05					Total Hazard Index Across Groundwater 4.70E+00

Total Liver HI =	3.7E-01	Total CNS HI =	6.8E-01
Total Kidney HI =	3.2E-02	Total Fetotoxicity HI =	6.5E-03
Total CVS HI =	3.6E-02	Total Body Weight HI =	4.5E-02
Total GI Tract HI =	1.4E-02	Total Prostate HI =	1.9E+00
Total Skin HI =	3.6E-02	Total Bone HI =	6.5E-03
Total Blood HI =	6.0E-01	Total Spleen HI =	2.0E-02

TABLE 9.4a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ASOLESCENT TRESPASSERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	6.8E-09		5.0E-10	7.3E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.5E-10		4.9E-11	2.0E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.0E-09		6.4E-10	2.6E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-10		8.9E-11	3.6E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-10		4.0E-11	1.6E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	6.0E-07		2.1E-07	8.1E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	5.9E-09		4.4E-10	6.3E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	8.6E-11		2.8E-11	1.1E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.0E-09		6.4E-10	2.6E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.8E-10		8.9E-11	3.6E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	7.1E-11		2.3E-11	9.3E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.0E-07		1.0E-07	4.1E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	3.7E-10		2.9E-11	4.0E-10	2,4,6-Trinitrotoluene	Liver	1.6E-04		1.2E-05	1.7E-04
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	8.3E-05		1.2E-06	8.4E-05
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	9.3E-05		2.1E-06	9.5E-05
			HMX					HMX	Liver, Blood	1.2E-06		1.8E-08	1.2E-06
			RDX	1.4E-09		5.2E-11	1.5E-09	RDX	Prostate	2.7E-05		1.0E-06	2.8E-05
			Aluminum					Aluminum	CNS	5.9E-04			5.9E-04
			Arsenic	7.3E-08		5.4E-09	7.8E-08	Arsenic	Skin, CVS	1.0E-03		7.6E-05	1.1E-03
			Barium					Barium	Kidney	4.4E-05			4.4E-05
			Mercury					Mercury	CNS	2.9E-05			2.9E-05
			Total Risk Across Surface Soil - Area Bldg 166				8.2E-07	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				4.2E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				8.0E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					2.1E-03

Target Organ Analysis - Building 166

Total Liver HI =	3.5E-04	Total CNS HI =	6.2E-04
Total Kidney HI =	4.4E-05	Total Blood HI =	1.2E-06
Total CVS HI =	1.1E-03	Total Prostate HI =	2.8E-05
Total Skin HI =	1.1E-03		

TABLE 9.4a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ASOLESCENT TRESPASSERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.5E-08		1.1E-09	1.6E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	5.2E-09		1.7E-09	6.9E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	4.8E-08		1.5E-08	6.3E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	5.2E-09		1.7E-09	6.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	9.5E-09		3.1E-09	1.3E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.1E-09		1.0E-09	4.1E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.1E-06		7.2E-07	2.8E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	5.2E-09		3.9E-10	5.6E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	5.2E-09		1.7E-09	6.9E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	4.7E-08		1.5E-08	6.3E-08	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	5.2E-09		1.7E-09	6.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	9.5E-09		3.0E-09	1.3E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.1E-09		9.9E-10	4.1E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.0E-06		3.5E-07	1.4E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.0E-10		8.2E-12	1.1E-10	2,4,6-Trinitrotoluene	Liver	4.4E-05		3.5E-06	4.8E-05
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	7.6E-05		1.1E-06	7.7E-05
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	1.1E-03		2.6E-05	1.2E-03
		Building 171	HMX					HMX	Liver, Blood	1.6E-04		2.4E-06	1.6E-04
		Historical Data	RDX	2.8E-09		1.0E-10	2.9E-09	RDX	Prostate	5.4E-05		2.0E-06	5.6E-05
			Aluminum					Aluminum	CNS	6.6E-04			6.6E-04
			Arsenic	7.9E-08		5.9E-09	8.5E-08	Arsenic	Skin, CVS	1.1E-03		8.3E-05	1.2E-03
			Barium					Barium	Kidney	3.9E-05			3.9E-05
			Mercury					Mercury	CNS	4.5E-05			4.5E-05
			Total Risk Across Surface Soil - Area Bldg 171				2.9E-06	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.4E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				8.8E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					3.5E-03

Target Organ Analysis - Building 171

Total Liver HI =	1.5E-03	Total CNS HI =	7.0E-04
Total Kidney HI =	3.9E-05	Total Blood HI =	1.6E-04
Total CVS HI =	1.2E-03	Total Prostate HI =	5.6E-05
Total Skin HI =	1.2E-03		

TABLE 9.4a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	9.3E-09		6.0E-09	1.5E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.8E-09		1.1E-09	2.9E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.1E-04			2.1E-04
			Arsenic	1.2E-07		1.8E-08	1.4E-07	Arsenic	Skin, CVS	1.8E-03		2.6E-04	2.0E-03
			Barium					Barium	Kidney	5.0E-05			5.0E-05
			Cadmium					Cadmium	Kidney	5.5E-05		5.5E-06	6.1E-05
			Chromium					Chromium	Fetotoxicity/GS/Bone	6.1E-04			6.1E-04
			Iron					Iron	NA	5.3E-03			5.3E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	7.1E-04			7.1E-04
			Vanadium					Vanadium	Kidney	1.2E-03			1.2E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.1E-09		1.7E-07	1.7E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	2.6E-08		3.6E-06	3.6E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene	3.8E-09		5.4E-07	5.4E-07	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.0E-09		2.9E-07	3.0E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	5.4E-10		8.9E-11	6.3E-10	2,4,6-Trinitrotoluene	Liver	2.3E-04		3.8E-05	2.7E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	1.3E-03		1.1E-04	1.4E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	3.1E-03		2.8E-04	3.4E-03
			HMX					HMX	Liver, Blood	4.4E-04		1.4E-05	4.5E-04
			RDX	2.8E-06		1.5E-07	2.9E-06	RDX	Prostate	5.4E-02		3.0E-03	5.7E-02
			Aluminum					Aluminum	CNS	3.1E-04		1.9E-05	3.3E-04
			Arsenic	1.2E-07		7.6E-09	1.3E-07	Arsenic	Skin, CVS	1.7E-03		1.1E-04	1.8E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.4E-04		1.7E-03	2.0E-03
			Iron					Iron	NA	9.3E-04		5.8E-05	9.9E-04
			Lead					Lead	NA				
			Manganese					Manganese	CNS	1.4E-03		2.2E-03	3.7E-03
			Vanadium					Vanadium	Kidney	8.1E-04		1.9E-03	2.7E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.2E-03		7.2E-05	1.2E-03
						Total Risk Across Gully Sediment	1.6E-07					Total Hazard Index Across Gully Sediment	1.0E-02
						Total Risk Across Gully Surface Water	7.7E-06					Total Hazard Index Across Gully Surface water	7.49E-02

TABLE 9.4a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADOLESCENT TRESPASSERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	2.8E-04			2.8E-04
			Antimony					Antimony	Blood	2.4E-04			2.4E-04
			Arsenic	2.8E-07		4.1E-08	3.2E-07	Arsenic	Skin, CVS	3.9E-03		5.8E-04	4.5E-03
			Cadmium					Cadmium	Kidney	7.1E-04		7.0E-05	7.8E-04
			Iron					Iron	NA	2.1E-02			2.1E-02
			Manganese					Manganese	CNS	1.2E-03			1.2E-03
			Vanadium					Vanadium	Kidney	2.1E-03			2.1E-03
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.4E-08		7.9E-10	1.5E-08	RDX	Prostate	2.7E-04		1.5E-05	2.9E-04
			Barium					Barium	Kidney	3.3E-04		2.9E-04	6.2E-04
							Total Risk Across Mainstream Sediment	3.2E-07					Total Hazard Index Across Mainstream Sediment 3.0E-02
							Total Risk Across Mainstream Surface Water	1.5E-08					Total Hazard Index Across Mainstream Surface water 9.13E-04

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	5.5E-03	Total CNS HI =	4.9E-03
Total Kidney HI =	4.1E-03	Total Fetotoxicity HI =	2.6E-03
Total CVS HI =	3.8E-03	Total Prostate HI =	5.7E-02
Total GI Tract HI =	2.6E-03	Total Bone HI =	2.6E-03
Total Skin HI =	3.8E-03	Total Blood HI =	1.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	3.5E-03	Total CNS HI =	1.5E-03
Total CVS HI =	4.5E-03	Total Prostate HI =	2.9E-04
Total Skin HI =	4.5E-03	Total Blood HI =	2.4E-04

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	7.1E-09		5.6E-10	7.6E-09	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	1.6E-10		5.4E-11	2.1E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.1E-09		7.1E-10	2.8E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.9E-10		9.9E-11	3.9E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.3E-10		4.4E-11	1.7E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	6.2E-07		2.3E-07	8.5E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	6.1E-09		4.9E-10	6.6E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	9.0E-11		3.1E-11	1.2E-10	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	2.1E-09		7.1E-10	2.8E-09	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	2.9E-10		9.9E-11	3.9E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	7.4E-11		2.5E-11	9.9E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.1E-07		1.2E-07	4.3E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	3.8E-10		3.2E-11	4.2E-10	2,4,6-Trinitrotoluene	Liver	9.0E-04		7.6E-05	9.7E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	4.8E-04		7.5E-06	4.8E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	5.3E-04		1.3E-05	5.5E-04
		Building 166	HMX					HMX	Liver, Blood	6.8E-06		1.1E-07	6.9E-06
		Historical Data	RDX	1.5E-09		5.8E-11	1.5E-09	RDX	Prostate	1.6E-04		6.2E-06	1.6E-04
			Aluminum					Aluminum	CNS	3.4E-03			3.4E-03
			Arsenic	7.6E-08		6.0E-09	8.2E-08	Arsenic	Skin, CVS	5.9E-03		4.7E-04	6.4E-03
			Barium					Barium	Kidney	2.5E-04			2.5E-04
			Mercury					Mercury	CNS	1.7E-04			1.7E-04
			Total Risk Across Surface Soil - Area Bldg 166				8.7E-07	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				4.4E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				8.4E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					1.2E-02

Target Organ Analysis - Building 166

Total Liver HI =	2.0E-03	Total CNS HI =	3.6E-03
Total Kidney HI =	2.5E-04	Total Blood HI =	6.9E-06
Total CVS HI =	6.4E-03	Total Prostate HI =	1.6E-04
Total Skin HI =	6.4E-03		

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.5E-08		1.2E-09	1.7E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	5.4E-09		1.9E-09	7.3E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	5.0E-08		1.7E-08	6.7E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	5.4E-09		1.9E-09	7.3E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	9.9E-09		3.4E-09	1.3E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.2E-09		1.1E-09	4.3E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.2E-06		8.0E-07	3.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	5.4E-09		4.3E-10	5.9E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	5.4E-09		1.9E-09	7.3E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	4.9E-08		1.7E-08	6.6E-08	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	5.4E-09		1.9E-09	7.3E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	9.9E-09		3.4E-09	1.3E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.2E-09		1.1E-09	4.3E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.0E-06		3.9E-07	1.4E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.1E-10		9.2E-12	1.2E-10	2,4,6-Trinitrotoluene	Liver	2.5E-04		2.1E-05	2.7E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	4.4E-04		6.9E-06	4.4E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	6.6E-03		1.6E-04	6.7E-03
		Building 171	HMX					HMX	Liver, Blood	9.1E-04		1.4E-05	9.2E-04
		Historical Data	RDX	2.9E-09		1.2E-10	3.0E-09	RDX	Prostate	3.1E-04		1.2E-05	3.2E-04
			Aluminum					Aluminum	CNS	3.8E-03			3.8E-03
			Arsenic	8.2E-08		6.5E-09	8.9E-08	Arsenic	Skin, CVS	6.4E-03		5.1E-04	6.9E-03
			Barium					Barium	Kidney	2.2E-04			2.2E-04
			Mercury					Mercury	CNS	2.6E-04			2.6E-04
			Total Risk Across Surface Soil - Area Bldg 171				3.1E-06	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				1.5E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				9.2E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					2.0E-02

Target Organ Analysis - Building 171

Total Liver HI =	8.4E-03	Total CNS HI =	4.0E-03
Total Kidney HI =	2.2E-04	Total Blood HI =	9.2E-04
Total CVS HI =	6.9E-03	Total Prostate HI =	3.2E-04
Total Skin HI =	6.9E-03		

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	1.1E-02		1.4E-04	1.1E-02
			2,4,6-Trinitrotoluene	2.8E-08		2.8E-10	2.8E-08	2,4,6-Trinitrotoluene	Liver	6.6E-02		6.6E-04	6.6E-02
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	4.7E-03		7.7E-05	4.8E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	4.8E-02		2.6E-04	4.8E-02
			2-Nitrotoluene	4.2E-09		2.2E-10	4.4E-09	2-Nitrotoluene	Spleen	2.8E-06		3.3E-06	6.1E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	8.1E-02		4.5E-04	8.2E-02
			HMX					HMX	Liver, Blood	7.5E-03		1.5E-05	7.5E-03
			RDX	1.0E-05		3.4E-08	1.0E-05	RDX	Prostate	1.1E+00		3.6E-03	1.1E+00
			Aluminum					Aluminum	CNS	1.3E-02		1.5E-05	1.3E-02
			Antimony					Antimony	Blood	4.4E-04		3.2E-06	4.4E-04
			Arsenic	2.5E-07		2.8E-10	2.5E-07	Arsenic	Skin, CVS	2.0E-02		2.2E-05	2.0E-02
			Barium					Barium	Kidney	3.2E-03		5.1E-05	3.3E-03
			Beryllium					Beryllium	GS	3.9E-03		6.1E-04	4.5E-03
			Cadmium					Cadmium	Kidney	1.3E-03		2.8E-05	1.3E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	3.5E-03		3.0E-04	3.8E-03
			Cobalt					Cobalt	NA	1.2E-02		1.3E-05	1.2E-02
			Iron					Iron	NA	3.5E-01		3.8E-04	3.5E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	2.0E-01		2.2E-04	2.0E-01
			Manganese					Manganese	CNS	3.5E-01		9.8E-03	3.6E-01
			Nickel					Nickel	Body Weight	2.5E-02		1.4E-04	2.5E-02
			Vanadium					Vanadium	Kidney	8.5E-03		3.6E-04	8.8E-03
			Zinc					Zinc	Blood	2.1E-03		1.4E-06	2.1E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	3.2E-01		3.5E-04	3.2E-01
							Total Risk Across Groundwater	1.0E-05					Total Hazard Index Across Groundwater	2.61E+00

Total Liver HI =	2.0E-01	Total CNS HI =	3.8E-01
Total Kidney HI =	1.8E-02	Total Fetotoxicity HI =	3.8E-03
Total CVS HI =	2.0E-02	Total Body Weight HI =	2.5E-02
Total GI Tract HI =	8.2E-03	Total Prostate HI =	1.1E+00
Total Skin HI =	2.0E-02	Total Bone HI =	3.8E-03
Total Blood HI =	3.3E-01	Total Spleen HI =	1.1E-02

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	1.9E-08		6.6E-09	2.6E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	3.7E-09		1.3E-09	4.9E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.4E-03			2.4E-03
			Arsenic	2.6E-07		2.0E-08	2.8E-07	Arsenic	Skin, CVS	2.0E-02		1.6E-03	2.2E-02
			Barium					Barium	Kidney	5.8E-04			5.8E-04
			Cadmium					Cadmium	Kidney	6.4E-04		3.4E-05	6.7E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.0E-03			7.0E-03
			Iron					Iron	NA	6.1E-02			6.1E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.1E-03			8.1E-03
			Vanadium					Vanadium	Kidney	1.4E-02			1.4E-02
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.2E-09		1.9E-07	1.9E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	2.7E-08		4.0E-06	4.0E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.0E-09		6.0E-07	6.0E-07	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.1E-09		3.3E-07	3.3E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	5.6E-10		9.8E-11	6.6E-10	2,4,6-Trinitrotoluene	Liver	1.3E-03		2.3E-04	1.5E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	7.3E-03		7.0E-04	8.0E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.8E-02		1.7E-03	2.0E-02
			HMX					HMX	Liver, Blood	2.5E-03		8.5E-05	2.6E-03
			RDX	2.9E-06		1.7E-07	3.1E-06	RDX	Prostate	3.1E-01		1.8E-02	3.3E-01
			Aluminum					Aluminum	CNS	1.8E-03		1.2E-04	1.9E-03
			Arsenic	1.3E-07		8.4E-09	1.4E-07	Arsenic	Skin, CVS	9.9E-03		6.5E-04	1.1E-02
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.0E-03		1.0E-02	1.2E-02
			Iron					Iron	NA	5.3E-03		3.5E-04	5.7E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.3E-03		1.4E-02	2.2E-02
			Vanadium					Vanadium	Kidney	4.6E-03		1.2E-02	1.6E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.6E-03		4.4E-04	7.1E-03
						Total Risk Across Gully Sediment	3.1E-07					Total Hazard Index Across Gully Sediment	1.1E-01
						Total Risk Across Gully Surface Water	8.3E-06					Total Hazard Index Across Gully Surface water	4.33E-01

TABLE 9.5a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - CHILD RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Child (3 to 12 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.3E-03			3.3E-03
			Antimony					Antimony	Blood	2.8E-03			2.8E-03
			Arsenic	5.8E-07		4.6E-08	6.2E-07	Arsenic	Skin, CVS	4.5E-02		3.6E-03	4.9E-02
			Cadmium					Cadmium	Kidney	8.1E-03		4.3E-04	8.5E-03
			Iron					Iron	NA	2.4E-01			2.4E-01
			Manganese					Manganese	CNS	1.3E-02			1.3E-02
			Vanadium					Vanadium	Kidney	2.4E-02			2.4E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.5E-08		8.8E-10	1.6E-08	RDX	Prostate	1.6E-03		9.3E-05	1.7E-03
			Barium					Barium	Kidney	1.9E-03		1.8E-03	3.7E-03
							Total Risk Across Mainstream Sediment						Total Hazard Index Across Mainstream Sediment
							6.2E-07						3.4E-01
							Total Risk Across Mainstream Surface Water						Total Hazard Index Across Mainstream Surface water
							1.6E-08						5.35E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	3.2E-02	Total CNS HI =	3.4E-02
Total Kidney HI =	3.1E-02	Total Fetotoxicity HI =	1.9E-02
Total CVS HI =	3.2E-02	Total Prostate HI =	3.3E-01
Total GI Tract HI =	1.9E-02	Total Bone HI =	1.9E-02
Total Skin HI =	3.2E-02	Total Blood HI =	9.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	3.6E-02	Total CNS HI =	1.7E-02
Total CVS HI =	4.9E-02	Total Prostate HI =	1.7E-03
Total Skin HI =	4.9E-02	Total Blood HI =	2.8E-03

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	2.6E-09		2.9E-10	2.9E-09	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	5.9E-11		2.8E-11	8.7E-11	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	7.8E-10		3.7E-10	1.1E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.1E-10		5.1E-11	1.6E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	4.8E-11		2.3E-11	7.1E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.3E-07		1.2E-07	3.5E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	2.3E-09		2.5E-10	2.6E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	3.4E-11		1.6E-11	5.0E-11	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	7.8E-10		3.7E-10	1.1E-09	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	1.1E-10		5.1E-11	1.6E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.8E-11		1.3E-11	4.1E-11	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.2E-07		6.0E-08	1.8E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	1.4E-10		1.7E-11	1.6E-10	2,4,6-Trinitrotoluene	Liver	9.6E-05		1.1E-05	1.1E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	5.1E-05		1.1E-06	5.2E-05
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	5.7E-05		1.9E-06	5.9E-05
		Building 166	HMX					HMX	Liver, Blood	7.3E-07		1.6E-08	7.5E-07
		Historical Data	RDX	5.5E-10		3.0E-11	5.8E-10	RDX	Prostate	1.7E-05		9.1E-07	1.8E-05
			Aluminum					Aluminum	CNS	3.6E-04			3.6E-04
			Arsenic	2.8E-08		3.1E-09	3.1E-08	Arsenic	Skin, CVS	6.3E-04		6.9E-05	7.0E-04
			Barium					Barium	Kidney	2.7E-05			2.7E-05
			Mercury					Mercury	CNS	1.8E-05			1.8E-05
			Total Risk Across Surface Soil - Area Bldg 166				3.6E-07	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				1.8E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				3.2E-08	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					1.3E-03

Target Organ Analysis - Building 166

Total Liver HI =	2.2E-04	Total CNS HI =	3.8E-04
Total Kidney HI =	2.7E-05	Total Blood HI =	7.5E-07
Total CVS HI =	7.0E-04	Total Prostate HI =	1.8E-05
Total Skin HI =	7.0E-04		

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	5.8E-09		6.3E-10	6.4E-09	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	2.0E-09		9.6E-10	3.0E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.9E-08		8.8E-09	2.7E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	2.0E-09		9.6E-10	3.0E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	3.7E-09		1.8E-09	5.5E-09	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-09		5.7E-10	1.8E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	8.1E-07		4.1E-07	1.2E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	2.0E-09		2.2E-10	2.3E-09	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	2.0E-09		9.6E-10	3.0E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.8E-08		8.7E-09	2.7E-08	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	2.0E-09		9.6E-10	3.0E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	3.7E-09		1.7E-09	5.4E-09	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.2E-09		5.7E-10	1.8E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.9E-07		2.0E-07	5.9E-07	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	4.1E-11		4.7E-12	4.5E-11	2,4,6-Trinitrotoluene	Liver	2.7E-05		3.1E-06	3.0E-05
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	4.7E-05		1.0E-06	4.8E-05
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	7.0E-04		2.3E-05	7.3E-04
		Building 171	HMX					HMX	Liver, Blood	9.7E-05		2.1E-06	9.9E-05
		Historical Data	RDX	1.1E-09		5.9E-11	1.1E-09	RDX	Prostate	3.3E-05		1.8E-06	3.5E-05
			Aluminum					Aluminum	CNS	4.0E-04			4.0E-04
			Arsenic	3.1E-08		3.4E-09	3.4E-08	Arsenic	Skin, CVS	6.9E-04		7.5E-05	7.6E-04
			Barium					Barium	Kidney	2.4E-05			2.4E-05
			Mercury					Mercury	CNS	2.8E-05			2.8E-05
			Total Risk Across Surface Soil - Area Bldg 171				1.3E-06	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				6.3E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				3.5E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					2.2E-03

Target Organ Analysis - Building 171

Total Liver HI =	9.0E-04	Total CNS HI =	4.3E-04
Total Kidney HI =	2.4E-05	Total Blood HI =	9.9E-05
Total CVS HI =	7.6E-04	Total Prostate HI =	3.5E-05
Total Skin HI =	7.6E-04		

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	2.4E-03		8.2E-05	2.5E-03
			2,4,6-Trinitrotoluene	2.1E-08		5.8E-10	2.2E-08	2,4,6-Trinitrotoluene	Liver	1.4E-02		3.9E-04	1.4E-02
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	1.0E-03		4.5E-05	1.1E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	1.0E-02		1.5E-04	1.0E-02
			2-Nitrotoluene	3.2E-09		4.5E-10	3.6E-09	2-Nitrotoluene	Spleen	6.0E-07		2.0E-06	2.6E-06
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.7E-02		2.6E-04	1.8E-02
			HMX					HMX	Liver, Blood	1.6E-03		8.6E-06	1.6E-03
			RDX	7.5E-06		7.0E-08	7.6E-06	RDX	Prostate	2.3E-01		2.1E-03	2.3E-01
			Aluminum					Aluminum	CNS	2.8E-03		8.6E-06	2.9E-03
			Antimony					Antimony	Blood	9.4E-05		1.9E-06	9.6E-05
			Arsenic	1.9E-07		5.7E-10	1.9E-07	Arsenic	Skin, CVS	4.2E-03		1.3E-05	4.3E-03
			Barium					Barium	Kidney	7.0E-04		3.0E-05	7.3E-04
			Beryllium					Beryllium	GS	8.3E-04		3.6E-04	1.2E-03
			Cadmium					Cadmium	Kidney	2.7E-04		1.6E-05	2.9E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.4E-04		1.8E-04	9.2E-04
			Cobalt					Cobalt	NA	2.5E-03		7.6E-06	2.5E-03
			Iron					Iron	NA	7.4E-02		2.2E-04	7.5E-02
			Lead					Lead	NA				
			Lithium					Lithium	NA	4.3E-02		1.3E-04	4.3E-02
			Manganese					Manganese	CNS	7.6E-02		5.7E-03	8.2E-02
			Nickel					Nickel	Body Weight	5.4E-03		8.1E-05	5.5E-03
			Vanadium					Vanadium	Kidney	1.8E-03		2.1E-04	2.0E-03
			Zinc					Zinc	Blood	4.6E-04		8.3E-07	4.6E-04
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.9E-02		2.1E-04	6.9E-02
							Total Risk Across Groundwater	7.8E-06					Total Hazard Index Across Groundwater	5.66E-01

Total Liver HI =	4.4E-02	Total CNS HI =	8.6E-02
Total Kidney HI =	4.1E-03	Total Fetotoxicity HI =	9.2E-04
Total CVS HI =	4.3E-03	Total Body Weight HI =	5.5E-03
Total GI Tract HI =	2.1E-03	Total Prostate HI =	2.3E-01
Total Skin HI =	4.3E-03	Total Bone HI =	9.2E-04
Total Blood HI =	7.2E-02	Total Spleen HI =	2.5E-03

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	7.2E-09		3.4E-09	1.1E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.4E-09		6.5E-10	2.0E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.6E-04			2.6E-04
			Arsenic	9.7E-08		1.1E-08	1.1E-07	Arsenic	Skin, CVS	2.2E-03		2.3E-04	2.4E-03
			Barium					Barium	Kidney	6.2E-05			6.2E-05
			Cadmium					Cadmium	Kidney	6.8E-05		4.9E-06	7.3E-05
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.5E-04			7.5E-04
			Iron					Iron	NA	6.5E-03			6.5E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.7E-04			8.7E-04
			Vanadium					Vanadium	Kidney	1.5E-03			1.5E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	3.3E-10		3.9E-07	3.9E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	4.0E-09		8.2E-06	8.2E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene	5.9E-10		1.2E-06	1.2E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	3.1E-10		6.7E-07	6.7E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	8.5E-11		2.0E-10	2.9E-10	2,4,6-Trinitrotoluene	Liver	5.6E-05		1.4E-04	1.9E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	3.1E-04		4.1E-04	7.3E-04
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	7.7E-04		1.0E-03	1.8E-03
			HMX					HMX	Liver, Blood	1.1E-04		5.0E-05	1.6E-04
			RDX	4.3E-07		3.5E-07	7.9E-07	RDX	Prostate	1.3E-02		1.1E-02	2.4E-02
			Aluminum					Aluminum	CNS	7.6E-05		6.9E-05	1.4E-04
			Arsenic	1.9E-08		1.7E-08	3.6E-08	Arsenic	Skin, CVS	4.2E-04		3.8E-04	8.1E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	8.4E-05		6.1E-03	6.2E-03
			Iron					Iron	NA	2.3E-04		2.1E-04	4.4E-04
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.5E-04		8.0E-03	8.4E-03
			Vanadium					Vanadium	Kidney	2.0E-04		6.9E-03	7.1E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	2.8E-04		2.6E-04	5.4E-04
							Total Risk Across Gully Sediment	1.2E-07					Total Hazard Index Across Gully Sediment	1.2E-02
							Total Risk Across Gully Surface Water	1.1E-05					Total Hazard Index Across Gully Surface water	5.04E-02

TABLE 9.6a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - ADULT RECREATIONAL USERS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.5E-04			3.5E-04
			Antimony					Antimony	Blood	3.0E-04			3.0E-04
			Arsenic	2.2E-07		2.4E-08	2.4E-07	Arsenic	Skin, CVS	4.8E-03		5.3E-04	5.4E-03
			Cadmium					Cadmium	Kidney	8.7E-04		6.3E-05	9.3E-04
			Iron					Iron	NA	2.5E-02			2.5E-02
			Manganese					Manganese	CNS	1.4E-03			1.4E-03
			Vanadium					Vanadium	Kidney	2.6E-03			2.6E-03
Surface Water	Surface Water	Mainstream Surface Water	RDX	2.2E-09		1.8E-09	4.0E-09	RDX	Prostate	6.7E-05		5.5E-05	1.2E-04
			Barium					Barium	Kidney	8.1E-05		1.1E-03	1.1E-03
							Total Risk Across Mainstream Sediment	2.4E-07					Total Hazard Index Across Mainstream Sediment 3.6E-02
							Total Risk Across Mainstream Surface Water	4.0E-09					Total Hazard Index Across Mainstream Surface water 1.26E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	2.9E-03	Total CNS HI =	9.7E-03
Total Kidney HI =	8.7E-03	Total Fetotoxicity HI =	6.9E-03
Total CVS HI =	3.2E-03	Total Prostate HI =	2.4E-02
Total GI Tract HI =	6.9E-03	Total Bone HI =	6.9E-03
Total Skin HI =	3.2E-03	Total Blood HI =	7.0E-04

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	4.6E-03	Total CNS HI =	1.8E-03
Total CVS HI =	5.4E-03	Total Prostate HI =	1.2E-04
Total Skin HI =	5.4E-03	Total Blood HI =	3.0E-04

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	9.7E-09		8.5E-10	1.1E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.2E-10		8.2E-11	3.0E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.9E-09		1.1E-09	3.9E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.9E-10		1.5E-10	5.4E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.8E-10		6.7E-11	2.4E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	8.6E-07		3.5E-07	1.2E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	8.4E-09		7.4E-10	9.2E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.2E-10		4.7E-11	1.7E-10	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	2.9E-09		1.1E-09	3.9E-09	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.9E-10		1.5E-10	5.4E-10	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.0E-10		3.8E-11	1.4E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.3E-07		1.8E-07	6.1E-07	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	5.3E-10		4.9E-11	5.8E-10	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	2.0E-09		8.8E-11	2.1E-09	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.0E-07		9.1E-09	1.1E-07	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 166				1.2E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				6.2E-07	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.2E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					

Target Organ Analysis - Building 166

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.1E-08		1.8E-09	2.3E-08	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	7.5E-09		2.8E-09	1.0E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	6.8E-08		2.6E-08	9.4E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	7.5E-09		2.8E-09	1.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.4E-08		5.2E-09	1.9E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	4.4E-09		1.7E-09	6.1E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.0E-06		1.2E-06	4.2E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	7.5E-09		6.5E-10	8.1E-09	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	7.5E-09		2.8E-09	1.0E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	6.8E-08		2.6E-08	9.3E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	7.5E-09		2.8E-09	1.0E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.4E-08		5.1E-09	1.9E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	4.4E-09		1.7E-09	6.1E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.4E-06		5.9E-07	2.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	1.5E-10		1.4E-11	1.6E-10	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	4.0E-09		1.7E-10	4.2E-09	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.1E-07		9.9E-09	1.2E-07	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 171				4.4E-06	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				2.2E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.3E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					

Target Organ Analysis - Building 171

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen				
			2,4,6-Trinitrotoluene	4.9E-08		8.6E-10	5.0E-08	2,4,6-Trinitrotoluene	Liver				
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			2-Nitrotoluene	7.4E-09		6.7E-10	8.0E-09	2-Nitrotoluene	Spleen				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	1.7E-05		1.0E-07	1.8E-05	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	4.5E-07		8.5E-10	4.5E-07	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Beryllium					Beryllium	GS				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Cobalt					Cobalt	NA				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Lithium					Lithium	NA				
			Manganese					Manganese	CNS				
			Nickel					Nickel	Body Weight				
			Vanadium					Vanadium	Kidney				
			Zinc					Zinc	Blood				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
							Total Risk Across Groundwater	1.8E-05					Total Hazard Index Across Groundwater

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Body Weight HI =	
Total GI Tract HI =		Total Prostate HI =	
Total Skin HI =		Total Bone HI =	
Total Blood HI =		Total Spleen HI =	

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	2.7E-08		1.0E-08	3.7E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	5.0E-09		1.9E-09	6.9E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS				
			Arsenic	3.6E-07		3.1E-08	3.9E-07	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.5E-09		5.8E-07	5.8E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	3.1E-08		1.2E-05	1.2E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.6E-09		1.8E-06	1.8E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.4E-09		1.0E-06	1.0E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	6.5E-10		3.0E-10	9.5E-10	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	3.3E-06		5.3E-07	3.9E-06	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.5E-07		2.6E-08	1.7E-07	Arsenic	Skin, CVS				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Gully Sediment	4.3E-07					Total Hazard Index Across Gully Sediment	
						Total Risk Across Gully Surface Water	2.0E-05					Total Hazard Index Across Gully Surface water	

TABLE 9.7a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RECREATIONAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.5E-04			3.5E-04
			Antimony					Antimony	Blood				
			Arsenic	8.0E-07		6.9E-08	8.7E-07	Arsenic	Skin, CVS				
			Cadmium					Cadmium	Kidney				
			Iron					Iron	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.7E-08		2.7E-09	2.0E-08	RDX	Prostate				
			Barium					Barium	Kidney				
						Total Risk Across Mainstream Sediment	8.7E-07					Total Hazard Index Across Mainstream Sediment	3.5E-04
						Total Risk Across Mainstream Surface Water	2.0E-08					Total Hazard Index Across Mainstream Surface water	

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Prostate HI =	
Total GI Tract HI =		Total Bone HI =	
Total Skin HI =		Total Blood HI =	

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =		Total CNS HI =	3.5E-04
Total CVS HI =		Total Prostate HI =	
Total Skin HI =		Total Blood HI =	

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	1.3E-07		4.3E-09	1.3E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	2.9E-09		4.2E-10	3.3E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.7E-08		5.5E-09	4.3E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	5.2E-09		7.5E-10	5.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.3E-09		3.4E-10	2.7E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.1E-05		1.8E-06	1.3E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 166	2,3,7,8-TCDD TEQ	1.1E-07		3.7E-09	1.1E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	1.6E-09		2.4E-10	1.9E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.7E-08		5.5E-09	4.3E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	5.2E-09		7.5E-10	5.9E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.3E-09		1.9E-10	1.5E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.7E-06		8.9E-07	6.5E-06	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 166 Historical Data	2,4,6-Trinitrotoluene	6.9E-09		2.5E-10	7.2E-09	2,4,6-Trinitrotoluene	Liver	1.6E-02		5.8E-04	1.7E-02
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	8.6E-03		5.8E-05	8.6E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	9.6E-03		9.7E-05	9.7E-03
			HMX					HMX	Liver, Blood	1.2E-04		8.3E-07	1.2E-04
			RDX	2.6E-08		4.4E-10	2.7E-08	RDX	Prostate	2.8E-03		4.7E-05	2.8E-03
			Aluminum					Aluminum	CNS	6.1E-02			6.1E-02
			Arsenic	1.4E-06		4.6E-08	1.4E-06	Arsenic	Skin, CVS	1.1E-01		3.6E-03	1.1E-01
			Barium					Barium	Kidney	4.6E-03			4.6E-03
			Mercury					Mercury	CNS	3.0E-03			3.0E-03
			Total Risk Across Surface Soil - Area Bldg 166				1.3E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				6.7E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				1.4E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					2.2E-01

Target Organ Analysis - Building 166

Total Liver HI =	3.5E-02	Total CNS HI =	6.4E-02
Total Kidney HI =	4.6E-03	Total Blood HI =	1.2E-04
Total CVS HI =	1.1E-01	Total Prostate HI =	2.8E-03
Total Skin HI =	1.1E-01		

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	2.8E-07		9.3E-09	2.9E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	9.8E-08		1.4E-08	1.1E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.9E-07		1.3E-07	1.0E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	9.8E-08		1.4E-08	1.1E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.8E-07		2.6E-08	2.0E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.8E-08		8.4E-09	6.6E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	3.9E-05		6.1E-06	4.5E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Area Bldg 171	2,3,7,8-TCDD TEQ	9.8E-08		3.3E-09	1.0E-07	2,3,7,8-TCDD TEQ	NA				
			Benzo(a)anthracene	9.8E-08		1.4E-08	1.1E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	8.9E-07		1.3E-07	1.0E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	9.8E-08		1.4E-08	1.1E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	1.8E-07		2.6E-08	2.0E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.8E-08		8.4E-09	6.6E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.9E-05		3.0E-06	2.2E-05	Aroclor-1248	NA				
Soil	Soil	Surface and Subsurface Soil Building 171 Historical Data	2,4,6-Trinitrotoluene	1.9E-09		7.0E-11	2.0E-09	2,4,6-Trinitrotoluene	Liver	4.5E-03		1.6E-04	4.7E-03
			2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	7.9E-03		5.3E-05	7.9E-03
			4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	1.2E-01		1.2E-03	1.2E-01
			HMX					HMX	Liver, Blood	1.6E-02		1.1E-04	1.6E-02
			RDX	5.2E-08		8.8E-10	5.3E-08	RDX	Prostate	5.5E-03		9.3E-05	5.6E-03
			Aluminum					Aluminum	CNS	6.8E-02			6.8E-02
			Arsenic	1.5E-06		5.0E-08	1.5E-06	Arsenic	Skin, CVS	1.2E-01		3.9E-03	1.2E-01
			Barium					Barium	Kidney	4.0E-03			4.0E-03
			Mercury					Mercury	CNS	4.6E-03			4.6E-03
			Total Risk Across Surface Soil - Area Bldg 171				4.7E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				2.3E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				1.6E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					3.5E-01

Target Organ Analysis - Building 171

Total Liver HI =	1.5E-01	Total CNS HI =	7.2E-02
Total Kidney HI =	4.0E-03	Total Blood HI =	1.6E-02
Total CVS HI =	1.2E-01	Total Prostate HI =	5.6E-03
Total Skin HI =	1.2E-01		

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	6.6E-02		1.3E-03	6.8E-02
			2,4,6-Trinitrotoluene	1.7E-07		2.6E-09	1.7E-07	2,4,6-Trinitrotoluene	Liver	3.9E-01		6.0E-03	4.0E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	2.8E-02		6.9E-04	2.9E-02
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	2.8E-01		2.4E-03	2.9E-01
			2-Nitrotoluene	2.5E-08		2.0E-09	2.7E-08	2-Nitrotoluene	Spleen	1.7E-05		3.0E-05	4.7E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	4.8E-01		4.0E-03	4.9E-01
			HMX					HMX	Liver, Blood	4.4E-02		1.3E-04	4.4E-02
			RDX	5.9E-05		3.1E-07	6.0E-05	RDX	Prostate	6.3E+00		3.3E-02	6.3E+00
			Aluminum					Aluminum	CNS	7.9E-02		1.3E-04	7.9E-02
			Antimony					Antimony	Blood	2.6E-03		2.9E-05	2.6E-03
			Arsenic	1.5E-06		2.5E-09	1.5E-06	Arsenic	Skin, CVS	1.2E-01		2.0E-04	1.2E-01
			Barium					Barium	Kidney	1.9E-02		4.6E-04	2.0E-02
			Beryllium					Beryllium	GS	2.3E-02		5.5E-03	2.8E-02
			Cadmium					Cadmium	Kidney	7.6E-03		2.5E-04	7.8E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.0E-02		2.7E-03	2.3E-02
			Cobalt					Cobalt	NA	7.0E-02		1.2E-04	7.0E-02
			Iron					Iron	NA	2.1E+00		3.4E-03	2.1E+00
			Lead					Lead	NA				
			Lithium					Lithium	NA	1.2E+00		2.0E-03	1.2E+00
			Manganese					Manganese	CNS	2.1E+00		8.8E-02	2.2E+00
			Nickel					Nickel	Body Weight	1.5E-01		1.2E-03	1.5E-01
			Vanadium					Vanadium	Kidney	5.0E-02		3.2E-03	5.4E-02
			Zinc					Zinc	Blood	1.3E-02		1.3E-05	1.3E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	1.9E+00		3.2E-03	1.9E+00
							Total Risk Across Groundwater	6.1E-05					Total Hazard Index Across Groundwater	1.56E+01

Total Liver HI =	1.2E+00	Total CNS HI =	2.3E+00
Total Kidney HI =	1.1E-01	Total Fetotoxicity HI =	2.3E-02
Total CVS HI =	1.2E-01	Total Body Weight HI =	1.5E-01
Total GI Tract HI =	5.2E-02	Total Prostate HI =	6.3E+00
Total Skin HI =	1.2E-01	Total Bone HI =	2.3E-02
Total Blood HI =	2.0E+00	Total Spleen HI =	6.8E-02

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	1.9E-08		5.6E-09	2.5E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	3.7E-09		1.1E-09	4.7E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.4E-03			2.4E-03
			Arsenic	2.6E-07		1.7E-08	2.8E-07	Arsenic	Skin, CVS	2.0E-02		1.3E-03	2.1E-02
			Barium					Barium	Kidney	5.8E-04			5.8E-04
			Cadmium					Cadmium	Kidney	6.4E-04		2.8E-05	6.6E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.0E-03			7.0E-03
			Iron					Iron	NA	6.1E-02			6.1E-02
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.1E-03			8.1E-03
			Vanadium					Vanadium	Kidney	1.4E-02			1.4E-02
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.2E-09		1.9E-07	1.9E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	2.7E-08		4.0E-06	4.0E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.0E-09		6.0E-07	6.0E-07	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.1E-09		3.3E-07	3.3E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	5.6E-10		9.8E-11	6.6E-10	2,4,6-Trinitrotoluene	Liver	1.3E-03		2.3E-04	1.5E-03
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	7.3E-03		7.0E-04	8.0E-03
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	1.8E-02		1.7E-03	2.0E-02
			HMX					HMX	Liver, Blood	2.5E-03		8.5E-05	2.6E-03
			RDX	2.9E-06		1.7E-07	3.1E-06	RDX	Prostate	3.1E-01		1.8E-02	3.3E-01
			Aluminum					Aluminum	CNS	1.8E-03		1.2E-04	1.9E-03
			Arsenic	1.3E-07		8.4E-09	1.4E-07	Arsenic	Skin, CVS	9.9E-03		6.5E-04	1.1E-02
			Chromium					Chromium	Fetotoxicity/GS/Bone	2.0E-03		1.0E-02	1.2E-02
			Iron					Iron	NA	5.3E-03		3.5E-04	5.7E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.3E-03		1.4E-02	2.2E-02
			Vanadium					Vanadium	Kidney	4.6E-03		1.2E-02	1.6E-02
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	6.6E-03		4.4E-04	7.1E-03
							Total Risk Across Gully Sediment	3.1E-07					Total Hazard Index Across Gully Sediment 1.1E-01
							Total Risk Across Gully Surface Water	8.3E-06					Total Hazard Index Across Gully Surface water 4.33E-01

TABLE 9.8a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE CHILD RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (0 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.3E-03			3.3E-03
			Antimony					Antimony	Blood	2.8E-03			2.8E-03
			Arsenic	5.8E-07		3.9E-08	6.2E-07	Arsenic	Skin, CVS	4.5E-02		3.0E-03	4.8E-02
			Cadmium					Cadmium	Kidney	8.1E-03		3.6E-04	8.5E-03
			Iron					Iron	NA	2.4E-01			2.4E-01
			Manganese					Manganese	CNS	1.3E-02			1.3E-02
			Vanadium					Vanadium	Kidney	2.4E-02			2.4E-02
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.5E-08		8.8E-10	1.6E-08	RDX	Prostate	1.6E-03		9.3E-05	1.7E-03
			Barium					Barium	Kidney	1.9E-03		1.8E-03	3.7E-03
							Total Risk Across Mainstream Sediment	6.2E-07					Total Hazard Index Across Mainstream Sediment 3.4E-01
							Total Risk Across Mainstream Surface Water	1.6E-08					Total Hazard Index Across Mainstream Surface water 5.35E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	3.2E-02	Total CNS HI =	3.4E-02
Total Kidney HI =	3.1E-02	Total Fetotoxicity HI =	1.9E-02
Total CVS HI =	3.2E-02	Total Prostate HI =	3.3E-01
Total GI Tract HI =	1.9E-02	Total Bone HI =	1.9E-02
Total Skin HI =	3.2E-02	Total Blood HI =	9.7E-03

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	3.6E-02	Total CNS HI =	1.7E-02
Total CVS HI =	4.8E-02	Total Prostate HI =	1.7E-03
Total Skin HI =	4.8E-02	Total Blood HI =	2.8E-03

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	4.8E-08		1.6E-09	4.9E-08	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	1.1E-09		1.6E-10	1.2E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.4E-08		2.1E-09	1.6E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.9E-09		2.9E-10	2.2E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	8.7E-10		1.3E-10	1.0E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	4.2E-06		6.7E-07	4.9E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	4.1E-08		1.4E-09	4.3E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	6.1E-10		9.0E-11	7.0E-10	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.4E-08		2.1E-09	1.6E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	1.9E-09		2.9E-10	2.2E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	5.0E-10		7.4E-11	5.7E-10	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.1E-06		3.4E-07	2.5E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.6E-09		9.5E-11	2.7E-09	2,4,6-Trinitrotoluene	Liver	1.7E-03		6.3E-05	1.8E-03
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	9.2E-04		6.3E-06	9.2E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	1.0E-03		1.1E-05	1.0E-03
		Building 166	HMX					HMX	Liver, Blood	1.3E-05		9.0E-08	1.3E-05
		Historical Data	RDX	9.9E-09		1.7E-10	1.0E-08	RDX	Prostate	3.0E-04		5.1E-06	3.0E-04
			Aluminum					Aluminum	CNS	6.6E-03			6.6E-03
			Arsenic	5.1E-07		1.7E-08	5.3E-07	Arsenic	Skin, CVS	1.1E-02		3.9E-04	1.2E-02
			Barium					Barium	Kidney	4.9E-04			4.9E-04
			Mercury					Mercury	CNS	3.2E-04			3.2E-04
			Total Risk Across Surface Soil - Area Bldg 166				5.0E-06	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				2.5E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				5.4E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					2.3E-02

Target Organ Analysis - Building 166

Total Liver HI =	3.8E-03	Total CNS HI =	6.9E-03
Total Kidney HI =	4.9E-04	Total Blood HI =	1.3E-05
Total CVS HI =	1.2E-02	Total Prostate HI =	3.0E-04
Total Skin HI =	1.2E-02		

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.0E-07		3.5E-09	1.1E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	3.7E-08		5.4E-09	4.2E-08	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	3.3E-07		5.0E-08	3.8E-07	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	3.7E-08		5.4E-09	4.2E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	6.7E-08		9.9E-09	7.7E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.2E-08		3.2E-09	2.5E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.5E-05		2.3E-06	1.7E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	3.7E-08		1.3E-09	3.8E-08	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	3.7E-08		5.4E-09	4.2E-08	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	3.3E-07		4.9E-08	3.8E-07	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	3.7E-08		5.4E-09	4.2E-08	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	6.7E-08		9.9E-09	7.6E-08	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	2.2E-08		3.2E-09	2.5E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	7.1E-06		1.1E-06	8.2E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	7.3E-10		2.7E-11	7.6E-10	2,4,6-Trinitrotoluene	Liver	4.9E-04		1.8E-05	5.1E-04
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver	8.4E-04		5.8E-06	8.5E-04
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver	1.3E-02		1.3E-04	1.3E-02
		Building 171	HMX					HMX	Liver, Blood	1.8E-03		1.2E-05	1.8E-03
		Historical Data	RDX	2.0E-08		3.4E-10	2.0E-08	RDX	Prostate	5.9E-04		1.0E-05	6.0E-04
			Aluminum					Aluminum	CNS	7.3E-03			7.3E-03
			Arsenic	5.6E-07		1.9E-08	5.8E-07	Arsenic	Skin, CVS	1.2E-02		4.2E-04	1.3E-02
			Barium					Barium	Kidney	4.3E-04			4.3E-04
			Mercury					Mercury	CNS	5.0E-04			5.0E-04
			Total Risk Across Surface Soil - Area Bldg 171				1.8E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				8.8E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				6.0E-07	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					3.7E-02

Target Organ Analysis - Building 171

Total Liver HI =	1.6E-02	Total CNS HI =	7.7E-03
Total Kidney HI =	4.3E-04	Total Blood HI =	1.8E-03
Total CVS HI =	1.3E-02	Total Prostate HI =	6.0E-04
Total Skin HI =	1.3E-02		

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen	3.0E-02		7.3E-04	3.1E-02
			2,4,6-Trinitrotoluene	2.7E-07		5.2E-09	2.7E-07	2,4,6-Trinitrotoluene	Liver	1.8E-01		3.5E-03	1.8E-01
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney	1.3E-02		4.0E-04	1.3E-02
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	1.3E-01		1.4E-03	1.3E-01
			2-Nitrotoluene	4.0E-08		4.0E-09	4.4E-08	2-Nitrotoluene	Spleen	7.5E-06		1.8E-05	2.5E-05
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	2.2E-01		2.4E-03	2.2E-01
			HMX					HMX	Liver, Blood	2.0E-02		7.7E-05	2.0E-02
			RDX	9.4E-05		6.3E-07	9.5E-05	RDX	Prostate	2.9E+00		1.9E-02	2.9E+00
			Aluminum					Aluminum	CNS	3.6E-02		7.7E-05	3.6E-02
			Antimony					Antimony	Blood	1.2E-03		1.7E-05	1.2E-03
			Arsenic	2.4E-06		5.2E-09	2.4E-06	Arsenic	Skin, CVS	5.3E-02		1.1E-04	5.4E-02
			Barium					Barium	Kidney	8.8E-03		2.7E-04	9.0E-03
			Beryllium					Beryllium	GS	1.0E-02		3.2E-03	1.4E-02
			Cadmium					Cadmium	Kidney	3.4E-03		1.5E-04	3.6E-03
			Chromium					Chromium	Fetotoxicity/GS/Bone	9.3E-03		1.6E-03	1.1E-02
			Cobalt					Cobalt	NA	3.2E-02		6.8E-05	3.2E-02
			Iron					Iron	NA	9.4E-01		2.0E-03	9.4E-01
			Lead					Lead	NA				
			Lithium					Lithium	NA	5.5E-01		1.2E-03	5.5E-01
			Manganese					Manganese	CNS	9.6E-01		5.1E-02	1.0E+00
			Nickel					Nickel	Body Weight	6.8E-02		7.3E-04	6.9E-02
			Vanadium					Vanadium	Kidney	2.3E-02		1.9E-03	2.5E-02
			Zinc					Zinc	Blood	5.8E-03		7.4E-06	5.8E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	8.6E-01		1.9E-03	8.7E-01
							Total Risk Across Groundwater	9.8E-05					Total Hazard Index Across Groundwater 7.09E+00

Total Liver HI =	5.5E-01	Total CNS HI =	1.1E+00
Total Kidney HI =	5.0E-02	Total Fetotoxicity HI =	1.1E-02
Total CVS HI =	5.4E-02	Total Body Weight HI =	6.9E-02
Total GI Tract HI =	2.5E-02	Total Prostate HI =	2.9E+00
Total Skin HI =	5.4E-02	Total Bone HI =	1.1E-02
Total Blood HI =	9.1E-01	Total Spleen HI =	3.1E-02

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	7.2E-09		2.1E-09	9.4E-09	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	1.4E-09		4.1E-10	1.8E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS	2.6E-04			2.6E-04
			Arsenic	9.7E-08		6.6E-09	1.0E-07	Arsenic	Skin, CVS	2.2E-03		1.5E-04	2.3E-03
			Barium					Barium	Kidney	6.2E-05			6.2E-05
			Cadmium					Cadmium	Kidney	6.8E-05		3.1E-06	7.1E-05
			Chromium					Chromium	Fetotoxicity/GS/Bone	7.5E-04			7.5E-04
			Iron					Iron	NA	6.5E-03			6.5E-03
			Lead					Lead	NA				
			Manganese					Manganese	CNS	8.7E-04			8.7E-04
			Vanadium					Vanadium	Kidney	1.5E-03			1.5E-03
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	3.3E-10		3.9E-07	3.9E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	4.0E-09		8.2E-06	8.2E-06	Benzo(a)pyrene					
			Benzo(b)fluoranthene	5.9E-10		1.2E-06	1.2E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	3.1E-10		6.7E-07	6.7E-07	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	8.5E-11		2.0E-10	2.9E-10	2,4,6-Trinitrotoluene	Liver	5.6E-05		1.4E-04	1.9E-04
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver	3.1E-04		4.1E-04	7.3E-04
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver	7.7E-04		1.0E-03	1.8E-03
			HMX					HMX	Liver, Blood	1.1E-04		5.0E-05	1.6E-04
			RDX	4.3E-07		3.5E-07	7.9E-07	RDX	Prostate	1.3E-02		1.1E-02	2.4E-02
			Aluminum					Aluminum	CNS	7.6E-05		6.9E-05	1.4E-04
			Arsenic	1.9E-08		1.7E-08	3.6E-08	Arsenic	Skin, CVS	4.2E-04		3.8E-04	8.1E-04
			Chromium					Chromium	Fetotoxicity/GS/Bone	8.4E-05		6.1E-03	6.2E-03
			Iron					Iron	NA	2.3E-04		2.1E-04	4.4E-04
			Lead					Lead	NA				
			Manganese					Manganese	CNS	3.5E-04		8.0E-03	8.4E-03
			Vanadium					Vanadium	Kidney	2.0E-04		6.9E-03	7.1E-03
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood	2.8E-04		2.6E-04	5.4E-04
						Total Risk Across Gully Sediment	1.1E-07					Total Hazard Index Across Gully Sediment	1.2E-02
						Total Risk Across Gully Surface Water	1.1E-05					Total Hazard Index Across Gully Surface water	5.04E-02

TABLE 9.9a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - FUTURE ADULT RESIDENT
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.5E-04			3.5E-04
			Antimony					Antimony	Blood	3.0E-04			3.0E-04
			Arsenic	2.2E-07		1.5E-08	2.3E-07	Arsenic	Skin, CVS	4.8E-03		3.3E-04	5.2E-03
			Cadmium					Cadmium	Kidney	8.7E-04		4.0E-05	9.1E-04
			Iron					Iron	NA	2.5E-02			2.5E-02
			Manganese					Manganese	CNS	1.4E-03			1.4E-03
			Vanadium					Vanadium	Kidney	2.6E-03			2.6E-03
Surface Water	Surface Water	Mainstream Surface Water	RDX	2.2E-09		1.8E-09	4.0E-09	RDX	Prostate	6.7E-05		5.5E-05	1.2E-04
			Barium					Barium	Kidney	8.1E-05		1.1E-03	1.1E-03
							Total Risk Across Mainstream Sediment	2.3E-07					Total Hazard Index Across Mainstream Sediment 3.6E-02
							Total Risk Across Mainstream Surface Water	4.0E-09					Total Hazard Index Across Mainstream Surface water 1.26E-03

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =	2.9E-03	Total CNS HI =	9.7E-03
Total Kidney HI =	8.7E-03	Total Fetotoxicity HI =	6.9E-03
Total CVS HI =	3.1E-03	Total Prostate HI =	2.4E-02
Total GI Tract HI =	6.9E-03	Total Bone HI =	6.9E-03
Total Skin HI =	3.1E-03	Total Blood HI =	7.0E-04

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =	4.6E-03	Total CNS HI =	1.8E-03
Total CVS HI =	5.2E-03	Total Prostate HI =	1.2E-04
Total Skin HI =	5.2E-03	Total Blood HI =	3.0E-04

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	1.7E-07		5.9E-09	1.8E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 166	Benzo(a)anthracene	3.9E-09		5.7E-10	4.5E-09	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	5.1E-08		7.5E-09	5.9E-08	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	7.1E-09		1.0E-09	8.1E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	3.2E-09		4.7E-10	3.7E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	1.5E-05		2.4E-06	1.8E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	1.5E-07		5.1E-09	1.6E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	2.2E-09		3.3E-10	2.6E-09	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	5.1E-08		7.5E-09	5.9E-08	Benzo(a)pyrene	NA				
		Area Bldg 166	Benzo(b)fluoranthene	7.1E-09		1.0E-09	8.1E-09	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene					Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	1.8E-09		2.7E-10	2.1E-09	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	7.8E-06		1.2E-06	9.0E-06	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	9.5E-09		3.4E-10	9.8E-09	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 166	HMX					HMX	Liver, Blood				
		Historical Data	RDX	3.6E-08		6.1E-10	3.7E-08	RDX	Prostate				
			Aluminum					Aluminum	,CNS				
			Arsenic	1.9E-06		6.3E-08	1.9E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 166				1.8E-05	Total Hazard Index Across Surface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 166				9.2E-06	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 166					
			Total Risk Across Surface/Subsurface Soil - Bldg 166 - Historical Data				2.0E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 166 - Historical Data					

Target Organ Analysis - Building 166

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS

SWMU 13 (MINE FILL B)

NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Surface Soil	2,3,7,8-TCDD TEQ	3.8E-07		1.3E-08	3.9E-07	2,3,7,8-TCDD TEQ	NA				
		Area Bldg 171	Benzo(a)anthracene	1.3E-07		2.0E-08	1.5E-07	Benzo(a)anthracene	NA				
			Benzo(a)pyrene	1.2E-06		1.8E-07	1.4E-06	Benzo(a)pyrene	NA				
			Benzo(b)fluoranthene	1.3E-07		2.0E-08	1.5E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	2.5E-07		3.6E-08	2.8E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	8.0E-08		1.2E-08	9.1E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	5.4E-05		8.5E-06	6.2E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,3,7,8-TCDD TEQ	1.3E-07		4.6E-09	1.4E-07	2,3,7,8-TCDD TEQ	NA				
		Subsurface	Benzo(a)anthracene	1.3E-07		2.0E-08	1.5E-07	Benzo(a)anthracene	NA				
		Soil	Benzo(a)pyrene	1.2E-06		1.8E-07	1.4E-06	Benzo(a)pyrene	NA				
		Area Bldg 171	Benzo(b)fluoranthene	1.3E-07		2.0E-08	1.5E-07	Benzo(b)fluoranthene	NA				
			Dibenzo(a,h)anthracene	2.4E-07		3.6E-08	2.8E-07	Dibenzo(a,h)anthracene	NA				
			Indeno(1,2,3-cd)pyrene	7.9E-08		1.2E-08	9.1E-08	Indeno(1,2,3-cd)pyrene	NA				
			Aroclor-1248	2.6E-05		4.1E-06	3.0E-05	Aroclor-1248	NA				
Soil	Soil	Surface and	2,4,6-Trinitrotoluene	2.7E-09		9.7E-11	2.8E-09	2,4,6-Trinitrotoluene	Liver				
		Subsurface	2-Amino-4,6-dinitrotoluene					2-Amino-4,6-dinitrotoluene	Liver				
		Soil	4-Amino-2,6-dinitrotoluene					4-Amino-2,6-dinitrotoluene	Liver				
		Building 171	HMX					HMX	Liver, Blood				
		Historical Data	RDX	7.2E-08		1.2E-09	7.3E-08	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	2.0E-06		6.9E-08	2.1E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Mercury					Mercury	CNS				
			Total Risk Across Surface Soil - Area Bldg 171				6.5E-05	Total Hazard Index Across Surface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Area Bldg 171				3.2E-05	Total Hazard Index Across Surface/Subsurface Soil - Area Bldg 171					
			Total Risk Across Surface/Subsurface Soil - Bldg 171 - Historical Data				2.2E-06	Total Hazard Index Across Surface/Subsurface Soil - Bldg 171 - Historical Data					

Target Organ Analysis - Building 171

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Blood HI =	
Total CVS HI =		Total Prostate HI =	
Total Skin HI =			

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Water	Onsite	1,3-Dinitrobenzene					1,3-Dinitrobenzene	Spleen				
			2,4,6-Trinitrotoluene	4.3E-07		7.8E-09	4.4E-07	2,4,6-Trinitrotoluene	Liver				
			2,6-Dinitrotoluene					2,6-Dinitrotoluene	CNS, Blood, Kidney				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			2-Nitrotoluene	6.5E-08		6.0E-09	7.1E-08	2-Nitrotoluene	Spleen				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	1.5E-04		9.4E-07	1.5E-04	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Antimony					Antimony	Blood				
			Arsenic	3.9E-06		7.7E-09	3.9E-06	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Beryllium					Beryllium	GS				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Cobalt					Cobalt	NA				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Lithium					Lithium	NA				
			Manganese					Manganese	CNS				
			Nickel					Nickel	Body Weight				
			Vanadium					Vanadium	Kidney				
			Zinc					Zinc	Blood				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Groundwater	1.6E-04					Total Hazard Index Across Groundwater	

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Body Weight HI =	
Total GI Tract HI =		Total Prostate HI =	
Total Skin HI =		Total Bone HI =	
Total Blood HI =		Total Spleen HI =	

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment in Gullies	Benzo(a)pyrene	2.7E-08		7.8E-09	3.4E-08	Benzo(a)pyrene					
			Dibenzo(a,h)anthracene	5.0E-09		1.5E-09	6.5E-09	Dibenzo(a,h)anthracene					
			Aluminum					Aluminum	CNS				
			Arsenic	3.6E-07		2.4E-08	3.8E-07	Arsenic	Skin, CVS				
			Barium					Barium	Kidney				
			Cadmium					Cadmium	Kidney				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Surface Water in Gullies	Benzo(a)anthracene	2.5E-09		5.8E-07	5.8E-07	Benzo(a)anthracene					
			Benzo(a)pyrene	3.1E-08		1.2E-05	1.2E-05	Benzo(a)pyrene					
			Benzo(b)fluoranthene	4.6E-09		1.8E-06	1.8E-06	Benzo(b)fluoranthene					
			Indeno(1,2,3-cd)pyrene	2.4E-09		1.0E-06	1.0E-06	Indeno(1,2,3-cd)pyrene					
			2,4,6-Trinitrotoluene	6.5E-10		3.0E-10	9.5E-10	2,4,6-Trinitrotoluene	Liver				
			2-Amino-4,6-Dinitrotoluene					2-Amino-4,6-Dinitrotoluene	Liver				
			4-Amino-2,6-Dinitrotoluene					4-Amino-2,6-Dinitrotoluene	Liver				
			HMX					HMX	Liver, Blood				
			RDX	3.3E-06		5.3E-07	3.9E-06	RDX	Prostate				
			Aluminum					Aluminum	CNS				
			Arsenic	1.5E-07		2.6E-08	1.7E-07	Arsenic	Skin, CVS				
			Chromium					Chromium	Fetotoxicity/GS/Bone				
			Iron					Iron	NA				
			Lead					Lead	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
			Nitrite/Nitrate-N					Nitrite/Nitrate-N	Blood				
						Total Risk Across Gully Sediment	4.2E-07					Total Hazard Index Across Gully Sediment	
						Total Risk Across Gully Surface Water	2.0E-05					Total Hazard Index Across Gully Surface water	

TABLE 9.10a. CENTRAL TENDENCY EXPOSURE (CTE)
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - TOTAL RESIDENTIAL ILCRS
SWMU 13 (MINE FILL B)
NSWC CRANE, CRANE, INDIANA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child + Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Mainstream Sediment	Aluminum					Aluminum	CNS	3.5E-04			3.5E-04
			Antimony					Antimony	Blood				
			Arsenic	8.0E-07		5.4E-08	8.5E-07	Arsenic	Skin, CVS				
			Cadmium					Cadmium	Kidney				
			Iron					Iron	NA				
			Manganese					Manganese	CNS				
			Vanadium					Vanadium	Kidney				
Surface Water	Surface Water	Mainstream Surface Water	RDX	1.7E-08		2.7E-09	2.0E-08	RDX	Prostate				
			Barium					Barium	Kidney				
							Total Risk Across Mainstream Sediment	8.5E-07					Total Hazard Index Across Mainstream Sediment	3.5E-04
							Total Risk Across Mainstream Surface Water	2.0E-08					Total Hazard Index Across Mainstream Surface water	

Total Target Organ Hazard Index for Gully Surface Water and Sediment

Total Liver HI =		Total CNS HI =	
Total Kidney HI =		Total Fetotoxicity HI =	
Total CVS HI =		Total Prostate HI =	
Total GI Tract HI =		Total Bone HI =	
Total Skin HI =		Total Blood HI =	

Total Target Organ Hazard Index for Mainstream Surface Water and Sediment

Total Kidney HI =		Total CNS HI =	3.5E-04
Total CVS HI =		Total Prostate HI =	
Total Skin HI =		Total Blood HI =	

APPENDIX I.2

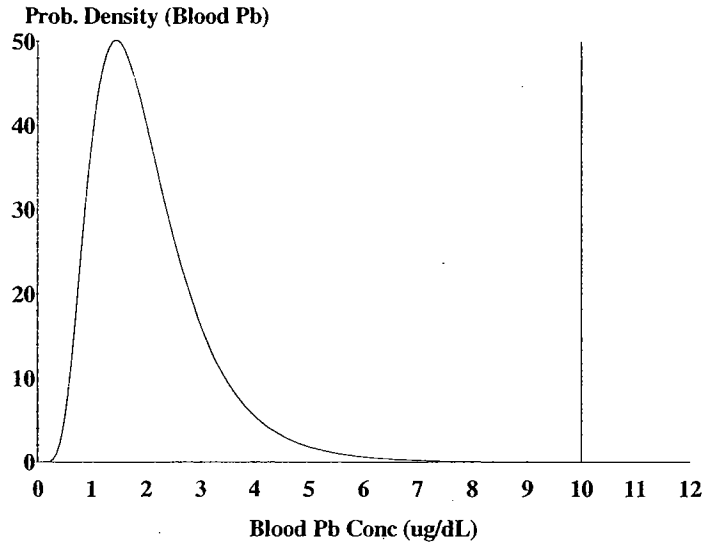
IEUBK CHILD LEAD MODEL
AND
TRW ADULT LEAD MODEL RESULTS

IEUBK MODEL –

SWMU 13 SURFACE SOIL

SOIL CONC = 29 mg/KG

GROUNDWATER = 4.5 µg/L



Cutoff = 10.000 ug/dl
Geo Mean = 1.886
GSD = 1.600
% Above = 0.019
% Below = 99.981

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

LEAD MODEL FOR WINDOWS Version 1.0

==========
Model Version: 1.0 Build 261
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========
The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.500 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 30.300 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)

.5-1	29.000	30.300
1-2	29.000	30.300
2-3	29.000	30.300
3-4	29.000	30.300
4-5	29.000	30.300
5-6	29.000	30.300
6-7	29.000	30.300

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/day)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.648	0.000	0.431
1-2	0.034	2.767	0.000	1.077
2-3	0.062	3.118	0.000	1.124
3-4	0.067	3.017	0.000	1.153
4-5	0.067	2.924	0.000	1.204
5-6	0.093	3.092	0.000	1.273
6-7	0.093	3.416	0.000	1.296

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	0.726	3.826	2.1
1-2	1.152	5.030	2.1
2-3	1.156	5.460	2.0
3-4	1.164	5.400	1.9
4-5	0.867	5.063	1.7
5-6	0.783	5.241	1.6
6-7	0.740	5.545	1.6

Calculations of Blood Lead Concentrations (PbBs) - Adult Recreational User

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
					GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	59	59	59	59
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.1	2.3	2.1	2.3
PbB_0	X	X	Baseline PbB	ug/dL	1.5	1.7	1.5	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.100	0.100
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	52	52	52	52
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.5**	**1.7**	**1.5**	**1.7**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**4.7**	**6.2**	**4.7**	**6.2**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.4%**	**1.3%**	**0.4%**	**1.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) - Construction Worker

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	29	29	29	29
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.1	2.3	2.1	2.3
PbB_0	X	X	Baseline PbB	ug/dL	1.5	1.7	1.5	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			ug/dL	**1.5**	**1.7**	**1.5**	**1.7**
$PbB_{fetal,0.95}$	**95th percentile PbB among fetuses of adult workers**			ug/dL	**4.7**	**6.1**	**4.7**	**6.1**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			ug/dL	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			%	**0.4%**	**1.3%**	**0.4%**	**1.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

APPENDIX I.3

WEIGHTED AVERAGES OF COPCS FOR THE SIX BUILDING AREAS INVESTIGATED IN THE BIOREMEDIATION PROGRAM (HISTORICAL DATA)

Table I-1
Weighted Averages of COPCs for Historical Data
SWMU 13

Location	RDX	HMX	246TNT	2A46DT	4A26DT	ALUMINUM	ARSENIC	BARIUM	MERCURY
Average BLDG 165	0.51	1.08	0.24	2.56	0.19	12,966	8.17	100.7	0.048
weighted avg BLDG 166	1.96	1.44	1.89	0.40	0.45	14,313	7.44	74.9	0.211
weighted avg BLDG 168/2500	2.24	1.61	1.36	0.36	0.37	12,849	7.94	77.0	0.099
weighted avg BLDG 171	3.89	191	0.53	0.37	5.52	15,834	8.10	65.6	0.326
weighted avg BLDG 173	3.59	2.13	0.80	0.49	0.49	13,175	7.68	81.7	0.030
Average BLDG 174	0.25	0.25	0.25	0.25	0.25	7,557	5.02	75.5	0.042

APPENDIX I.4

EMAIL AND SUMMARY MEMORANDUM REGARDING ESTIMATION OF DERMAL PERMEABILITY COEFFICIENT FOR PAHs

Jackman, Tom
From: Simon.Ted@epamail.epa.gov
Sent: Tuesday, July 18, 2000 8:45 AM
To: JackmanT@ttnus.com
Subject: Re: Charleston NWSC

Please use the new dermal guidance except for SVOCs in water, e.g PAHs in surface water. If you have these, call me at 404-562-8642. The R9 PRGs should be used for screening COPCs at an HQ=0.1 and risk = 1E-6. The rest of the guidance is correct. Email me with other questions.

Ted W. Simon, Ph.D., D.A.B.T.
Toxicologist
EPA Region 4
Voice: 404-562-8642
Fax: 404-562-8566
E-mail: simon.ted@epa.gov

|--------+----------->
	JackmanT@ttnu
	s.com
	07/14/2000
	10:20 AM
--------+----------->
>----------|
To: Ted Simon/R4/USEPA/US@EPA
cc:
Subject: Charleston NWSC
>----------|

Dr. Simon,

My name is Tom Jackman and I work in the risk assessment section of TtNUS in Pittsburgh. I have been doing risk assessments for the Naval Weapons Station Charleston (NWSC) for the past few years. We are about to start two new risk assessments for SWMU 10 and SWMU 36 and would like to know if there are any changes in Region IV that we should be aware of. For example, should we make use the new Interim Dermal Guidance, Part E of RAGS? Also, we have been using the Region III RBC tables for screening. Should we now use Region IX's PRG tables? I got Region IV's latest Human Health Risk Assessment Bulletin from your Web Site and am following its guidance. Does this give Region IV's latest guidance?

I appreciate any information you can provide.

Thanks,

Tom

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

61 Forsyth Street
Atlanta, Georgia 30303-3104

April 27, 2001

4WD-OTS

MEMORANDUM

SUBJECT: Estimation of the Dermal Permeability Coefficient for PAHs for Coal-Tar Shampoo Experiments

FROM: Ted W. Simon, PhD, DABT
Toxicologist
Office of Technical Services

TO: Dan Stralks
Risk Assessor, Region 9

CC: Elmer W. Akin, Chief, OTS
David Bennett, OSWER
Linda Birnbaum, ORD

The purpose of this memo is to privide a written version of the calculations that support my objection to the water pathway method in the current version of the *Risk Assessment Guidance for Superfund, Volume 1: Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance.* My objection to the current method for assessing dermal risk from SVOCs in water stems a site-related situation. At a golf course at a closing military base, benzo(a)pyrene was found in surface water at sub-ppb concentrations. The method and calculations returned to me by the dermal workgroup indicated a risk greater than 1E-04. To me, this result did not make sense. PAHs are essentially insoluble in water and would have difficulty penetrating unbroken skin.

Summary

Using measurements of dermal uptake from a coal-tar shampoo event, I calculated a permeability coefficient for PAHs (benzo(a)pyrene) that was more than ten orders of magnitude lower (10E-10) than the value presented in the dermal guidance. The value presented in the dermal guidance is 7.7E-01 cm/hr. The value calculated below is 6.4E-11 cm/hr.

☞ *Therefore, one could say the uncertainty in dermal exposure for PAHs by the water pathway is greater than a billion fold.*

Obviously, this presents a difficulty for risk-based decision-making.

Origin of the Value in the Dermal Guidance.

The calculation of risk by the dermal workgroup used a regression equation to estimate the permeability coefficient, K_p, and this regression equation is problematic. As indicated at a recent presentation, the regression equation vastly overestimates K_p for SVOCs.

The empirical regression equation used to estimate K_p is:

$$\log K_p = -2.80 + 0.67 \log K_{ow} - 0.0056\, MW \qquad (1)$$

For benzo(a)pyrene, with values of log K_{ow} = 5.66 and MW = 250, the value of Kp is 0.39 cm/hr if "log" means base 10 logarithms or 0.66 if "log" means Naperian logarithms. I was not able to obtain the value of 0.77 in the table in Appendix B of the dermal guidance.

Estimation of K_p from the Shampooing Experiment

To ascertain the uncertainty in K_p, I estimated a value from an experiment in which volunteers shampooed with coal tar shampoo containing known concentrations of pyrene and benzo(a)pyrene. Urinary hydroxypyrene was measured for two days following shampoo application.[1]

From these data, I was able to develop a value for K_p. These data are shown in the textbox below:

Duration of Event (t_{event})	1 min	0.01666 hr
Amount of shampoo	20g	0.02 kg
Conc of BaP		56 mg/kg
MW BaP		250
Conc of Pyrene		285 mg/kg
MW pyrene		202
Total OH-pyrene in urine (from figure in van Schooten[1])		33 nmol
τ_{event} (from Appendix B)		2.64 hr
Scalp Area (EFH)	$0.115 m^2$ * 50% * 10,000	575 cm^2

Assumptions

2) All BaP and pyrene absorbed is also excreted
3) No other shampoo components are excreted as OH-pyrene
4) τ_{event} calculated using Appendix A is reasonable

---

[1]Van Schooten F-J, Moonen EJC, Rhijnsberger E, van Agen B, Thijssen HHW, Kleinjans JCS (1994) Dermal uptake of polycyclic aromatic hydrocarbons after hairwash with coal-tar shampoo. Lancet 344, 1505-1506.

The equation for the dermally absorbed dose for exposures shorter than 2.4* τ_{event} is:

$$DA_{event} = 2\,FA\;K_p\;C_w\sqrt{\frac{6\;\tau_{event}\;t_{event}}{\pi}} \qquad (2)$$

Rearranging to solve for K_p gives:

$$K_p = \frac{DA_{event}}{2\,FA\;C_w\sqrt{\frac{6\;\tau_{event}\;t_{event}}{\pi}}} \qquad (3)$$

Using a weighted average of pyrene and BaP, the MW of the absorbed chemicals is 210. Hence, if the total excretion is 33 nmol, this is 0.007 mg. For a scalp area of 575 cm^2, DA_{event} is 1.2E-05 mg/cm^2. Assuming that 1 kg of shampoo is 1 L in volume, the concentration of substances metabolized to OH-pyrene in the shampoo is 56 mg/kg + 285 mg/kg = 341 mg/kg = 341,000 mg/cm^3. The other values are available in Appendix B.

$$K_p = \frac{1.2E-05\;mg/cm^2}{2\cdot 1\cdot 3.41E+05\;mg/cm^3\cdot\sqrt{\frac{6\cdot 2.64hr\cdot 0.0166hr}{3.1416}}} = 6.4E-11\;cm/hr$$

Hence, plugging in numbers gives a value of 6.4E-11 cm/hr for K_p.

Please let me know if you need further help
T.W. Simon/tws:4WD-OTS:28642/06/04/7/A:\DISK11\APR01\MCD_ECO2.WPD

APPENDIX J

SUPPORTING DOCUMENTATION FOR THE ECOLOGICAL RISK ASSESSMENT SWMU 13

APPENDIX J.1

CHECKLIST FOR ECOLOGICAL RISK ASSESSMENT/SAMPLING

Checklist for Ecological Assessment/Sampling

I. SITE DESCRIPTION

1. Site Name: NSWC CRANE

   Location: SWMU 13 - MILL FILL B

   County: MARTIN City: CRANE State: INDIANA

2. Latitude: 38.84325 Longitude: -86.83353

3. What is the approximate area of the site? 49.4 ACRES

4. Is this the first site visit? ☒ yes ☐ no If no, attach trip report of previous site visit(s), if available.

   Date(s) of previous site visit(s): 1ST SITE VISIT FOR ECO. ASSESSMENT. OTHER SITE VISITS WERE MADE FOR ENVIRONMENTAL SAMPLING.

5. Please attach to the checklist USGS topographic map(s) of the site, if available.

6. Are aerial or other site photographs available? ☒ yes ☐ no If yes, please attach any available photo(s) to the site map at the conclusion of this section.

   REPRODUCTION MUST BE W / NAVY APPROVAL

7. The land use on the site is:

— % Urban

— % Rural

— % Residential

16 % Industrial (☒ light ☐ heavy)

— % Agricultural

(Crops: —)

— % Recreational

(Describe; note if it is a park, etc.)

6 % ~~Undisturbed~~ WOODED

78 % ~~Other~~ Maintained Grass

The area surrounding the site is:
_____ mile radius

____% Urban

____% Rural

____% Residential

~15 % ~~Industrial (☒ light ☐ heavy)~~

____% Agricultural

(Crops: _____)

____% Recreational

(Describe; note if it is a park, etc.)

~85 % ~~Undisturbed~~ Wooded

____% Other

8. Has any movement of soil taken place at the site? ☒ yes ☐ no. If yes, please identify the most likely cause of this disturbance:

____ Agricultural Use ___X___ Heavy Equipment ____ Mining

____ Natural Events ____ Erosion ____ Other

Please describe:

Thermal Boiler Buildings were removed with Follow up cleanup activities near Bldgs 166 & 171.

9. Do any potentially sensitive environmental areas exist adjacent to or in proximity to the site, e.g., Federal and State parks, National and State monuments, wetlands, prairie potholes? *Remember, flood plains and wetlands are not always obvious; do not answer "no" without confirming information.*

Please provide the source(s) of information used to identify these sensitive areas, and indicate their general location on the site map.

10. What type of facility is located at the site?

☐ Chemical ☒ Manufacturing ☐ Mixing ☐ Waste disposal

☒ Other (specify) Storage

11. What are the suspected contaminants of concern at the site? If known, what are the maximum concentration levels?

VOCs, SVOCs, metals & Explosives.

12. Check any potential routes of off-site migration of contaminants observed at the site:

☑ Swales ☐ Depressions ☑ Drainage ditches

☐ Runoff ☐ Windblown particulates ☐ Vehicular traffic

☐ Other (specify)_____

13. If known, what is the approximate depth to the water table? 3' to 17' (May 2003 water level information)

14. Is the direction of surface runoff apparent from site observations? ☒ yes ☐ no If yes, to which of the following does the surface runoff discharge? Indicate all that apply.

☒ Surface water ☒ Groundwater ☐ Sewer ☐ Collection impoundment

15. Is there a navigable waterbody or tributary to a navigable waterbody? ☐ yes ☒ no

16. Is there a waterbody anywhere on or in the vicinity of the site? If yes, also complete Section III: Aquatic Habitat Checklist -- Non-Flowing Systems and/or Section IV: Aquatic Habitat Checklist -- Flowing Systems.

☐ yes (approx. distance_____) ☒ no

17. Is there evidence of flooding? ☐ yes ☒ no *Wetlands and flood plains are not always obvious; do not answer "no" without confirming information.* If yes, complete Section V: Wetland Habitat Checklist.
Site conditions considered poor to very poor for wetland plants (Martin Co. Soil Survey)

18. If a field guide was used to aid any of the identifications, please provide a reference. Also, estimate the time spent identifying fauna. [Use a blank sheet if additional space is needed for text.]

19. Are any threatened and/or endangered species (plant or animal) known to inhabit the area of the site? ☐ yes ☐ no *If yes, you are required to verify this information with the U.S. Fish and Wildlife Service.* If species' identities are known, please list them next.

THE INDIANA BAT has been observed @ NSWC CRANE. But not at SWMU 13

20. Record weather conditions at the time this checklist was prepared:

DATE: 5-11-03

70°s Temperature (°C/(F)) 75.8 Normal daily high temperature (Source Martin Co. Soil Survey)

W→E Wind (direction/speed) NONE Precipitation (rain, snow)

750% Cloud cover

IA. SUMMARY OF OBSERVATIONS AND SITE SETTING

Light industry comprises 16% (3.2 acres) of SWMU 13 and consists of numerous buildings, an elaborate railroad system, covered walkways, asphalt and gravel roads, and gravel storage lay down areas. Open land comprises 78% of SWMU 13 and consists of 38.7 acres of maintained grass. The remaining 6% (2.6 acres) of SWMU 13 is wooded. For the spacial distribution of land use see the cover type as shown on Proposed Sample Locations Map (Figure 3-2) of the QAPP attached to this ecological assessment checklist.

The wooded areas can be described as three isolated riparian woodlots (see attached photographs Figure 1-3u, 1-3y and 1-3dd). Sycamore, yellow poplar and sassafras are the dominant species in the tree canopy, with American elm, black cherry, red maple, white oak, ash *sp.* and black willow as associated species. Sassafras and flowering dogwood are common species in the understory.

SWMU 13 drains mostly northwest toward tributaries of Boggs Creek and to a lesser extent to the southeast toward Turkey Creek tributaries. There is a network of numerous culverts (see attached photographs for culvert examples like Figure 1-3r, 1-3v and 1-3x) used to facilitate the drainage of SWMU 13 and divert surface water under Highway-18 (the site's perimeter road), Highway-45 (the main road that runs southeast of the SWMU) and the numerous railroads that traverse the site. In fact all 13 surface water samples collected during March or May of 2003 were collected at or near a culvert. And, for the most part drainage ditches carry surface water to these culverts; however, there are some intermittent streams (associated with the three riparian woodlots) found within the confines of SWMU 13 that are also diverted off site via culverts.

As noted above all of SWMU's 13 drainage flows into tributaries that feeds either Boggs Creek or Turkey Creek (which also flows into Boggs Creek). Boggs Creek in turn flows into Lake Gallimore near the southern boundary of NSWC Crane then continues to flow out of Lake Gallimore until it ultimately discharges into the East Fork of White River.

At the time of this assessment slow to moderate flow was observed on site at the intermittent streams associated with the riparian woodlots. However, the common occurrence of aquatic receptors (i.e. fish and sediment invertebrates) maybe considered somewhat unlikely. Furthermore, this site is an upland site well outside of FEMAs flood hazard area (Zone A). Additionally, Martin County soil survey considers this a poor to very poor site for wetland plants and a very poor site for wetland wildlife. With that said, several crayfish burrows were observed throughout the low laying areas within SWMU 13 and an adult fish (~12" long) was observed in a pool just offsite but down stream of a raised culvert (see attached photograph Figure 1-3z).

In addition to crayfish burrows, eastern cottontail rabbits, wild turkeys, tadpoles (see attached photograph Figure 1-3s) and a raccoon (see attached photograph Figure 1-3ff) were also observed within SWMU 13.

See attached SWMU 13 photographs, cover type map and photograph direction map to enhance site familiarity.

Completed by TERRY ROJAHN Affiliation T+NUS

Additional Preparers

Site Manager RALPH BASINSKI

Date 6-20-03

II. TERRESTRIAL HABITAT CHECKLIST

IIA. WOODED

1. Are there any wooded areas at the site? ☒ yes ☐ no If no, go to Section IIB: Shrub/Scrub.

2. What percentage or area of the site is wooded? (6 % 2.6 acres). Indicate the wooded area on the site map which is attached to a copy of this checklist. Please identify what information was used to determine the wooded area of the site.

3. What is the dominant type of vegetation in the wooded area? (Circle one: Evergreen/Deciduous/Mixed) Provide a photograph, if available.

   Dominant plant, if known: Sycamore

4. What is the predominant size of the trees at the site? Use diameter at breast height.

   ☐ 0-6 in. ☑ 6-12 in. ☐ > 12 in.
   ↳ Estimate

5. Specify type of understory present, if known. Provide a photograph, if available.

   See Question I A

IIB. SHRUB/SCRUB

1. Is shrub/scrub vegetation present at the site? ☐ yes ☒ no If no, go to Section IIC: Open Field.

2. What percentage of the site is covered by scrub/shrub vegetation? (_____% _____ acres). Indicate the areas of shrub/scrub on the site map. Please identify what information was used to determine this area.

3. What is the dominant type of scrub/shrub vegetation, if known? Provide a photograph, if available.

4. What is the approximate average height of the scrub/shrub vegetation?

   ☐ 0-2 ft. ☐ 2-5 ft. ☐ > 5 ft.

5. Based on site observations, how dense is the scrub/shrub vegetation?

☐ Dense ☐ Patchy ☐ Sparse

IIC. OPEN FIELD

1. Are there open (bare, barren) field areas present at the site? ☐ yes ☒ no If yes, please indicate the type below:

☐ Prairie/plains ☐ Savannah ☐ Old field ☐ Other (specify)_____

2. What percentage of the site is open field? (_____%_____ acres). Indicate the open fields on the site map.

3. What is/are the dominant plant(s)? Provide a photograph, if available.

4. What is the approximate average height of the dominant plant?_____

5. Describe the vegetation cover: ☐ Dense ☐ Sparse ☐ Patchy

IID. MISCELLANEOUS

1. ~~Are other types of terrestrial habitats present at the site, other than woods, scrub/shrub, and open field?~~ ☒ yes ☐ no If yes, identify and describe them below.

Approximately 39 Acres of Maintained Grass.

2. Describe the terrestrial miscellaneous habitat(s) and identify these area(s) on the site map.

See Attached cover map.

Grass from 3"- 8" in height & dense.

3. What observations, if any, were made at the site regarding the presence and/or absence of insects, fish, birds, mammals, etc.?

SEE Question IA

4. Review the questions in Section I to determine if any additional habitat checklists should be completed for this site.

III. AQUATIC HABITAT CHECKLIST – NON-FLOWING SYSTEMS NA

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. What type of open-water, non-flowing system is present at the site?

   ☐ Natural (pond, lake)
   ☐ Artificially created (lagoon, reservoir, canal, impoundment)

2. If known, what is the name(s) of the waterbody(ies) on or adjacent to the site?

   _____

3. If a waterbody is present, what are its known uses (e.g.: recreation, navigation, etc.)?

4. What is the approximate size of the waterbody(ies)? _____ acre(s).

5. Is any aquatic vegetation present? ☐ yes ☐ no If yes, please identify the type of vegetation present if known.

   ☐ Emergent ☐ Submergent ☐ Floating

6. If known, what is the depth of the water? _____

7. What is the general composition of the substrate? Check all that apply.

   ☐ Bedrock ☐ Sand (coarse) ☐ Muck (fine/black)
   ☐ Boulder (>10 in.) ☐ Silt (fine) ☐ Debris
   ☐ Cobble (2.5-10 in.) ☐ Marl (shells) ☐ Detritus
   ☐ Gravel (0.1-2.5 in.) ☐ Clay (slick) ☐ Concrete
   ☐ Other (specify)_____

8. What is the source of water in the waterbody?

   ☐ River/Stream/Creek ☐ Groundwater ☐ Other (specify)_____
   ☐ Industrial discharge ☐ Surface runoff

9. Is there a discharge from the site to the waterbody? ☐ yes ☐ no If yes, please describe this discharge and its path.

10. Is there a discharge from the waterbody? ☐ yes ☐ no If yes, and the information is available, identify from the list below the environment into which the waterbody discharges.

☐ River/Stream/Creek	☐ onsite	☐ offsite	Distance_____
☐ Groundwater	☐ onsite	☐ offsite	
☐ Wetland	☐ onsite	☐ offsite	Distance_____
☐ Impoundment	☐ onsite	☐ offsite	

11. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected provide the measurement and the units of measure below:

_____ Area

_____ Depth (average)

_____ ~~Temperature (depth of the water at which the reading was taken)~~ _____

_____ pH

_____ Dissolved oxygen

_____ Salinity

_____ Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth _____)

_____ Other (specify)

12. Describe observed color and area of coloration.

13. Mark the open-water, non-flowing system on the site map attached to this checklist.

14. What observations, if any, were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

IV. AQUATIC HABITAT CHECKLIST – FLOWING SYSTEMS

Note: Aquatic systems are often associated with wetland habitats. Please refer to Section V, Wetland Habitat Checklist.

1. What type(s) of flowing water system(s) is (are) present at the site?

☐ River	☐ Stream	☐ Creek
☐ Dry wash	☐ Arroyo	☐ Brook
☒ Artificially created (ditch, etc.)	☒ Intermittent Stream	☐ Channeling
	☐ Other (specify)_____	

2. If known, what is the name of the waterbody? No names - but flow the tributaries of Boggs Ck. & Turkey Ck.

3. For natural systems, are there any indicators of physical alteration (e.g., channeling, debris, etc.)?
☒ yes ☐ no If yes, please describe indicators that were observed.
All intermittent streams are diverted off site via culverts.

4. What is the general composition of the substrate? Check all that apply.

☐ Bedrock	☑ Sand (coarse)	☐ Muck (fine/black)
☑ Boulder (>10 in.)	☑ Silt (fine)	☐ Debris
☑ Cobble (2.5-10 in.)	☐ Marl (shells)	☑ Detritus
☑ Gravel (0.1-2.5 in.)	☑ Clay (slick)	☐ Concrete
☐ Other (specify)_____		

5. What is the condition of the bank (e.g., height, slope, extent of vegetative cover)?
Ht. for the most part <2'.

Gentle slopes

Veg. cover mostly grasses.

6. Is the system influenced by tides? ☐ yes ☒ no What information was used to make this determination?

7. Is the flow intermittent? ☒ yes ☐ no If yes, please note the information that was used in making this determination.

Source - Martin Co. Soil Survey

8. Is there a discharge from the site to the waterbody? ☒ yes ☐ no If yes, please describe the discharge and its path.

To Bogg Ck & Turkey Ck. tributaries.
SEE Also Question IA

9. Is there a discharge from the waterbody? ☒ yes ☐ no If yes, and the information is available, please identify what the waterbody discharges to and whether the discharge is on site or off site.

SEE Question IA

10. Identify any field measurements and observations of water quality that were made. For those parameters for which data were collected, provide the measurement and the units of measure in the appropriate space below:

3/29-30/03

0.5-3'	Width (ft.)
1-4"	Depth (ft.)
5-50	Velocity (specify units): 2 streams ~5-20 gpm most Northern Intermittent stream ~20-50 gpm
6.52 - 9.3 °C	Temperature (depth of the water at which the reading was taken 1-3")
7.74 - 8.07 SU	pH
9.95 - 12.32 mg/l	Dissolved oxygen
—	Salinity
17 - 150 NTUs	Turbidity (clear, slightly turbid, turbid, opaque) (Secchi disk depth —)
.199 - 0.640 mS/cm	Other (specify) Conductivity

11. Describe observed color and area of coloration.

Clear to a very slight tan.

← most southern stream

Other two intermittent streams

12. Is any aquatic vegetation present? ☐ yes ☐ no If yes, please identify the type of vegetation present, if known.

☐ Emergent ☐ Submergent ☐ Floating

Only Grasses observed

13. Mark the flowing water system on the attached site map.

14. What observations were made at the waterbody regarding the presence and/or absence of benthic macroinvertebrates, fish, birds, mammals, etc.?

SEE Question IA

V. WETLAND HABITAT CHECKLIST

1. Based on observations and/or available information, are designated or known wetlands definitely present at the site?
☐ yes ☒ no

Please note the sources of observations and information used (e.g., USGS Topographic Maps, National Wetland Inventory, Federal or State Agency, etc.) to make this determination.

2. Based on the location of the site (e.g., along a waterbody, in a floodplain) and site conditions (e.g., standing water; dark, wet soils; mud cracks; debris line; water marks), are wetland habitats suspected?
☐ yes ☐ no If yes, proceed with the remainder of the wetland habitat identification checklist.

3. What type(s) of vegetation are present in the wetland?

☐ Submergent ☐ Emergent
☐ Scrub/Shrub ☐ Wooded

☐ Other (specify)_____

4. Provide a general description of the vegetation present in and around the wetland (height, color, etc.). Provide a photograph of the known or suspected wetlands, if available.

5. Is standing water present? ☐ yes ☐ no If yes, is this water: ☐ Fresh ☐ Brackish
What is the approximate area of the water (sq. ft.)?_____
Please complete questions 4, 11, 12 in Checklist III - Aquatic Habitat -- Non-Flowing Systems.

6. Is there evidence of flooding at the site? What observations were noted?

☐ Buttressing ☐ Water marks ☐ Mud cracks

☐ Debris line ☐ Other (describe below)

7. If known, what is the source of the water in the wetland?

☐ Stream/River/Creek/Lake/Pond ☐ Groundwater

☐ Flooding ☐ Surface Runoff

8. Is there a discharge from the site to a known or suspected wetland? ☐ yes ☐ no If yes, please describe.

9. Is there a discharge from the wetland? ☐ yes ☐ no. If yes, to what waterbody is discharge released?

☐ Surface Stream/River ☐ Groundwater ☐ Lake/Pond ☐ Marine

10. If a soil sample was collected, describe the appearance of the soil in the wetland area. Circle or write in the best response.

Color (blue/gray, brown, black, mottled) _____

Water content (dry, wet, saturated/unsaturated) _____

11. Mark the observed wetland area(s) on the attached site map.

APPENDIX J.2

PHYSICAL AND CHEMICAL CHARACTERISTICS OF ECOLOGICAL COPC CLASSES

APPENDIX J.2
CHEMICAL TOXICITY INFORMATION

This appendix presents a discussion of the different chemical classes retained as COPCs at SMWU 13, including toxicity information, potential food chain and trophic transfer, and bioaccumulation potential. Appendix Table J.2-1 presents the bioaccumulation factors (BAFs) that were used in the surrogate species' food-chain models for the individual constituents that were detected at SWMU 13. The sources for most of the BAFs are presented in section 8.4.2.1 of the Ecological Risk Assessment (ERA), while the text below discusses some additional sources of the BAFs, where necessary. Note that dry weight BAFs were used for this ERA.

PCBs

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to 10 chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (USEPA, 1985).

PCBs released into water adsorb to sediments and other organic matter. Typically, PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time (ATSDR, 1989b). For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process (USEPA, 1985).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the more persistent it will be in the environment. Factors that determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1989b).

Because PCBs are highly lipophilic, they can bioaccumulate in the lipid portions of animals. Bioconcentration factors in the thousands have been reported for various aquatic species (Eisler, 1986a). PCBs can also accumulate in upper trophic level animals such as piscivorous birds and mammals that feed on contaminated prey items (Eisler, 1986a).

Adverse effects of PCBs on terrestrial wildlife include increased mortality, reproductive effects, and behavioral effects (USEPA, 1985). As a group, birds are more resistant to acutely toxic effects of PCBs than mammals (Eisler, 1986a). Among sensitive avian species, PCBs disrupt the normal pattern of growth, reproduction, metabolism, and behavior (Eisler, 1986a). Of the mammals, the mink is the most sensitive wildlife species tested for which data are available (Eisler, 1986a). Impacts to mink include anorexia, weight loss, lethargy, reproductive effects, and death (Eisler, 1986a).

Dioxins

Dioxin and dioxin-like compounds consist of the following chemical classes: polychlorinated dibenzo-p-dioxins (PCDDs or CDDs), polychlorinated dibenzofurans (PCDFs of CDFs), polybrominated dibenzodioxins (PBDDs or BDDs), polybrominated dibenzofurans (PBDFs or BDFs), and PCBs (USEPA, 1998). The CDDs and BDDs each include 75 individual compounds, and the CDFs BDFs each include 135 different compounds (USEPA, 1998). Of all these compounds, only 7 of the 75 congeners of CDDs or BDDs are thought to have dioxin-like toxicity, as are 10 of the 135 congeners of CDFs, or BDFs (USEPA, 1998). These are the ones with chlorine/bromine substitutions in, at least, the 2, 3, 7, and 8 positions (USEPA, 1998). Of the 209 PCB congeners, 13 are thought to have dioxin-like toxicity, which include the PCBs with four or more chlorines with just one or no substitution in the ortho position (USEPA, 1998).

There are very few toxicity data for dioxins except for 2,3,7,8-TCDD, which has been associated with lethal, carcinogenic, teratogenic, reproductive, mutagenic, histopathologic, and immunotoxic effects (Eisler, 1986b). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is the most toxic congener within these groups of compounds (Van den Berg et al., 1998). Because of this, toxicity equivalency factors (developed to estimate the relative toxicity of the dioxin and dioxin-like compounds to 2,3,7,8-TCDD (Van den Berg et al., 1998). There are substantial inter- and intraspecific differences in sensitivity and toxic responses to 2,3,7,8-TCDD (Eisler, 1986b). Two species of earthworms showed no adverse effects at soil concentrations of 5 mg/kg; however, they died at 10 mg/kg of 2,3,7,8-TCDD (Eisler, 1986b). This indicates that terrestrial invertebrates may be resistant to 2,3,7,8-TCDD.

Although there presently is no evidence of biomagnification of PCDDs in birds, it is suspected that piscivorous birds have a greater potential to accumulate PCDDs than the fish that they eat (Eisler, 1986b).

Explosives

Some of the more common explosives include nitroaromatic compounds such as 2,4,6-trinitrotoluene, hexahydro-1,3,5-trinitro-1,3,5-triazine, octahydro-1,3,5,7-tetranitro-1,3,5-tetrazocine, N-methyl-N,2,4,6-tetranitroaniline, and associated by-products and degradation products that may have been released to the environment during manufacturing and load, assembly, and pack processes at military facilities (Talmage et al., 1999). These explosives are moderately to highly toxic to freshwater organisms, with chronic screening values less than 1 mg/L, although some of the screening values are low because of the conservative methods used to develop them based on an absence of data (Talmage et al., 1999). Available data indicate that none of the compounds are expected to bioconcentrate (Talmage et al., 1999). Most of the explosives do not appear to be highly toxic to mammals. Terrestrial reference values (TRVs) are greater than 1 mg/kg-day.

Explosives have little to moderate potential to adsorb to soil and sediment (Talmage et al., 1999). Therefore, explosives will have moderate to high mobility in soils and sediment, and most of the explosives will be found in the water column (Talmage et al., 1999).

Metals

Many metals occur naturally at various concentrations in the surface water and sediment primarily to chemical weathering of rocks and fallout from volcanoes. Most metals are toxic to aquatic (i.e., fish, invertebrates) and terrestrial (i.e., plants, invertebrates, vertebrates) ecological receptors above certain concentrations, with some metals being more toxic at lower concentrations than others. Also, different chemical forms of the metals may be more toxic than others. For example, hexavalent chromium is typically more toxic than trivalent chromium, and methylmercury is more toxic than inorganic mercury. In addition, the toxicity of several metals (cadmium, chromium, copper, lead, nickel, silver, and zinc) to aquatic receptors in freshwater systems decreases with increasing water hardness.

Many factors (e.g., pH, Eh, clay content, organic matter content) influence the bioavailability of metals to invertebrates in sediment. One way to estimate the bioavailable portion of certain divalent metals (cadmium, copper, lead, nickel, and zinc) in sediment is to measure the amount of acid volatile sulfides (AVS) and simultaneously extracted metals (SEM) in a sediment sample. If the molar concentration of AVS is higher than the molar concentration of SEM, than the SEM metals are expected to be unavailable to aquatic invertebrates and, therefore, nontoxic. AVS plays little or no role in determining interstitial water concentrations of metals in aerobic systems or those with low productivity (i.e., where the absence of organic carbon limits sulfate reduction)

(Ankley et al., 1995), or when ingestion of sediments is the primary exposure route (Lee et al., 2000).

For several metals, the Eco SSL Guidance referenced a document prepared by Sample et al., (1998), which presented soil to biota BAFs (see Appendix Table J.2-1). These BAFs were used to predict the tissue concentrations in the small mammals from the chemical concentrations in the soil. The 90 percentile BAFs from Sample et al., (1998) were used for the conservative food chain model and the median BAFs were used for the average food chain model. Finally, the Eco SSL Guidance referenced Baes et al., (1984) for diet to biota tissue BAFs for a few metals (antimony, barium, and beryllium). Only one BAF was available for these metals so they were used for both the conservative and average food chain model.

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TABLE J.2-1

DRY WEIGHT BAFS FOR PLANTS, EARTHWORMS, AND MAMMALS
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 1

Chemicals	Plant BAFs[1,2]		Earthworm BAFs[3]		Mammal BAFs	
	Conservative	Average	Conservative	Average	Conservative	Average
Pesticides/ PCBs						
Aroclor-1248	1.60E-02	1.60E-02	1.59E+01	6.67E+00	1.00E+00	1.00E+00
Explosives						
2,4,6-Trinitrotoluene	1.80E+00	1.80E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
2-Nitrotoluene	1.80E+00	1.80E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
1,3,5-Trinitrobenzene	7.70E+00	7.70E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
RDX	4.60E-01	4.60E-01	1.00E+00	1.00E+00	1.00E+00	1.00E+00
4-Amino-2,6-dinitrotoluene			1.00E+00	1.00E+00	1.00E+00	1.00E+00
HMX	1.70E+01	1.70E+01	1.00E+00	1.00E+00	1.00E+00	1.00E+00
2-Amino-4,6-dinitrotoluene			1.00E+00	1.00E+00	1.00E+00	1.00E+00
Dioxins						
TEQ Bird	4.30E-03	4.30E-03	2.22E+01	1.10E+01	2.20E+00	1.07E+00
TEQ Bird HALFND	4.30E-03	4.30E-03	2.22E+01	1.10E+01	2.20E+00	1.07E+00
TEQ Mammal	4.30E-03	4.30E-03	2.22E+01	1.10E+01	2.20E+00	1.07E+00
TEQ Mammal HALFND	4.30E-03	4.30E-03	2.22E+01	1.10E+01	2.20E+00	1.07E+00
Inorganics						
Arsenic	1.10E+00	3.75E-02	5.23E-01	2.24E-01	1.49E-02	2.50E-03
Cadmium	3.25E+00	5.86E-01	4.07E+01	7.71E+00	4.48E-01	1.26E-01
Chromium	8.39E-02	4.10E-02	3.16E+00	3.06E-01	3.33E-01	8.46E-02
Lead	4.68E-01	3.89E-02	1.52E+00	2.66E-01	2.86E-01	1.05E-01
Mercury	5.00E+00	6.52E-01	2.06E+01	1.69E+00	1.92E-01	5.43E-02
Selenium	3.01E+00	6.72E-01	1.34E+00	9.85E-01	1.19E+00	1.62E-01

Footnotes:
BAF - Bioaccumulation Factor
1 - ORNL (2001) for organics; only one value is available for conservative and average exposures
2 - Sample et al., (1997) for inorganics; conservative value is 90th percentile; average value is median value
3 - ORNL (September, 1998) for all chemicals; conservative value is 90th percentile; average value is median value

Conservative and average refers to the exposure scenarios for which the uptake factors are used
Default value of 1 is assigned to parameters without uptake factors

APPENDIX J.3

SURROGATE TERRESTRIAL RECEPTOR PROFILES

APPENDIX J.3
RECEPTOR PROFILES UPDATE

The following sections present the receptor profiles for the short-tailed shrew, meadow vole, northern bobwhite quail, American woodcock, red fox, and red-tailed hawk. The majority of the information for the profiles was obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993). The data for the incidental soil ingestion rates were obtained from the Estimates of Soil Ingestion by Wildlife (Beyer, 1994) or the draft USEPA Ecological Soil Screening Guidance (USEPA, July 2000).

The food and water ingestion rates are listed in g/g (of body weight)-day on a wet weight basis but were converted to dry weight for the ERA. The home ranges are presented in hectares in USEPA (1993) but were converted to acres by multiplying the number of hectares by 2.471. Also note that the estimated percent of soil in the diets are listed in dry weight. The attached table presents the calculation of the exposure parameters and how the calculations were done.

Short-Tailed Shrew (*Blarina brevicauda*)

Shrews inhabit a wide variety of habitats and are common in areas with abundant vegetative cover. They need cool, moist habitats because of their high metabolic and water-loss rates. The short-tailed shrew is primarily carnivorous, eating insects such as earthworms, slugs, and snails.

The adult body weight for the short-tailed shrew in various habitats ranged from 0.015 to 0.01921 kg with an average of 0.0169 kg. The listed food ingestion rates for shrews are between 0.43 and 0.96 g/g-day (wet-weight). The water ingestion rate was listed as 0.223 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.16, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 3% for conservative food chain model and 1.5% for the average food chain model) from USEPA (July 2000). 3% is the 90th percentile value and 1.5% is the 50th percentile value from USEPA (July 2000). The home range for the shrew (0. 9699 acres) was calculated using data from a tamarek bog in Manitoba (only value available).

American Woodcock (*Scolopax minor*)

Woodcocks inhabit both woodlands and abandoned fields, particularly those with risk and moderately to poorly drained loamy soils, which tend to support abundant earthworm populations. They feed primarily on

invertebrates found in moist upland soils by probing the soil with their long prehensile-tipped bill. Earthworms are their preferred diet, but seeds and other plant matter may also be consumed.

The adult body weight for the woodcock ranges from 0.166 to 0.213 kg with an average of 0.190 kg. The listed food ingestion rates for the woodcock are between 0.73 and 1.0 g/g-day (wet-weight). The water ingestion rate is listed as 0.1 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 8-9. The food ingestion rates were then multiplied by 0.16, which is the percent solids of worms (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (assumed 11.74% for conservative food chain model and 6.68% for the average food chain model) from USEPA (July 2000). 11.74% is the 90th percentile value and 6.68% is the 50th percentile value from USEPA (July 2000).

The range of home range sizes for the woodcock is 7.66 to 182 acres with an average home range of 61 acres.

Meadow Vole (Microtus pennsylvanicus)

Meadow voles inhabit grassy fields, marshes, and bogs; however, they prefer fields with more grass, more cover, and fewer woody plants. They typically consume green succulent vegetation, sedges, seeds, roots, bark, fungi, insects, and animal matter. However, green succulent vegetation makes up the majority of their diet.

The adult body weight for the vole ranges from 0.0329 to 0.0391 kg with an average of 0.0366 kg. The only listed food ingestion rates for voles range from 0.30 to 0.35 g/g-day (wet-weight), with an average of 0.325 g/g-day. The water ingestion rates are 0.14 (estimated) and 0.21 g/g-day, with an average of 0.175 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown in Table 8-9. The food ingestion rates were then multiplied by 0.30, which is the percent solids of young grass (Sample et al., 1997), to convert the ingestion rate from a wet-weight value to a dry-weight value. Finally, the incidental soil ingestion rate is calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (2.4 percent) from Beyer (1994). The home range for the meadow vole ranges from 0.0297 to 1.06 acres with an average home range of 0.16 acres.

Northern Bobwhite Quail (*Colinus virginianus*)

Quails inhabit grasslands, idle fields, pastures, and large clumps of grasses. Bobwhite quails forage in areas with open vegetation, some bare ground, and light litter. Seeds from weeds, woody plants, and grasses

comprise the majority of an adult's diet, although green vegetation has been found to dominate the diet of this species in winter in the southern areas of the United States.

The adult body weight for the bobwhite quail ranges from 0.162 to 0.186 kg with an average of 0.177 kg. The listed food ingestion rates for quails range from 0.067 to 0.093 g/g-day (wet-weight), with an average of 0.082 g/g-day. The water ingestion rate ranges from 0.086 to 0.131 g/g-day, with an average water ingestion rate of 0.104 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.30, which is the percent solids of young grass (Sample et al., 1997), to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate is calculated by multiplying the food ingestion rate by the percentage of soil that is incidentally ingested (8.2 percent). The 8.2 percent is based on the incidental sediment ingestion rate of a Canada goose (Beyer, 1994), which also consumes terrestrial vegetation, because an incidental soil ingestion rate was not available for the quail.

The home range for the quail ranges from 16 to 41 acres with an average home range of 29 acres.

Red Fox (Vulpes vulpes)

Red foxes are present throughout the United States, except in the southeast, extreme southwest, and some central states. Unlike the more social wolves of the *Vulpes* family, red foxes are nocturnal and generally hunt solo preying on small mammals. Meadow voles are important food sources for the red fox. They are also considered scavengers of carcasses and other refuse. Red foxes are distinguished as the most widely distributed carnivore in the world, preferring areas with broken and diverse upland habitats, including croplands, farm lands, pastures, and hardwood stands.

The literature derived body weights for the red fox range from 4.128 kg to 5.253 kg, with an average of 4.711 kg. Males generally outweigh females by 1 kg. The listed food ingestion rates range from 0.069 g/g-day (non-breeding adult) to 0.14 g/g-day (adult after whelp), with an average of 0.095 g/g-day (wet-weight). The water ingestion rates ranged from 0.084 g/g-day to 0.086 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.32, which is the percent solids of small mammals (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the food ingestion rate by the percentage of soil that is incidentally ingested (approximately 2.8%). The home range for the red fox varies considerably with larger home ranges in rural areas than in urban areas.

Listed home ranges for the red fox range from 237 acres to 1772 acres, with an average of 1307 acres.

Red-tailed Hawk (*Buteo jamaicensis*)

Red-tailed hawks are considered buteo hawks (birds of prey including eagles and osprey). Red-tailed hawks are the most common buteo species in the United States and are considered moderately large and soaring birds of prey. They inhabit open or semi-open areas although breeding populations are largely distributed through wooded and semi-wooded regions. Hawks are the most common daytime avian predators of ground-dwelling vertebrates, in particular, rodents and other small mammals.

Studies of the red-tailed hawk indicate that the adult body weight varies from approximately 1.024 kg to 1.235 kg, with an average of 1.128 kg. Females generally are larger than males and are approximately 20% heavier. The listed food ingestion rates range from 0.102 g/g-day to 0.112 g/g-day, with an average of 0.107 g/g-day (wet-weight) while the water ingestion rates range from 0.055 g/g-day to 0.059 g/g-day, with an average of 0.057 g/g-day. The food and water ingestion rates in kg/day and L/day, respectively, were calculated as shown on Table 8-9. The food ingestion rates were then multiplied by 0.32, which is the percent solids of small mammals (Sample et al., 1997) to convert the ingestion rate from a wet-weight value to a dry-weight value. The incidental soil ingestion rate was calculated by multiplying the food ingestion rate by the percentage of soil that is incidentally ingested (approximately 2.8%).

The home range for the red-tailed hawk ranges from 408 to 1772 acres, with an average of 1021 acres.

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TABLE J.3-1

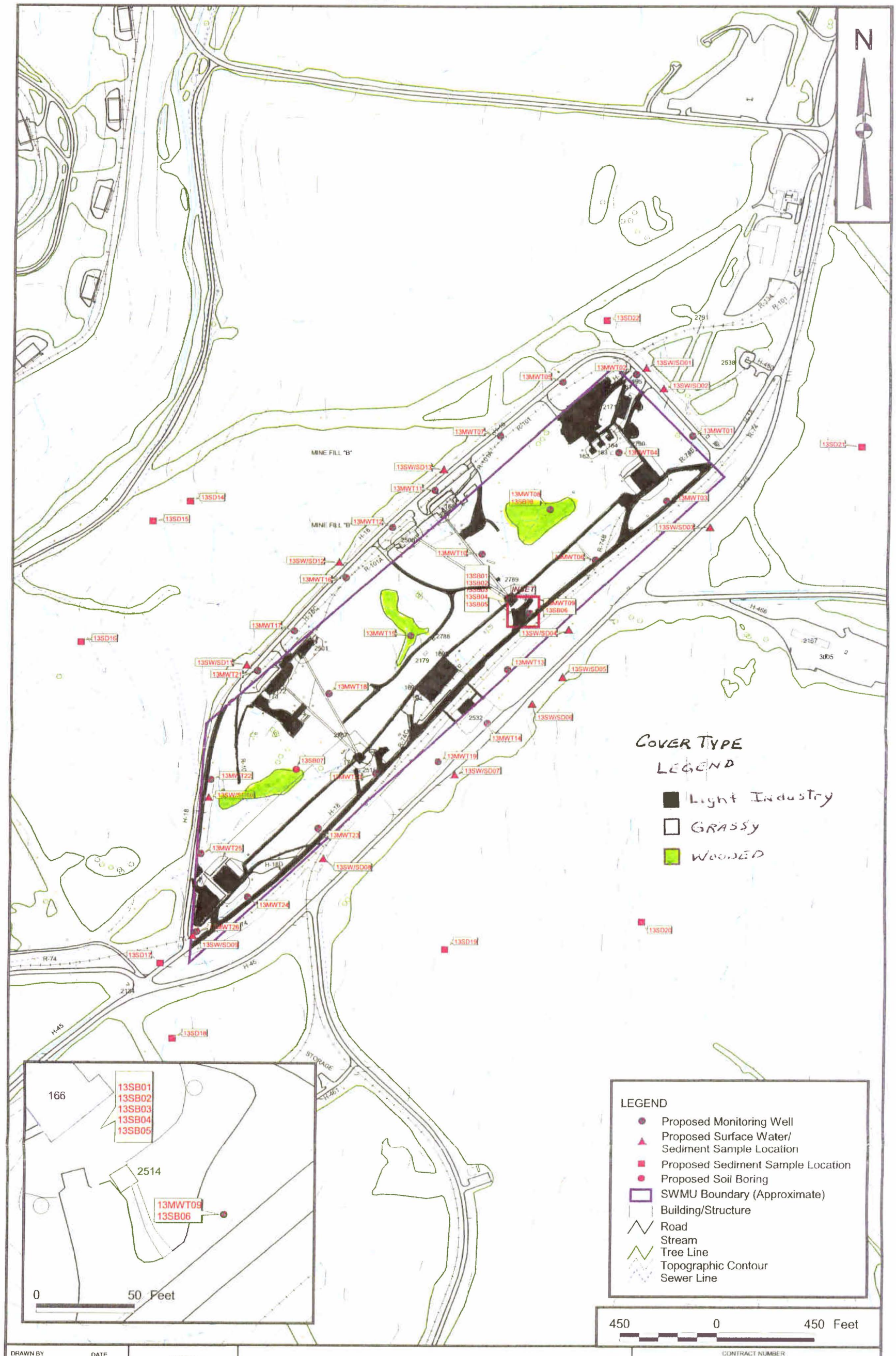
CALCULATION OF EXPOSURE PARAMETERS FOR SURROGATE WILDLIFE RECEPTORS
NSWC CRANE
CRANE, INDIANA

Exposure Parameters	Meadow Vole		Short-Tailed Shrew		American Woodcock	Bobwhite Quail		Red-tailed Hawk	Red Fox
Body Weights (g)	32.9		17.61	16.87	168	180	181	1028	4213
	39.1		17.33	15.58	209	168	183	1224	5253
	35.5		19.21	15.7	166	162	179	1024	5250
	39		17.4	15.25	212	175	175	1235	4128
					169	178	183.2		
					213	179	185.5		
						180	173		
						162.8	180.4		
Minimum	***32.9***		***15.25***		***166***	***162***		***1024***	***4128***
Maximum	***39.1***		***19.21***		***213***	***186***		***1235***	***5253***
Average	***36.6***		***16.87***		***190***	***177***		***1128***	***4711***
Food Ingestion Rate (g/g-day) [1]	0.3		0.49	0.77	1.0	0.067	0.079	0.112	0.075
	0.35		0.62	0.55	0.77	0.072	0.093	0.102	0.14
			0.43	0.96	0.73	0.09	0.089		0.069
			0.52	0.54					
Minimum	***0.3***		***0.43***		***0.73***	***0.067***		***0.102***	***0.069***
Maximum	***0.35***		***0.96***		***1.0***	***0.093***		***0.112***	***0.14***
Average	***0.325***		***0.61***		***0.8***	***0.082***		***0.107***	***0.095***
Food Ingestion Rate (kg/day)									
Conservative	***1.28E-02***		***1.62E-02***		***1.90E-01***	***1.64E-02***		***1.26E-01***	***6.60E-01***
Average	***1.19E-02***		***1.03E-02***		***1.58E-01***	***1.44E-02***		***1.21E-01***	***4.46E-01***
Water Ingestion Rate (g/g-day) [1]	0.14	0.21	0.223		0.1	0.115	0.1	0.055	0.084
					0.1	0.106	0.131	0.059	0.086
						0.093	0.101		
						0.086	0.102		
						0.11	0.1		
Minimum	***0.14***		***0.223***		***0.1***	***0.086***		***0.055***	***0.084***
Maximum	***0.21***		***0.223***		***0.1***	***0.131***		***0.059***	***0.086***
Average	***0.175***		***0.223***		***0.1***	***0.104***		***0.057***	***0.085***
Water Ingestion Rate (L/day)									
Conservative	***7.69E-03***		***4.28E-03***		***1.90E-02***	***2.31E-02***		***6.65E-02***	***4.05E-01***
Average	***6.41E-03***		***3.76E-03***		***1.90E-02***	***1.84E-02***		***6.43E-02***	***4.00E-01***
Home Range (Ha)	0.43	0.097	0.3925		4.5	7.6		377	512
	0.019	0.041			32.4	16.7		697	717
	0.013	0.033			3.1	6.4		165	96
	0.012	0.013			73.6	15.6			620
	0.043	0.057			10.5				699
	0.023	0.032							
	0.051	0.078							
	0.058	0.061							
Minimum (acres)	***0.0297***		***0.97***		***7.7***	***16***		***408***	***237***
Maximum (acres)	***1.06***		***0.97***		***182***	***41***		***1722***	***1772***
Average (acres)	***0.16***		***0.97***		***61***	***29***		***1021***	***1307***

Notes:
Source of data is U.S. EPA (1993).

Footnotes:
(1) - Ingestion Rates (kg/day or L/day) (if more than 1 ingestion rate is available)
- Conservative value = Max Ingestion Rate (g/g-day) * Avg. Body Weight
- Average value = Avg. Ingestion Rate (g/g-day) * Avg. Body Weight
Ingestion Rates (L/day) (if only 1 ingestion rate is available)
- Conservative value = Ingestion Rate (g/g-day) * Max. Body Weight
- Average value = Ingestion Rate (g/g-day) * Avg. Body Weight

P:\GIS\NSWC_CRANE\APR\MINEFILL_B.APR PROPOSED SAMPLE LOCATIONS 7/24/02 JAL



DRAWN BY: J. LAMEY	DATE: 8/21/01	PROPOSED SAMPLE LOCATIONS MINE FILL B (SWMU 13/14) NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	CONTRACT NUMBER: —
CHECKED BY: —	DATE: —		APPROVED BY: — DATE: —
COST/SCHEDULE AREA: —			APPROVED BY: — DATE: —
SCALE: AS NOTED			DRAWING NO: FIGURE 3-2 REV: 0

APPENDIX J.4

TOXICITY REFERENCE VALUES

TABLE J.4-1
EXPOSURE PARAMETERS FOR TEST SPECIES AND SURROGATE WILDLIFE SPECIES
NAVAL SURFACE WARFARE CENTER, CRANE, INDIANA

Species	Body Weight (kg)			Food Ingestion Rate (kg/day)		Water Ingestion Rate (L/day)		Soil Ingestion Rate (kg/day)		Home Range (acres)		
	Avg.	Min.	Max.	Avg.	Conserv.	Avg.	Conserv.	Avg.	Conserv.	Avg.	Min.	Max.
Potential Test Species[1]												
Rat[2]	0.35	NA	NA	NA		NA		NA		NA		
Old field mouse[3]	0.014	NA	NA	NA		NA		NA		NA		
Mouse[2]	0.03	NA	NA	NA		NA		NA		NA		
Rabbit	3.8	NA	NA	NA		NA		NA		NA		
Mink[4]	1	NA	NA	NA		NA		NA		NA		
Rhesus monkey[4]	5	NA	NA	NA		NA		NA		NA		
Beagle[2]	10	NA	NA	NA		NA		NA		NA		
Surrogate Wildlife Species[5]												
Short-Tailed Shrew	0.01687	0.01525	0.01921	0.0103	0.0162	0.0038	0.0043	0.0002142	0.000337	0.97	0.97	0.97
Meadow Vole	0.03663	0.0329	0.0391	0.0119	0.0128	0.0064	0.0077	0.00008568	0.00009216	0.16	0.03	1.06
Fox	4.711	4.128	5.253	0.446	0.66	0.4	0.405	0.004	0.00591	1307	237	1772

Notes:
See Table 8-9 for the exposure factors.
NA - Not Applicable
1 - Only one value was provided so it was placed in the average column and some generic body weights may have been replaced by study-specific body weights.
2 - U.S. EPA, 1998
3 - Silva and Downing, 1996
4 - U.S. EPA 1993
5 - Source is U.S. EPA, 1993 for all factors except soil ingestion; Beyer (1993) or Talmage and Walton (in press) for soil ingestion rates.

TABLE J.4-2
DERIVATION OF MAMMAL TRVS BASED ON MAXIMUM BODY WEIGHTS
NSWC CRANE
CRANE, INDIANA

Parameter	Mammals				Short-tailed Shrew		Meadow Vole		Red Fox	
	NOAEL	LOAEL	Test Species	Body Weight (kg)	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBs (mg/kg)										
Aroclor-1248	0.01	0.1	Rhesus monkey	5	2.60	26.03	1.28	12.8	9.5E-03	9.5E-02
DIOXINS AND FURANS (mg/kg)										
TEQ Mammal	1.0E-06	1.0E-05	rat	0.35	1.8E-05	1.8E-04	9.0E-06	9.0E-05	6.7E-08	6.7E-07
EXPLOSIVES (mg/kg)										
1,3,5-Trinitrobenzene	2.64	13.31	rat	0.35	48.1	242.5	23.6	119.1	1.8E-01	8.9E-01
2,4,6-Trinitrotoluene	1.6	16	rat	0.35	29.15	291.5	14.3	143.2	1.1E-01	1.1E+00
2-Amino-4,6-dinitrotoluene	NV	NV	NA	NA	NV	NV	NV	NV	NV	NV
2-Nitrotoluene	20	200	rat	0.35	364.4	3644	179.0	1790.3	1.3E+00	1.3E+01
4-Amino-2,6-dinitrotoluene	NV	NV	NA	NA	NV	NV	NV	NV	NV	NV
HMX	3	7.5	mouse	0.03	4.7	11.7	2.3	5.8	1.7E-02	4.3E-02
RDX	7	35	mouse	0.03	10.9	54.7	5.4	26.9	4.0E-02	2.0E-01
INORGANICS (mg/kg)										
Arsenic	0.126	1.26	mouse	0.03	0.20	2.0	0.10	1.0	7.2E-04	7.2E-03
Cadmium	1	10	rat	0.303	15.77	157.7	7.7	77.5	5.8E-02	5.8E-01
Chromium	3.28	13.14	rat	0.35	59.8	239.4	29.4	117.6	2.2E-01	8.8E-01
Lead	8	80	rat	0.35	145.8	1458	71.6	716.1	5.3E-01	5.3E+00
Mercury	0.015	0.025	mink	1	0.8	1.3	0.4	0.6	2.9E-03	4.8E-03
Selenium	0.2	0.33	rat	0.35	3.6	6.0	1.8	3.0	1.3E-02	2.2E-02

Acronyms:
NA = Not Applicable or Not Available
NV = No value available
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

Maximum Body Weights (kg)
Shrew: 0.01921
Vole: 0.0391
Fox: 5.253

Derivation NOAEL/LOAEL Equation:
Derived NOAEL = NOAEL*(test species body weight/surrogate species maximum body weight
Derived LOAEL = LOAEL*(test species body weight/surrogate species maximum body weight)

TABLE J.4-3

DERIVATION OF MAMMAL TRVS BASED ON AVERAGE BODY WEIGHTS
NSWC CRANE
CRANE, INDIANA

Parameter	Mammals				Short-tailed Shrew		Meadow Vole		Fox	
	NOAEL	LOAEL	Test Species	Body Weight (kg)	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
PESTICIDES/PCBs (mg/kg)										
Aroclor-1248	0.01	0.1	Rhesus monkey	5	2.96	29.64	1.37	13.7	0.01	0.11
DIOXINS AND FURANS (mg/kg)										
TEQ Mammal	0.000001	0.00001	rat	0.35	2.1E-05	2.1E-04	9.56E-06	9.6E-05	7.4E-08	7.4E-07
EXPLOSIVES (mg/kg)										
1,3,5-Trinitrobenzene	2.64	13.44	rat	0.35	54.8	278.8	25.2	128.4	0.2	1.0
2,4,6-Trinitrotoluene	1.6	16	rat	0.35	33.2	332.0	15.3	152.9	0.1	1.2
2-Amino-4,6-dinitrotoluene	NV	NV	NA	NA	NV	NV	NV	NV	NV	NV
2-Nitrotoluene	20	200	rat	0.35	414.9	4149	191.1	1911	1.5	15
4-Amino-2,6-dinitrotoluene	NV	NV	NA	NA	NV	NV	NV	NV	NV	NV
HMX	3	7.5	mouse	0.03	5.3	13.3	2.5	6.1	0.0	0.0
RDX	7	35	mouse	0.03	12.4	62.2	5.7	28.7	0.0	0.2
INORGANICS (mg/kg)										
Arsenic	0.126	1.26	mouse	0.03	0.22	2.2	0.10	1.0	0.00	0.0
Cadmium	1	10	rat	0.303	18.0	179.6	8.3	82.7	0.1	0.6
Chromium	3.28	13.14	rat	0.35	68.0	272.6	31.3	125.6	0.2	1.0
Lead	8	80	rat	0.35	166.0	1660	76.4	764	0.6	6
Mercury	0.015	0.025	mink	1	0.89	1.48	0.41	0.68	0.00	0.01
Selenium	0.2	0.33	rat	0.35	4.15	6.85	1.91	3.15	0.01	0.02

Acronyms:
NA = Not Applicable or Not Available
NV = No value available
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level

Average Body Weights (kg)
Shrew: 0.01687
Vole: 0.03663
Fox: 4.711

Derivation NOAEL/LOAEL Equation:
Derived NOAEL = NOAEL*(test species body weight/surrogate species average body weight)
Derived LOAEL = LOAEL*(test species body weight/surrogate species average body weight)

TABLE J.4-4

NOAELS AND LOAELS FOR BIRDS
NAVAL SURFACE WARFARE CENTER CRANE, INDIANA

Parameter	NOAEL[1] (mg/kg-day)	LOAEL[1] (mg/kg-day)
PCBs		
Aroclor-1248	NV	NV
DIOXINS AND FURANS		
TEQ Bird	0.000014	0.00014
EXPLOSIVES		
1,3,5-Trinitrobenzene	NV	NV
2,4,6-Trinitrotoluene	NV	NV
2-Amino-4,6-dinitrotoluene	NV	NV
2-Nitrotoluene	NV	NV
4-Amino-2,6-dinitrotoluene	NV	NV
HMX	NV	NV
RDX	NV	NV
INORGANICS		
Arsenic	2.46	7.38
Cadmium	1.45	20
Chromium	1	5
Lead	1.13	11.3
Mercury	0.0064	0.064
Selenium	0.4	0.8

Footnotes:
1 - The sources of these NOAELS and LOAELS are presented in the table J.4-5.
The NOAELS and LOAELS in the source table were divided by 10 if a subchronic study was the basis for the value.
Also, if only a NOAEL was available, the value was multiplied by 10 to estimate the LOAEL and if only a LOAEL was available, the value was divided by 10 to estimate the NOAEL.

Acronyms:
NOAEL = No Observed Adverse Effect Level
LOAEL = Lowest Observed Adverse Effect Level
PCB = Polychlorinated Biphenyl
NV = No value available

TABLE J.4-5

SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE
NSWC CRANE
CRANE, INDIANA

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
PCBs							
Aroclor-1248	0.1	LOAEL	reproductive	chronic	rhesus monkey	Barsotti et al., 1976	Sample et.al., 1996
Dioxins/Furans							
2,3,7,8-TCDD	0.000014	NOAEL	reproduction	chronic	pheasant	Nosek et al., 1992	Sample et.al., 1996
2,3,7,8-TCDD	0.00014	LOAEL	reproduction	chronic	pheasant	Nosek et al., 1992	Sample et.al., 1996
Explosives							
HMX	30	NOAEL	mortality	subchronic	mouse	Everett and Maddock, 1985	Talmage et al., 1999
HMX	75	LOAEL	mortality	subchronic	mouse	Everett and Maddock, 1985	Talmage et al., 1999
RDX	7	NOAEL	reproduction	chronic	mouse	Lish et al., 1984	Talmage et al., 1999
RDX	35	LOAEL	reproduction	chronic	mouse	Lish et al., 1984	Talmage et al., 1999
1,3,5-Trinitrobenzene	2.64	NOAEL	systemic	chronic	rat	Reddy et al, 1996	IRIS, 2001
1,3,5-Trinitrobenzene	13.31	LOAEL	systemic	chronic	rat	Reddy et al, 1996	IRIS, 2001
2,4,6-Trinitrotoluene	160	LOAEL	reproductive	subchronic	rat	Dilley et al., 1982	Talmage et al., 1999
Inorganics							
Arsenic	1.261	LOAEL	reproductive	chronic	mouse	Schroeder and Mitchner, 1971	Sample et.al., 1996
Arsenic	2.46	NOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Arsenic	7.38	LOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Cadmium	1	NOAEL	reproductive	chronic	rat	Sutou et al., 1980b	Sample et.al., 1996
Cadmium	10	LOAEL	reproductive	chronic	rat	Sutou et al., 1980b	Sample et.al., 1996
Cadmium	1.45	NOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Cadmium	20	LOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Chromium(III)	1	NOAEL	reproductive	chronic	black duck	Haseltine et al., unpubl.	Sample et.al., 1996
Chromium(III)	5	LOAEL	reproductive	chronic	black duck	Haseltine et al., unpubl.	Sample et.al., 1996
Chromium(VI)	3.28	NOAEL	BW/food cons.	chronic	rat	Mackenzie, 1958	Sample et.al., 1996
Chromium(VI)	131.4	LOAEL	mortality	subchronic	rat	Steven et al., 1976	Sample et.al., 1996
Lead	8	NOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	80	LOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	1.13	NOAEL	reproductive	chronic	Japanese quail	Edens et al., 1982	Sample et.al., 1996
Lead	11.3	LOAEL	reproductive	chronic	Japanese quail	Edens et al., 1982	Sample et.al., 1996
Mercury	0.064	LOAEL	reproductive	chronic	mallard duck	Heinze, 1979	Sample et.al., 1996
Mercury	0.032	NOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Mercury	0.16	LOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Selenium	0.5	NOAEL	reproductive	chronic	mallard duck	Heinz, et al., 1987	Sample et.al., 1996
Selenium	1	LOAEL	reproductive	chronic	mallard duck	Heinz, et al., 1987	Sample et.al., 1996
Selenium	0.2	NOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996
Selenium	0.33	LOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996

NOAEL = No Observed Adverse Effect Level

LOAEL = Lowest Observed Adverse Effect Level

APPENDIX J.5

FOOD-CHAIN MODEL CALCULATIONS

RED FOX
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
MAXIMUM CONCENTRATIONS, AVERAGE BAF, AND AVERAGE EXPOSURE PARAMETERS
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Biotransfer Factor (soil to inv)[1]	Biotransfer Factor (diet to mammal)	Mammal Conc.[2] (mg/kg)	Dose (mg/kg/d) from:			Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	NOAEL EEQ	LOAEL EEQ
						Soil	Surface Water	Mammal					
Dioxins/Furans													
TEQ Mammal	1.49E-05	0.00E+00	1.07E+00	NA	1.59E-05	1.26E-08	0.00E+00	4.82E-07	4.94E-07	6.66E-08	6.66E-07	7.42E+00	7.42E-01
EXPLOSIVES													
1,3,5-Trinitrobenzene	1.70E+00	0.00E+00	1.00E+00	1.00E+00	1.70E+00	1.44E-03	0.00E+00	5.15E-02	5.29E-02	1.76E-01	8.87E-01	3.01E-01	5.97E-02
2,4,6-Trinitrotoluene	5.70E+01	0.00E+00	1.00E+00	1.00E+00	5.70E+01	4.84E-02	0.00E+00	1.73E+00	1.78E+00	1.07E-01	1.07E+00	1.67E+01	1.67E+00
2-Amino-4,6-dinitrotoluene	1.50E+02	0.00E+00	1.00E+00	1.00E+00	1.50E+02	1.27E-01	0.00E+00	4.54E+00	4.67E+00	NV	NV	NA	NA
2-Nitrotoluene	4.30E-01	0.00E+00	1.00E+00	1.00E+00	4.30E-01	3.65E-04	0.00E+00	1.30E-02	1.34E-02	1.33E+00	1.33E+01	1.00E-02	1.00E-03
4-Amino-2,6-dinitrotoluene	3.03E+02	0.00E+00	1.00E+00	1.00E+00	3.03E+02	2.57E-01	0.00E+00	9.18E+00	9.44E+00	NV	NV	NA	NA
HMX	5.39E+03	3.20E-03	1.00E+00	1.00E+00	5.39E+03	4.57E+00	2.72E-04	1.63E+02	1.68E+02	1.71E-02	4.28E-02	9.80E+03	3.92E+03
RDX	2.90E+01	9.90E-03	1.00E+00	1.00E+00	2.90E+01	2.46E-02	8.41E-04	8.79E-01	9.04E-01	4.00E-02	2.00E-01	2.26E+01	4.52E+00
PCBs													
Aroclor-1248	1.60E+02	0.00E+00	1.30E+01	NA	2.08E+03	1.36E-01	0.00E+00	6.30E+01	6.31E+01	9.52E-03	9.52E-02	6.63E+03	6.63E+02
METALS													
Arsenic	3.05E+01	0.00E+00	2.50E-03	NA	7.63E-02	2.59E-02	0.00E+00	2.31E-03	2.82E-02	7.20E-04	7.20E-03	3.92E+01	3.92E+00
Cadmium	1.70E+00	0.00E+00	1.26E-01	NA	2.14E-01	1.44E-03	0.00E+00	6.48E-03	7.92E-03	5.77E-02	5.77E-01	1.37E-01	1.37E-02
Chromium	9.58E+01	6.00E-04	8.46E-02	NA	8.10E+00	8.13E-02	5.10E-05	2.46E-01	3.27E-01	2.19E-01	8.75E-01	1.50E+00	3.73E-01
Lead	6.90E+01	0.00E+00	1.05E-01	NA	7.27E+00	5.85E-02	0.00E+00	2.20E-01	2.79E-01	5.33E-01	5.33E+00	5.23E-01	5.23E-02
Mercury	3.60E+00	0.00E+00	5.43E-02	NA	1.95E-01	3.05E-03	0.00E+00	5.92E-03	8.98E-03	2.86E-03	4.76E-03	3.14E+00	1.89E+00
Selenium	1.24E+01	0.00E+00	1.62E-01	NA	2.01E+00	1.05E-02	0.00E+00	6.08E-02	7.13E-02	1.33E-02	2.20E-02	5.35E+00	3.24E+00

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	4.711E+00	kg
Food Ingestion Rate = (If)	1.427E-01	kg/day
Water Ingestion Rate = (Iw)	4.004E-01	L/day
Soil Ingestion Rate = (Is)	3.996E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose (soil) = (Cs * Is)(H)/BW
Dose (mammal) = (Cm * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Total Dose = Dose (soil) + Dose (mammal) + Dose (water)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

Footnotes:
(1)Value is the biotransfer factor for soil to inverbrates (explosives only) and biotransfer factor for soil to mammals (dioxins, Aroclor-1248 and metals).
(2)Mammal concentration (dioxins, PCBs, and metals) = Cs*soil to mammal biotransfer factor
Mammal concentration (explosives) = Cs*soil to invertebrate * soil to mammal biotransfer factors

RED FOX - BACKGROUND VALUES
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
MAXIMUM CONCENTRATIONS, AVERAGE BAF, AND AVERAGE EXPOSURE PARAMETERS
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Biotransfer Factor (soil to inv)[1]	Biotransfer Factor (diet to mammal)	Mammal Conc.[2] (mg/kg)	Dose (mg/kg/d) from:			Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	NOAEL EEQ	LOAEL EEQ
						Soil	Surface Water	Mammal					
METALS													
Arsenic	1.02E+01	0.00E+00	2.50E-03	NA	2.55E-02	8.65E-03	0.00E+00	7.73E-04	9.42E-03	7.20E-04	7.20E-03	1.31E+01	1.31E+00
Cadmium	3.60E+00	0.00E+00	1.26E-01	NA	4.53E-01	3.05E-03	0.00E+00	1.37E-02	1.68E-02	5.77E-02	5.77E-01	2.91E-01	2.91E-02
Chromium	2.17E+01	6.00E-04	8.46E-02	NA	1.84E+00	1.84E-02	5.10E-05	5.56E-02	7.41E-02	2.19E-01	8.75E-01	3.39E-01	8.46E-02
Lead	2.15E+01	0.00E+00	1.05E-01	NA	2.27E+00	1.82E-02	0.00E+00	6.87E-02	8.69E-02	5.33E-01	5.33E+00	1.63E-01	1.63E-02
Mercury	7.00E-02	0.00E+00	5.43E-02	NA	3.80E-03	5.94E-05	0.00E+00	1.15E-04	1.75E-04	2.86E-03	4.76E-03	6.11E-02	3.67E-02
Selenium	6.40E-01	0.00E+00	1.62E-01	NA	1.04E-01	5.43E-04	0.00E+00	3.14E-03	3.68E-03	1.33E-02	2.20E-02	2.76E-01	1.67E-01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	4.711E+00	kg
Food Ingestion Rate = (If)	1.427E-01	kg/day
Water Ingestion Rate = (Iw)	4.004E-01	L/day
Soil Ingestion Rate = (Is)	3.996E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose (soil) = (Cs * Is)(H)/BW
Dose (mammal) = (Cm * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Total Dose = Dose (soil) + Dose (mammal) + Dose (water)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)

Footnotes:
(1)Value is the biotransfer factor for soil to inverbrates (explosives only) and biotransfer factor for soil to mammals (dioxins, Aroclor-1248 and metals).
(2)Mammal concentration (dioxins, PCBs, and metals) = Cs*soil to mammal biotransfer factor
Mammal concentration (explosives) = Cs*soil to invertebrate * soil to mammal biotransfer factors

RED FOX - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Chemical	Max Soil Conc. (mg/kg)	Max SW Conc. (mg/L)	Biotransfer Factor (soil to inv)[1]	Biotransfer Factor (diet to mammal)	Mammal Conc.[2] (mg/kg)	Dose (mg/kg/d) from:			Total Dose (mg/kg/d)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	NOAEL EEQ	LOAEL EEQ
						Soil	Surface Water	Mammal					
Dioxins/Furans													
TEQ Mammal	1.49E-05	0.00E+00	2.20E+00	NA	3.28E-05	2.13E-08	0.00E+00	1.68E-06	1.70E-06	6.66E-08	6.66E-07	2.55E+01	2.55E+00
EXPLOSIVES													
1,3,5-Trinitrobenzene	1.70E+00	0.00E+00	1.00E+00	1.00E+00	1.70E+00	2.43E-03	0.00E+00	8.69E-02	8.93E-02	1.76E-01	8.87E-01	5.08E-01	1.01E-01
2,4,6-Trinitrotoluene	5.70E+01	0.00E+00	1.00E+00	1.00E+00	5.70E+01	8.16E-02	0.00E+00	2.91E+00	3.00E+00	1.07E-01	1.07E+00	2.81E+01	2.81E+00
2-Amino-4,6-dinitrotoluene	1.50E+02	0.00E+00	1.00E+00	1.00E+00	1.50E+02	2.15E-01	0.00E+00	7.67E+00	7.88E+00	NV	NV	NA	NA
2-Nitrotoluene	4.30E-01	0.00E+00	1.00E+00	1.00E+00	4.30E-01	6.16E-04	0.00E+00	2.20E-02	2.26E-02	1.33E+00	1.33E+01	1.70E-02	1.70E-03
4-Amino-2,6-dinitrotoluene	3.03E+02	0.00E+00	1.00E+00	1.00E+00	3.03E+02	4.34E-01	0.00E+00	1.55E+01	1.59E+01	NV	NV	NA	NA
HMX	5.39E+03	3.20E-03	1.00E+00	1.00E+00	5.39E+03	7.72E+00	3.14E-04	2.76E+02	2.83E+02	1.71E-02	4.28E-02	1.65E+04	6.61E+03
RDX	2.90E+01	9.90E-03	1.00E+00	1.00E+00	2.90E+01	4.15E-02	9.72E-04	1.48E+00	1.53E+00	4.00E-02	2.00E-01	3.81E+01	7.63E+00
PCBs													
Aroclor-1248	1.60E+02	0.00E+00	1.30E+01	NA	2.08E+03	2.29E-01	0.00E+00	1.06E+02	1.07E+02	9.52E-03	9.52E-02	1.12E+04	1.12E+03
METALS													
Arsenic	3.05E+01	0.00E+00	1.49E-02	NA	4.54E-01	4.37E-02	0.00E+00	2.32E-02	6.69E-02	7.20E-04	7.20E-03	9.30E+01	9.30E+00
Cadmium	1.70E+00	0.00E+00	4.48E-01	NA	7.62E-01	2.43E-03	0.00E+00	3.89E-02	4.14E-02	5.77E-02	5.77E-01	7.17E-01	7.17E-02
Chromium	9.58E+01	6.00E-04	3.33E-01	NA	3.19E+01	1.37E-01	5.89E-05	1.63E+00	1.77E+00	2.19E-01	8.75E-01	8.10E+00	2.02E+00
Lead	6.90E+01	0.00E+00	2.86E-01	NA	1.98E+01	9.88E-02	0.00E+00	1.01E+00	1.11E+00	5.33E-01	5.33E+00	2.08E+00	2.08E-01
Mercury	3.60E+00	0.00E+00	1.92E-01	NA	6.91E-01	5.15E-03	0.00E+00	3.53E-02	4.05E-02	2.86E-03	4.76E-03	1.42E+01	8.51E+00
Selenium	1.24E+01	0.00E+00	1.19E+00	NA	1.47E+01	1.78E-02	0.00E+00	7.52E-01	7.70E-01	1.33E-02	2.20E-02	5.78E+01	3.50E+01

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	4.128E+00	kg
Food Ingestion Rate = (If)	2.110E-01	kg/day
Water Ingestion Rate = (Iw)	4.051E-01	L/day
Soil Ingestion Rate = (Is)	5.909E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (soil) = (Cs * Is)(H)/BW
Dose (mammal) = (Cm * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Total Dose = Dose (soil) + Dose (mammal) + Dose (water)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NA = Not Available or Not Applicable
NV = No Value Available

Footnotes:
(1)Value is the biotransfer factor for soil to inverbrates (explosives only) and biotransfer factor for soil to mammals (dioxins, Aroclor-1248 and metals).
(2)Mammal concentration (dioxins, PCBs, and metals) = Cs*soil to mammal biotransfer factor
Mammal concentration (explosives) = Cs*soil to invertebrate * soil to mammal biotransfer factors

SWMU 13 - MINE FILL B
BUILDING 174
TERRESTRIAL WILDLIFE MODEL-AVERAGE CONCENTRATIONS, AVERAGE BAF, AND AVERAGE EXPOSURE PARAMETERS
NSWC CRANE, INDIANA

	Meadow Vole		Short-Tailed Shrew		American Woodcock		Bobwhite Quail		Red-tailed Hawk		Red Fox	
Parameter	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ	NOAEL EEQ	LOAEL EEQ
EXPLOSIVES												
HMX	2.4E-04	9.7E-05	1.5E-04	6.2E-05	NA	NA	NA	NA	NA	NA	1.59E-02	6.35E-03
RDX	3.2E-04	6.4E-05	2.0E-04	4.1E-05	4.5E-04	3.8E-04	4.6E-04	3.9E-04	2.5E-04	2.1E-04	2.10E-02	4.21E-03
METALS												
Arsenic	3.1E-01	3.1E-02	8.7E-01	8.7E-02	7.8E-02	2.6E-02	5.9E-03	2.0E-03	2.1E-03	7.0E-04	6.38E+00	6.38E-01
Cadmium	1.0E-03	1.0E-04	6.3E-03	6.3E-04	9.3E-02	6.7E-03	1.5E-03	1.1E-04	4.7E-04	3.4E-05	1.05E-02	1.05E-03
Chromium	2.4E-03	6.1E-04	8.1E-03	2.0E-03	5.6E-01	1.1E-01	3.4E-02	6.8E-03	4.4E-02	8.7E-03	1.77E-01	4.41E-02
Lead	1.5E-03	1.5E-04	4.6E-03	4.6E-04	6.8E-01	6.8E-02	4.5E-02	4.5E-03	7.0E-02	7.0E-03	1.32E-01	1.32E-02
Mercury	6.9E-03	4.1E-03	9.1E-03	5.5E-03	1.5E+00	1.5E-01	1.1E-01	1.1E-02	1.8E-02	1.8E-03	3.49E-02	2.10E-02
Selenium	9.0E-03	5.4E-03	7.1E-03	4.3E-03	8.3E-02	4.2E-02	1.1E-02	5.5E-03	3.9E-03	1.9E-03	1.02E-01	6.20E-02

Notes:
- Cells are shaded if the EEQ is greater than 1.0
NA - Not applicable
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Concentration
LOAEL - Lowest Observed Adverse Effects Concentration

RED-TAILED HAWK - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL - AVERAGE CONCENTRATIONS, AVERAGE BAF, AVERAGE EXPOSURE PARAMETERS, AND AREA USE FACTORS
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Chemical	Average Soil Conc. (mg/kg)	Average SW Conc. (mg/L)	Biotransfer Factor (soil to inv)[1]	Biotransfer Factor (diet to mammal)	Mammal Conc.[2] (mg/kg)	Dose (mg/kg/d) from:			Total Dose (mg/kg/d)	Dose (AUF = 1%) (mg/kg/day)	NOAEL (mg/kg/d)	LOAEL (mg/kg/d)	NOAEL EEQ	LOAEL EEQ
						Soil	Surface Water	Mammal						
Dioxins/Furans														
TEQ Bird	7.10E-06	0.00E+00	1.07E+00	NA	7.57E-06	6.81E-09	0.00E+00	2.59E-07	2.66E-07	7.17E-10	1.40E-05	1.40E-04	5.1E-05	5.1E-06
EXPLOSIVES														
1,3,5-Trinitrobenzene	4.22E-01	0.00E+00	1.00E+00	1.00E+00	4.22E-01	4.05E-04	0.00E+00	1.45E-02	1.49E-02	1.46E-04	NV	NV	NA	NA
2,4,6-Trinitrotoluene	1.26E+00	0.00E+00	1.00E+00	1.00E+00	1.26E+00	1.21E-03	0.00E+00	4.31E-02	4.43E-02	4.34E-04	7.00E+00	1.78E+02	6.2E-05	2.4E-06
2-Amino-4,6-dinitrotoluene	8.13E-01	0.00E+00	1.00E+00	1.00E+00	8.13E-01	7.80E-04	0.00E+00	2.78E-02	2.86E-02	2.80E-04	NV	NV	NA	NA
2-Nitrotoluene	4.19E-01	0.00E+00	1.00E+00	1.00E+00	4.19E-01	4.02E-04	0.00E+00	1.44E-02	1.48E-02	1.45E-04	NV	NV	NA	NA
4-Amino-2,6-dinitrotoluene	1.25E+00	0.00E+00	1.00E+00	1.00E+00	1.25E+00	1.20E-03	0.00E+00	4.29E-02	4.42E-02	4.33E-04	NV	NV	NA	NA
HMX	2.80E+00	2.01E-03	1.00E+00	1.00E+00	2.80E+00	2.69E-03	1.15E-04	9.59E-02	9.87E-02	9.67E-04	NV	NV	NA	NA
RDX	2.74E+00	5.23E-03	1.00E+00	1.00E+00	2.74E+00	2.63E-03	2.98E-04	9.38E-02	9.67E-02	9.48E-04	2.23E+00	2.63E+00	4.3E-04	3.6E-04
PCBs														
Aroclor-1248	1.69E+01	0.00E+00	1.30E+01	NA	2.20E+02	1.62E-02	0.00E+00	7.52E+00	7.54E+00	2.03E-02	1.80E-01	1.80E+00	1.1E-01	1.1E-02
METALS														
Arsenic	9.05E+00	0.00E+00	2.50E-03	NA	2.26E-02	8.67E-03	0.00E+00	7.75E-04	9.45E-03	9.26E-05	2.46E+00	7.38E+00	3.8E-05	1.3E-05
Cadmium	4.67E-01	0.00E+00	1.26E-01	NA	5.87E-02	4.48E-04	0.00E+00	2.01E-03	2.46E-03	2.41E-05	1.45E+00	2.00E+01	1.7E-05	1.2E-06
Chromium	1.81E+01	3.75E-04	8.46E-02	NA	1.53E+00	1.74E-02	2.14E-05	5.25E-02	7.00E-02	6.86E-04	1.00E+00	5.00E+00	6.9E-04	1.4E-04
Lead	1.95E+01	0.00E+00	1.05E-01	NA	2.06E+00	1.87E-02	0.00E+00	7.06E-02	8.93E-02	8.75E-04	1.13E+00	1.13E+01	7.7E-04	7.7E-05
Mercury	1.34E-01	0.00E+00	5.43E-02	NA	7.28E-03	1.29E-04	0.00E+00	2.49E-04	3.78E-04	3.70E-06	6.40E-03	6.40E-02	5.8E-04	5.8E-05
Selenium	1.72E+00	0.00E+00	1.62E-01	NA	2.79E-01	1.65E-03	0.00E+00	9.56E-03	1.12E-02	1.10E-04	4.00E-01	8.00E-01	2.7E-04	1.4E-04

Cells are shaded if the value is greater than 1.0

Body Weight = (BW)	1.128E+00	kg
Food Ingestion Rate = (If)	3.862E-02	kg/day
Water Ingestion Rate = (Iw	6.430E-02	L/day
Soil Ingestion Rate = (Is)	1.081E-03	kg/day
Home Range = (HR)	1.021E+03	
Contaminated Area = (CA)	10	
H=HR/CA	0.0098	(used for explosives and metals)
H=HR/CA	0.0027	(used 2.75 acres for PCB and dioxin area)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

Dose (soil) = (Cs * Is)(H)/BW
Dose (mammal) = (Cm * If)(H)/BW
Dose (water) = (Cw * Iw)(H)/BW
Total Dose = Dose (soil) + Dose (mammal) + Dose (water)
- Dose was adjusted using an H of 0.0098 for explosives and metals and 0.0027 for PCBs and dioxins (see above).

Footnotes:
(1)Value is the biotransfer factor for soil to inverbrates (explosives only) and biotransfer factor for soil to mammals (dioxins, Aroclor-1248 and metals).
(2)Mammal concentration (dioxins, PCBs, and metals) = Cs*soil to mammal biotransfer factor
Mammal concentration (explosives) = Cs*soil to invertebrate * soil to mammal biotransfer factors

BELTED KINGFISHER - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - BOGGS CREEK SEDIMENT
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Parameter	Max Sediment Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (sed to inv.)[1]	Fish Concentration (mg/kg)	Dose (mg/kg/day) from:			Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
					Sediment	Surface Water	Fish					
Inorganics												
ARSENIC	1.17E+01	0.00E+00	6.90E-01	8.07E+00	5.38E-02	0.00E+00	1.12E+00	1.18E+00	2.46E+00	7.38E+00	4.79E-01	1.60E-01
CADMIUM	5.10E+00	0.00E+00	7.99E+00	4.07E+01	2.35E-02	0.00E+00	5.68E+00	5.70E+00	1.45E+00	2.00E+01	3.93E+00	2.85E-01
SILVER	1.90E+00	0.00E+00	1.00E+00	1.90E+00	8.74E-03	0.00E+00	2.65E-01	2.73E-01	NV	NV	NA	NA
ZINC	1.75E+02	0.00E+00	7.53E+00	1.32E+03	8.05E-01	0.00E+00	1.84E+02	1.84E+02	1.45E+01	1.31E+02	1.27E+01	1.41E+00

Cells are shaded if the EEQ is greater than 1.0.
1- The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

Body Weight = (BW) 1.360E-01 kg
Food Ingestion Rate = 1.895E-02 kg/day
Water Ingestion Rate 1.870E-02 L/day
Sediment Ingestion R 6.254E-04 kg/day
Home Range = (HR) Assume 100% on site
Contaminated Area = Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant conc. in fish (=sediment concentration * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

BELTED KINGFISHER - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - BOGGS CREEK SEDIMENT
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Parameter	Avg Sediment Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (sed to inv.)[1]	Fish Concentration (mg/kg)	Dose (mg/kg/day) from: Sediment	Surface Water	Fish	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
ARSENIC	8.50E+00	0.00E+00	1.43E-01	1.22E+00	3.18E-02	0.00E+00	1.38E-01	1.70E-01	2.46E+00	7.38E+00	6.89E-02	2.30E-02
CADMIUM	1.40E+00	0.00E+00	6.00E-01	8.40E-01	5.24E-03	0.00E+00	9.52E-02	1.00E-01	1.45E+00	2.00E+01	6.93E-02	5.02E-03
SILVER	4.60E-01	0.00E+00	1.00E+00	4.60E-01	1.72E-03	0.00E+00	5.21E-02	5.38E-02	NV	NV	NA	NA
ZINC	5.71E+01	0.00E+00	1.94E+00	1.11E+02	2.14E-01	0.00E+00	1.25E+01	1.27E+01	1.45E+01	1.31E+02	8.79E-01	9.73E-02

Cells are shaded if the EEQ is greater than 1.0.
1- The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

Body Weight = (BW)	1.520E-01	kg
Food Ingestion Rate	1.723E-02	kg/day
Water Ingestion Rate	1.670E-02	L/day
Sediment Ingestion F	5.684E-04	kg/day
Home Range = (HR)	1.160E+00	km

Contaminated Area = Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant conc. in fish (=sediment concentration * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

BOBWHITE QUAIL - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B (BLDG 165)
NSWC CRANE, INDIANA

Parameter	Average Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
EXPLOSIVES												
1,3,5-Trinitrobenzene	1.30E-01	0.00E+00	7.70E+00	1.00E+00	2.60E-04	0.00E+00	2.44E-02	2.47E-02	NV	NV	NA	NA
2,4,6-Trinitrotoluene	3.40E-01	0.00E+00	1.80E+00	6.12E-01	6.80E-04	0.00E+00	1.49E-02	1.56E-02	7.00E+00	1.78E+02	2.23E-03	8.77E-05
2-Amino-4,6-dinitrotoluene	4.99E+00	0.00E+00	0.00E+00	0.00E+00	9.99E-03	0.00E+00	0.00E+00	9.99E-03	NV	NV	NA	NA
2-Nitrotoluene	1.40E-01	0.00E+00	1.80E+00	2.52E-01	2.80E-04	0.00E+00	6.15E-03	6.43E-03	NV	NV	NA	NA
4-Amino-2,6-dinitrotoluene	2.50E-01	0.00E+00	0.00E+00	0.00E+00	5.00E-04	0.00E+00	0.00E+00	5.00E-04	NV	NV	NA	NA
HMX	1.11E+00	3.20E-03	1.70E+01	1.89E+01	2.22E-03	3.33E-04	4.61E-01	4.63E-01	NV	NV	NA	NA
RDX	5.40E-01	9.90E-03	4.60E-01	2.48E-01	1.08E-03	1.03E-03	6.06E-03	8.17E-03	2.23E+00	2.63E+00	3.66E-03	3.11E-03
METALS												
Arsenic	8.65E+00	0.00E+00	3.75E-02	3.24E-01	1.73E-02	0.00E+00	7.92E-03	2.52E-02	2.46E+00	7.38E+00	1.03E-02	3.42E-03
Cadmium	2.00E-01	0.00E+00	5.86E-01	1.17E-01	4.00E-04	0.00E+00	2.86E-03	3.26E-03	1.45E+00	2.00E+01	2.25E-03	1.63E-04
Chromium	1.89E+01	6.00E-04	4.10E-02	7.75E-01	3.78E-02	6.24E-05	1.89E-02	5.68E-02	1.00E+00	5.00E+00	5.68E-02	1.14E-02
Lead	2.03E+01	0.00E+00	3.89E-02	7.90E-01	4.06E-02	0.00E+00	1.93E-02	5.99E-02	1.13E+00	1.13E+01	5.30E-02	5.30E-03
Mercury	7.30E-02	0.00E+00	6.52E-01	4.76E-02	1.46E-04	0.00E+00	1.16E-03	1.31E-03	6.40E-03	6.40E-02	2.04E-01	2.04E-02
Selenium	8.71E-01	0.00E+00	6.72E-01	5.85E-01	1.74E-03	0.00E+00	1.43E-02	1.60E-02	4.00E-01	8.00E-01	4.01E-02	2.00E-02

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW) 1.770E-01 kg
Food Ingestion Rate = (If) 4.320E-03 kg/day
Water Ingestion Rate = (Iw) 1.840E-02 L/day
Soil Ingestion Rate = (Is) 3.542E-04 kg/day
Home Range = (HR) Assume 100% on site
Contaminated Area = (CA) Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Cv = Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

SHORT-TAILED SHREW - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B (BLDG 174)
NSWC CRANE, INDIANA

Parameter	Average Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
EXPLOSIVES												
HMX	0.00E+00	3.20E-03	1.00E+00	0.00E+00	0.00E+00	7.21E-04	0.00E+00	7.21E-04	4.69E+00	1.17E+01	1.54E-04	6.15E-05
RDX	0.00E+00	9.90E-03	1.00E+00	0.00E+00	0.00E+00	2.23E-03	0.00E+00	2.23E-03	1.09E+01	5.47E+01	2.04E-04	4.08E-05
METALS												
Arsenic	4.97E+00	0.00E+00	2.24E-01	1.11E+00	6.31E-02	0.00E+00	1.09E-01	1.72E-01	1.97E-01	1.97E+00	8.73E-01	8.73E-02
Cadmium	1.30E-01	0.00E+00	7.71E+00	1.00E+00	1.65E-03	0.00E+00	9.79E-02	9.95E-02	1.58E+01	1.58E+02	6.31E-03	6.31E-04
Chromium	1.13E+01	6.00E-04	3.06E-01	3.46E+00	1.44E-01	1.35E-04	3.38E-01	4.81E-01	5.98E+01	2.39E+02	8.06E-03	2.01E-03
Lead	1.74E+01	0.00E+00	2.66E-01	4.63E+00	2.21E-01	0.00E+00	4.52E-01	6.73E-01	1.46E+02	1.46E+03	4.62E-03	4.62E-04
Mercury	4.00E-02	0.00E+00	1.69E+00	6.77E-02	5.08E-04	0.00E+00	6.62E-03	7.12E-03	7.81E-01	1.30E+00	9.12E-03	5.47E-03
Selenium	2.37E-01	0.00E+00	9.85E-01	2.33E-01	3.01E-03	0.00E+00	2.28E-02	2.58E-02	3.64E+00	6.01E+00	7.08E-03	4.29E-03

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.687E-02	kg
Food Ingestion Rate = (If)	1.648E-03	kg/day
Water Ingestion Rate = (Iw)	3.800E-03	L/day
Soil Ingestion Rate = (Is)	2.142E-04	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

MINK - CONSERVATIVE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - TURKEY CREEK SEDIMENT
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Parameter	Max Sediment Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (sed to inv.)[1]	Fish Concentration (mg/kg)	Dose (mg/kg/day) from: Sediment	Surface Water	Fish	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
Inorganics												
ARSENIC	1.05E+01	0.00E+00	6.90E-01	7.25E+00	3.53E-02	0.00E+00	7.39E-01	7.74E-01	2.18E-03	2.18E-02	3.55E+02	3.55E+01
CADMIUM	8.40E+00	0.00E+00	7.99E+00	6.71E+01	2.83E-02	0.00E+00	6.84E+00	6.87E+00	1.75E-01	1.75E+00	3.93E+01	3.93E+00
COPPER	2.45E+02	0.00E+00	5.25E+00	1.29E+03	8.24E-01	0.00E+00	1.31E+02	1.32E+02	6.75E+00	8.73E+00	1.95E+01	1.51E+01
NICKEL	3.17E+01	0.00E+00	2.32E+00	7.35E+01	1.07E-01	0.00E+00	7.50E+00	7.60E+00	8.07E+00	1.61E+01	9.42E-01	4.71E-01
SELENIUM	4.90E-01	0.00E+00	1.00E+00	4.90E-01	1.65E-03	0.00E+00	5.00E-02	5.16E-02	4.04E-02	6.66E-02	1.28E+00	7.75E-01
SILVER	7.80E-01	0.00E+00	1.00E+00	7.80E-01	2.62E-03	0.00E+00	7.95E-02	8.21E-02	3.13E-03	3.13E-02	2.62E+01	2.62E+00
ZINC	2.62E+02	0.00E+00	7.53E+00	1.97E+03	8.81E-01	0.00E+00	2.01E+02	2.02E+02	3.23E+01	6.46E+01	6.25E+00	3.13E+00

Cells are shaded if the EEQ is greater than 1.0.
1- The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

Body Weight = (BW) 5.500E-01 kg
Food Ingestion Rate = (If) 5.608E-02 kg/day
Water Ingestion Rate = (Iw 1.907E-01 L/day
Sediment Ingestion Rate = 1.850E-03 kg/day
Home Range = (HR) Assume 100% on site
Contaminated Area = (CA) Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant conc. in fish (=sediment concentration * Biotransfer Factor)

MINK - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION - TURKEY CREEK SEDIMENT
SWMU 13 - MINE FILL B
NSWC CRANE, INDIANA

Parameter	Avg Sediment Concentration (mg/kg)	Avg SW Concentration (mg/L)	Biotransfer Factor (sed to inv.)[1]	Fish Concentration (mg/kg)	Dose (mg/kg/day) from:			Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
					Sediment	Surface Water	Fish					
Inorganics												
ARSENIC	6.70E+00	0.00E+00	1.43E-01	9.58E-01	8.70E-03	0.00E+00	3.77E-02	4.64E-02	3.71E-03	3.71E-02	1.25E+01	1.25E+00
CADMIUM	2.90E+00	0.00E+00	6.00E-01	1.74E+00	3.77E-03	0.00E+00	6.85E-02	7.23E-02	2.97E-01	2.97E+00	2.43E-01	2.43E-02
COPPER	8.63E+01	0.00E+00	1.56E+00	1.34E+02	1.12E-01	0.00E+00	5.29E+00	5.40E+00	1.15E+01	1.48E+01	4.70E-01	3.64E-01
NICKEL	1.87E+01	0.00E+00	4.86E-01	9.09E+00	2.43E-02	0.00E+00	3.58E-01	3.82E-01	1.37E+01	2.75E+01	2.78E-02	1.39E-02
SELENIUM	2.60E-01	0.00E+00	1.00E+00	2.60E-01	3.38E-04	0.00E+00	1.02E-02	1.06E-02	6.86E-02	1.13E-01	1.54E-01	9.34E-02
SILVER	2.80E-01	0.00E+00	1.00E+00	2.80E-01	3.64E-04	0.00E+00	1.10E-02	1.14E-02	5.32E-03	5.32E-02	2.14E+00	2.14E-01
ZINC	1.07E+02	0.00E+00	1.94E+00	2.07E+02	1.39E-01	0.00E+00	8.15E+00	8.29E+00	5.49E+01	1.10E+02	1.51E-01	7.55E-02

Cells are shaded if the EEQ is greater than 1.0.
1- The sediment to invertebrate BAF was used for metals because no sediment to fish BAFs were available for metals.

Body Weight = (BW)	1.020E+00	kg
Food Ingestion Rate = (If)	4.015E-02	kg/day
Water Ingestion Rate = (I	8.050E-02	L/day
Sediment Ingestion Rate	1.325E-03	kg/day
Home Range = (HR)	3.484E+01	acres
Contaminated Area = (CA	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose (sediment) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (fish) = (Cf * If)(H)/BW
Total Dose = Dose (sediment) + Dose (surface water) + Dose (fish)

Definitions:
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Cf = Contaminant conc. in fish (=sediment concentration * Biotransfer Factor)

MEADOW VOLE - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B (BLDG 174)
NSWC CRANE, INDIANA

Parameter	Average Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to veg.)	Vegetation Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Vegetation	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
EXPLOSIVES												
HMX	0.00E+00	3.20E-03	1.70E+01	0.00E+00	0.00E+00	5.59E-04	0.00E+00	5.59E-04	2.30E+00	5.75E+00	2.43E-04	9.72E-05
RDX	0.00E+00	9.90E-03	4.60E-01	0.00E+00	0.00E+00	1.73E-03	0.00E+00	1.73E-03	5.37E+00	2.69E+01	3.22E-04	6.44E-05
METALS												
Arsenic	4.97E+00	0.00E+00	3.75E-02	1.86E-01	1.16E-02	0.00E+00	1.82E-02	2.98E-02	9.67E-02	9.67E-01	3.08E-01	3.08E-02
Cadmium	1.30E-01	0.00E+00	5.86E-01	7.62E-02	3.04E-04	0.00E+00	7.42E-03	7.73E-03	7.75E+00	7.75E+01	9.97E-04	9.97E-05
Chromium	1.13E+01	6.00E-04	4.10E-02	4.63E-01	2.64E-02	1.05E-04	4.52E-02	7.17E-02	2.94E+01	1.18E+02	2.44E-03	6.09E-04
Lead	1.74E+01	0.00E+00	3.89E-02	6.77E-01	4.07E-02	0.00E+00	6.60E-02	1.07E-01	7.16E+01	7.16E+02	1.49E-03	1.49E-04
Mercury	4.00E-02	0.00E+00	6.52E-01	2.61E-02	9.36E-05	0.00E+00	2.54E-03	2.64E-03	3.84E-01	6.39E-01	6.87E-03	4.12E-03
Selenium	2.37E-01	0.00E+00	6.72E-01	1.59E-01	5.54E-04	0.00E+00	1.55E-02	1.61E-02	1.79E+00	2.95E+00	8.98E-03	5.44E-03

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	3.663E-02	kg
Food Ingestion Rate = (If)	3.570E-03	kg/day
Water Ingestion Rate = (Iw	6.400E-03	L/day
Soil Ingestion Rate = (Is)	8.568E-05	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (vegetation) = (Cv * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (vegetation)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Cv = Contaminant conc. in vegetation (=soil conc. * Biotransfer Factor)

AMERICAN WOODCOCK - AVERAGE INPUTS
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B (BLDG 165)
NSWC CRANE, INDIANA

Parameter	Average Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL EEQ	LOAEL EEQ
EXPLOSIVES												
1,3,5-Trinitrobenzene	1.30E-01	0.00E+00	1.00E+00	1.30E-01	1.16E-03	0.00E+00	1.73E-02	1.85E-02	NV	NV	NA	NA
2,4,6-Trinitrotoluene	3.40E-01	0.00E+00	1.00E+00	3.40E-01	3.03E-03	0.00E+00	4.53E-02	4.84E-02	7.00E+00	1.78E+02	6.91E-03	2.72E-04
2-Amino-4,6-dinitrotoluene	4.99E+00	0.00E+00	1.00E+00	4.99E+00	4.44E-02	0.00E+00	6.65E-01	7.10E-01	NV	NV	NA	NA
2-Nitrotoluene	1.40E-01	0.00E+00	1.00E+00	1.40E-01	1.25E-03	0.00E+00	1.87E-02	1.99E-02	NV	NV	NA	NA
4-Amino-2,6-dinitrotoluene	2.50E-01	0.00E+00	1.00E+00	2.50E-01	2.23E-03	0.00E+00	3.33E-02	3.56E-02	NV	NV	NA	NA
HMX	1.11E+00	3.20E-03	1.00E+00	1.11E+00	9.89E-03	3.21E-04	1.48E-01	1.58E-01	NV	NV	NA	NA
RDX	5.40E-01	9.90E-03	1.00E+00	5.40E-01	4.81E-03	9.93E-04	7.20E-02	7.78E-02	2.23E+00	2.63E+00	3.49E-02	2.96E-02
METALS												
Arsenic	8.65E+00	0.00E+00	2.24E-01	1.94E+00	7.70E-02	0.00E+00	2.58E-01	3.35E-01	2.46E+00	7.38E+00	1.36E-01	4.54E-02
Cadmium	2.00E-01	0.00E+00	7.71E+00	1.54E+00	1.78E-03	0.00E+00	2.06E-01	2.07E-01	1.45E+00	2.00E+01	1.43E-01	1.04E-02
Chromium	1.89E+01	6.00E-04	3.06E-01	5.78E+00	1.68E-01	6.02E-05	7.71E-01	9.39E-01	1.00E+00	5.00E+00	9.39E-01	1.88E-01
Lead	2.03E+01	0.00E+00	2.66E-01	5.40E+00	1.81E-01	0.00E+00	7.20E-01	9.01E-01	1.13E+00	1.13E+01	7.97E-01	7.97E-02
Mercury	7.30E-02	0.00E+00	1.69E+00	1.24E-01	6.50E-04	0.00E+00	1.65E-02	1.71E-02	6.40E-03	6.40E-02	2.68E+00	2.68E-01
Selenium	8.71E-01	0.00E+00	9.85E-01	8.58E-01	7.76E-03	0.00E+00	1.14E-01	1.22E-01	4.00E-01	8.00E-01	3.05E-01	1.53E-01

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW)	1.895E-01	kg
Food Ingestion Rate = (If)	2.526E-02	kg/day
Water Ingestion Rate = (Iw)	1.900E-02	L/day
Soil Ingestion Rate = (Is)	1.688E-03	kg/day
Home Range = (HR)	Assume 100% on site	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available

AMERICAN WOODCOCK - AVERAGE INPUTS (20% AUF)
TERRESTRIAL WILDLIFE MODEL ECOLOGICAL EFFECTS QUOTIENT CALCULATION
SWMU 13 - MINE FILL B (BLDG 165)
NSWC CRANE, INDIANA

Parameter	Average Soil Concentration (mg/kg)	Max SW Concentration (mg/L)	Biotransfer Factor (soil to inv.)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day) from: Surface Soil	Surface Water	Inverts.	Total Dose (mg/kg/day)	Dose AUF = 20% (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	Adjusted NOAEL EEQ	Adjusted LOAEL EEQ
EXPLOSIVES													
1,3,5-Trinitrobenzene	1.30E-01	0.00E+00	1.00E+00	1.30E-01	1.16E-03	0.00E+00	1.73E-02	1.85E-02	3.70E-03	NV	NV	NA	NA
2,4,6-Trinitrotoluene	3.40E-01	0.00E+00	1.00E+00	3.40E-01	3.03E-03	0.00E+00	4.53E-02	4.84E-02	9.67E-03	7.00E+00	1.78E+02	1.38E-03	5.43E-05
2-Amino-4,6-dinitrotoluene	4.99E+00	0.00E+00	1.00E+00	4.99E+00	4.44E-02	0.00E+00	6.65E-01	7.10E-01	1.42E-01	NV	NV	NA	NA
2-Nitrotoluene	1.40E-01	0.00E+00	1.00E+00	1.40E-01	1.25E-03	0.00E+00	1.87E-02	1.99E-02	3.98E-03	NV	NV	NA	NA
4-Amino-2,6-dinitrotoluene	2.50E-01	0.00E+00	1.00E+00	2.50E-01	2.23E-03	0.00E+00	3.33E-02	3.56E-02	7.11E-03	NV	NV	NA	NA
HMX	1.11E+00	3.20E-03	1.00E+00	1.11E+00	9.89E-03	3.21E-04	1.48E-01	1.58E-01	3.16E-02	NV	NV	NA	NA
RDX	5.40E-01	9.90E-03	1.00E+00	5.40E-01	4.81E-03	9.93E-04	7.20E-02	7.78E-02	1.56E-02	2.23E+00	2.63E+00	6.98E-03	5.92E-03
METALS													
Arsenic	8.65E+00	0.00E+00	2.24E-01	1.94E+00	7.70E-02	0.00E+00	2.58E-01	3.35E-01	6.71E-02	2.46E+00	7.38E+00	2.73E-02	9.09E-03
Cadmium	2.00E-01	0.00E+00	7.71E+00	1.54E+00	1.78E-03	0.00E+00	2.06E-01	2.07E-01	4.15E-02	1.45E+00	2.00E+01	2.86E-02	2.07E-03
Chromium	1.89E+01	6.00E-04	3.06E-01	5.78E+00	1.68E-01	6.02E-05	7.71E-01	9.39E-01	1.88E-01	1.00E+00	5.00E+00	1.88E-01	3.76E-02
Lead	2.03E+01	0.00E+00	2.66E-01	5.40E+00	1.81E-01	0.00E+00	7.20E-01	9.01E-01	1.80E-01	1.13E+00	1.13E+01	1.59E-01	1.59E-02
Mercury	7.30E-02	0.00E+00	1.69E+00	1.24E-01	6.50E-04	0.00E+00	1.65E-02	1.71E-02	3.43E-03	6.40E-03	6.40E-02	5.35E-01	5.35E-02
Selenium	8.71E-01	0.00E+00	9.85E-01	8.58E-01	7.76E-03	0.00E+00	1.14E-01	1.22E-01	2.44E-02	4.00E-01	8.00E-01	6.11E-02	3.05E-02

Cells are shaded if the EEQ is greater than 1.0.

Body Weight = (BW) 1.895E-01 kg
Food Ingestion Rate = (If) 2.526E-02 kg/day
Water Ingestion Rate = (Iw) 1.900E-02 L/day
Soil Ingestion Rate = (Is) 1.688E-03 kg/day
Home Range = (HR) Assume 100% on site
Contaminated Area = (CA) Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose (surface soil) = (Cs * Is)(H)/BW
Dose (surface water) = (Cw * Iw)(H)/BW
Dose (invertebrates) = (Ci * If)(H)/BW
Total Dose = Dose (surface soil) + Dose (surface water) + Dose (invertebrates)

Definitions:
EEQ = Ecological Effects Quotient
NOAEL = No Observed Adverse Effects Level
LOAEL = Lowest Observed Adverse Effects Level
Cs = Contaminant concentration in soil
Cw = Contaminant concentration in water
Ci = Contaminant conc. in soil invertebrates (=soil conc. * Biotransfer Factor)
NA = Not Applicable or Not Available
NV = No Value Available